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Empowerment Model of Farmers Group Association (Gapoktan) as a Delivery Point for Subsidized Fertilizer In Several Large Areas Increase Planting (LTT), and Optimize Land (OPLAH) Indonesian Rice Fields

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Abstract
A series of research to detect the readiness of the Association of Farmer Groups (Gapoktan) as a delivery point for subsidized fertilizer in accordance with Presidential Regulation of the Republic of Indonesia Number 6 of 2025 has been carried out in several areas for the rice planting area (LTT) and land optimization (OPLAH) program. Specifically, this research aims to: 1) describe variables related to the role of Gapoktan as a handover point, 2) analyze the factors that influence Gapoktan's role as a handover point, and 3) formulate a strategy to increase Gapoktan's role as a handover point. The research applied a survey method to 240 GAPoktan member farmers in the LTT and OPLAH areas from 15 districts and five provinces, namely: West Java, Lampung, South Sumatra, Jambi and South Kalimantan. Determination of respondents is based on each district's quota. Data was collected using a questionnaire that had been tested for validity and reliability. Data analysis uses Samrt-PLS analysis. The research results show that Gapoktan's empowerment is influenced by environmental factors (X3) and needs factors (X4). Environmental factors are determined by community perception, availability of facilities and infrastructure, and support from parties, while need factors are determined by social needs, the need for achievement and the need to participate in development.

Keywords: Empowerment, Association of Farmer Groups, Subsidized Fertilizer, Increased Planting Area, Land Optimization

1. Introduction

Transformation towards a modern agricultural system requires readiness and involves various parties, both those directly involved as main actors and business actors or those supporting the agricultural sector, including farmer institutions such as; Farmers Group (Poktan), Association of Farmers Groups (Gapoktan). Farmer Economic Institutions (KEP) and others. The existence of farmer institutions is spread across all provinces and remote corners of the country. So far little is known about the institutional readiness of farmers to be directly involved in providing inputs from the government and still needs to be studied, especially the readiness of Gapoktan. According [1] there are still problems with Farmer Institutions, namely; (1) built only to strengthen horizontal ties, not vertical ties. The members of an institution consist of people with the same type of activity, (2) most institutions are formed more for the purpose of distributing aid and facilitating control tasks for program implementers, rather than to actually increase the social capital of the community, (3) apply a generalization pattern, so that the organizational structure built is relatively uniform. (4) The coaching carried out tends to be individual, namely only to administrators, (5) institutional development always uses structural channels, and is weak from developing cultural aspects, and (6) institutional development is believed to occur if material support is sufficient. Thus, the existence of institutions is generally believed to be based on the motive of obtaining assistance and facilities, resulting in a lack of independence, which can hinder the growth of a sense of organization for administrators in

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managing the organization and its members [2]. The existence of Gapoktan and Farmer Institutions in general are still not as developed as they should be so they need to be improved, as presented in Table 1.

Table 1. Number of Farmer Institutions by Class

No	District		Farmer Group Class			Percentage (%)	
		Jumlah	Pemula	Lanjut	Madya	Utama	Madya-Utama
1	Cirebon	2.517	803	898	171	22	7,66
2	Sukabumi	3.887	1.557	1.738	309	25	8,59
3	Cianjur	3.892	1.343	1.803	414	65	12,30
4	Garut	6.314	4.171	1.732	72	1	1,16
5	Tasikmalaya	3.663	1.578	1.555	219	11	8.46
6	Kuningan	2.546	1.343	954	61	3	2,51
7	Majalengka	3.049	1.766	1.072	160	4	2,10
8	Sumedang	3.128	1.479	1.485	58	1	1,89
9	Indramayu	2.845	855	1.406	244	6	8,79
10	Karawang	2.855	855	1.405	354	14	12,89

Source: Agricultural Resources and Farmer Institutions Statistics Book 2023 (adapted)

Based on the description above, the main problem of the research is the limited number of Gapoktans and the ability or readiness of Gapoktans to play a role in the development of modern agriculture, in particular their role as delivery points for subsidized fertilizers in accordance with the mandate of Presidential Regulation Number 6 of 2025 [3] concerning the management of subsidized fertilizers. So far there is not much information regarding Gapoktan's readiness to act as a distributor of subsidized fertilizer to other farmers, so an in-depth study is needed regarding how to empower Farmer Group Associations as a delivery point for subsidized fertilizer to achieve sustainable food self-sufficiency. Based on the description in question, this research specifically aims to: 1) describe the level of empowerment of Gapoktan in the LTT and OPLAH areas, 2) analyze the factors that influence the empowerment of Gapoktan in West Java in supporting modern agriculture, 3) find a model of Gapoktan empowerment in supporting sustainable food self-sufficiency agriculture.

2. Research Thinking Framework

The research framework is a picture or ideal model or hypothesis framework that is proven from the research results. The Thinking Framework is built based on theories and references that serve as references, so the thinking framework is also a hypothesis framework. Gapoktan's empowerment is the ability and readiness of Gapoktan in efforts to involve in the development of special areas to increase rice production towards sustainable food self-sufficiency, as in Figure 1

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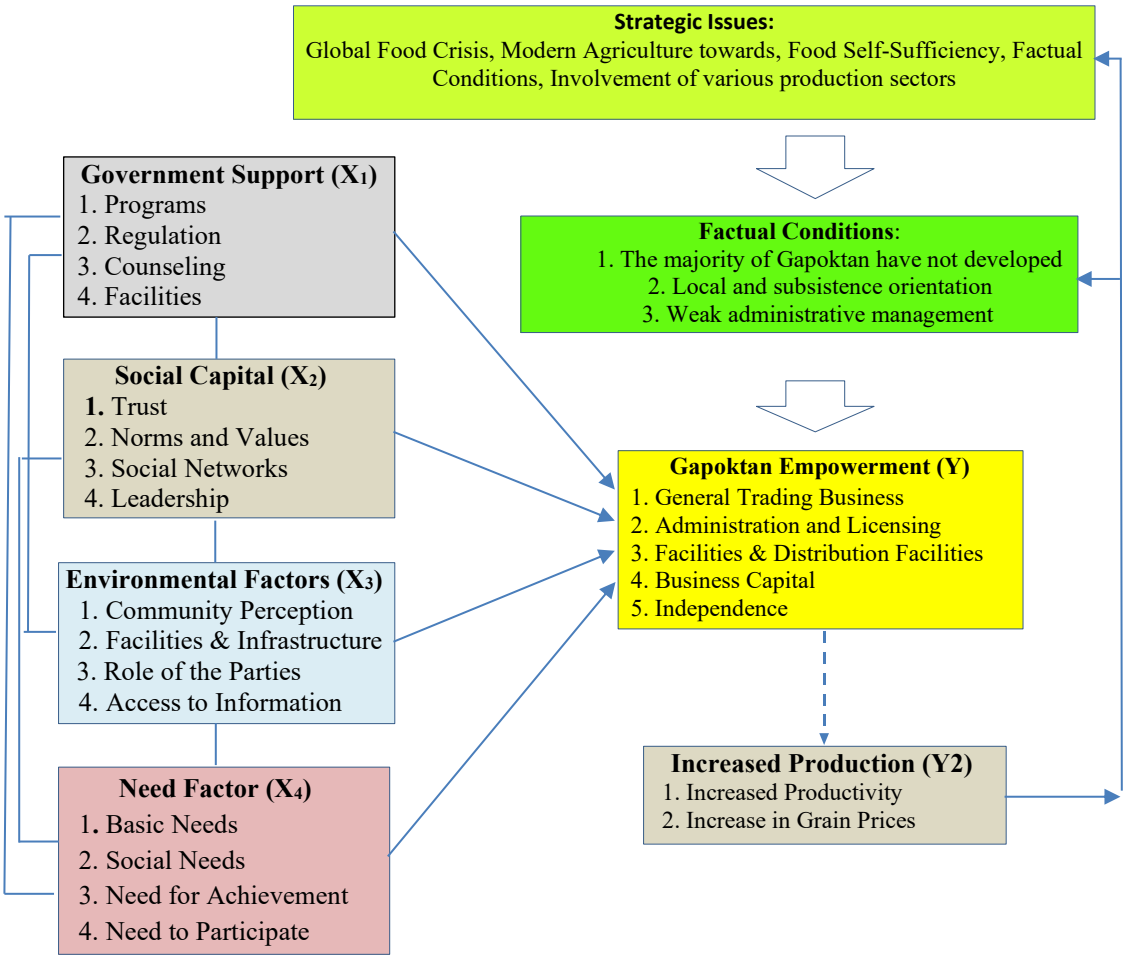

Figure 1. Thinking Framework for the Gapoktan Empowerment Model as a Fertilizer Delivery Point

The research hypothesis is as follows:

H0: Government Support (X_1), Social Capital (X_2), Environmental Factors (X_3), and Need Factors (X_4) are strongly suspected that together they have no real effect on Gapoktan Empowerment (Y).

H1: Government Support (X_1), Social Capital (X_2), Environmental Factors (X_3), and Need Factors (X_4) are strongly suspected to have a significant effect on Gapoktan Empowerment (Y).

3. Research methods

The research was carried out in five provinces that have or received a Land Optimization Program (OPLAH) which was determined with technical and affordability considerations, namely: (1) South Sumatra Province, (2) Jambi, (3) Lampung, (4) West Java, and (5) South Kalimantan. The research locus was chosen by the Association of Farmer Groups (GAPOKTAN) which is active and represents areas that have received the OPLAH program in each province and district. Some of the selected districts are: Banyu Asin, Muara Enim, and Ogan Ilir (South Sumatra), Mesuji, Central Lampung, and East Lampung (Lampung), Muaro Jambi and West Tanjung Jabung (Jambi), Karawang, Subang, Indramayu, Bogor, and Sumedang (West Java), Banjar and Karau (South Kalimantan). The research is planned for six months (May - October 2025) as detailed in the attached schedule. The basic method used in this research is a combination of quantitative research supported by qualitative data through surveys. Next, data collection was carried out through direct observation and interviews with farmers managing Gapoktan, using closed questionnaires whose validity and reliability had been tested..

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Survey research focuses on relational research, namely studying the relationship between variables, so that directly or indirectly the research hypothesis is questioned (Singarimbun, and Sofian Effendi, 1995). The variables used in the research are independent variables, namely: Government Support (X_1), Social Capital (X_2), Environmental Factors (X_3), and Need Factors (X_4). Meanwhile the dependent variable is; Gapoktan Empowerment (Y_1) and Rice Production (Y_2). The research population was farmer members of Gapoktan in the area of added planting area (LTT) and OPLAH programs in 15 (fifteen) selected districts. In each district, 10 - 20 Gapoktan members were selected based on the number of active members, so that 150 - 280 respondents were obtained. The total number of respondents was 240 people. The data that has been collected in this assessment will then be analyzed to describe the level of success of the pumping program and the factors that influence it so that from these results strategies can be formulated to increase the success of the pumping program. The data analysis techniques used in this research are descriptive analysis techniques and path analysis using Smart-PLS.

4. Results

4.1. Performance of Research Respondents

As explained in the research method, research respondents are farmers who are members of Gapoktan who are in the LTT and OPLAH Program areas and spread across five provinces; West Java, South Sumatra, Lampung, Jambi and South Kalimantan total 240 farmers. A description of the condition of the respondent farmers when the research was conducted is presented in Table 2.

Tabel 2. Keragaan responden penelitian model pemberdayaan Gapoktan

Indicator	Category	Number of people	Percentage (%)
Gender	Man	226	94,17
	Woman	14	5,83
	Amount	240	100
Age	19 – 24 year	11	4,58
	25 - 29 year	6	2,50
	30 - 35 tyear	10	4,17
	>35 year	213	88,75
	Amount	240	100
Long time to join in Gapoktan	< 3 year	53	22,08
	3 – 5 tyear	54	22,50
	6 – 10 year	45	18,75
	> 10 year	88	36,67
	Amount	240	100
Land area	≤ 370 Ha	125	52,08
	371 - 740 Ha	61	25,42
	741 - 1.110 Ha	31	12,91
	>1.110 Ha	23	9,58
	Amount	240	100
Distance to District City (1 – 200 Km)	≤ 2 Km	45	18.75
	3 – 6 Km	15	6.25
	7 – 10 Km	11	4.58
	≥ 11 Km	169	76.42
	Amount	240	100
Distance to Subdistrict City (1 – 80 Km)	≤ 23 Km	52	21.67
	24 – 39 Km	63	26.25
	40 - 57 Km	61	25.42
	≥ 57 Km	58	24.16
	Amount	240	100

4.2. Deskripsi Variabel Penelitian

Variable description is an explanation of the variables taken in the assessment. The variables taken in the research on the combined empowerment model of farmer groups in supporting modern agriculture are government support, social capital, environmental factors, need factors, farmer empowerment, and increased rice productivity.

4.2.1. Government Support

Government support is an encouragement to increase farmer empowerment. The aspect of government support for empowering farmer groups in supporting modern agriculture includes program support, regulatory support, extension activities and facility support. Research data is grouped into three categories, namely low, medium and high, resulting from observations of 240 farmer respondents which are presented in Table 3.

Table 3 Descriptive analysis of government support variables

Government Support (X_1)					
No	Indicator	Percentage (%)			Amount
		Low	Medium	High	
1	Program Support	12,71	63,56	23,73	100
2	Regulatory Support	19,07	59,75	21,19	100
3	Extension Activities	9,32	61,02	29,66	100
4	Facility Support	23,73	58,05	18,22	100
	Average	16,21	**60,59**	23,20	100

Table 3 shows that the majority of farmers, 63.56 percent, assessed program support as being in the medium category, then in the aspect of regulatory support, 59.75 percent assessed it as being in the medium category, then 61.02 percent of farmers assessed extension activities in the medium category, and in the aspect of facility support, 58.05 percent assessed it as being in the medium category. Therefore, farmers assess that government support for empowering combined farmer groups in supporting modern agriculture is 60.59 percent in the medium category, which means it is supportive but not yet optimal.

4.2.2. Social Capital

Social capital is one aspect that can support farmer empowerment in increasing rice productivity. The social capital aspect of empowering farmer groups in supporting modern agriculture includes faith and belief, norms and values, social networks and cooperation, and leadership. Research data is grouped into three categories, namely low, medium and high, resulting from observations of 240 farmer respondents which are presented in Table 4.

Table 4 Descriptive analysis of social capital variables

Social Capital (X_2)					
No	Indicator	Percentase (%)			Amount
		Low	Medium	High	
1	Confidence and Trust	16,95	60,59	22,46	100
2	Norms and Values	6,78	61,86	31,36	100
3	Social Networks and Collaboration	12,71	61,86	25,42	100
4	Leadership	12,29	64,83	22,88	100
	Average	12,18	**61,54**	25,53	100

Table 4 shows that the majority of farmers rate confidence and trust at 60.59 percent in the medium category, then in the aspects of norms and values at 61.86 percent in the medium category, then in social networks and cooperation 61.86 percent are in the medium category, and in the leadership aspect 64.83 percent are in the medium category. Therefore, farmers assess that social capital in empowering combined farmer groups in supporting modern agriculture is 62.29 percent in the medium category, which means that this social capital has built capital in the empowerment of farmers in supporting modern agriculture.

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4.2.3. Environmental Factors

The environment is one of the factors that supports farmers' empowerment in increasing rice productivity. Environmental factors in empowering farmer groups to support modern agriculture include community perception, availability of facilities and infrastructure, the role of the parties, and access to information. Research data is grouped into three categories, namely low, sedang, dan tinggi yang dihasilkan dari observasi terhadap 240 responden petani yang disajikan pada Tabel 5.

Table 5. Descriptive analysis of environmental factor variables

Environmental Factors (X_3)					
No	Indicator	Percentage (%)			Amount
		Low	Medium	High	
1	Public Perception	3,81	56,78	39,41	100
2	Availability of Infrastructure	7,63	63,98	28,39	100
3	Role of stake holders	15,68	62,29	22,03	100
4	Information Access	8,05	64,83	27,12	100
	Average	8,79	**61,97**	29,24	100

Table 5 shows that the majority of farmers assess that community perception is 56.78 percent in the medium category, then in the aspect of availability of infrastructure, 63.98 percent is in the medium category, then the role of parties in farmer empowerment is 62.29 percent in the medium category, and regarding access to information, 64.83 percent is in the medium category. Therefore, the environmental factor in empowering combined farmer groups in supporting modern agriculture is 61.97 percent in the medium category.

4.2.4. Need Factor

The need factor is one of the capital for farmers to be empowered. The need factors for empowering farmer groups to support modern agriculture include basic needs, social needs, achievement needs and participation needs. Research data is grouped into three categories, namely low, medium and high, resulting from observations of 240 farmer respondents which are presented in Table 6.

Table 6. Descriptive analysis of need factor variables

Need Factor (X_4)					
No	Indicator	Percentage (%)			Amount
		Low	Medium	High	
1	Basic Physiological Needs	4,24	57,20	38,56	100
2	Social Needs	7,63	69,49	22,88	100
3	Need for Achievement	27,97	54,66	17,37	100
4	Need to Participate	14,41	66,53	19,07	100
	Average	13,56	**61,97**	24,47	100

Table 6 shows that the majority of farmers assess that basic needs are 57.20 percent in the medium category, then in the aspect of social needs 69.49 percent are in the medium category, then in the need for achievement 54.66 percent are in the medium category, and in the aspect of participation needs 66.52 percent are in the medium category. Therefore, the need factor for empowering combined farmer groups to support modern agriculture is 61.97 percent in the medium category.

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4.2.5. Farmer Empowerment

Farmer empowerment is one aspect of empowering farmer groups to support modern agriculture. Farmer empowerment includes trading business capabilities, administration and licensing management, facilities and infrastructure, business capital capabilities, as well as GAPoktan independence. Research data is grouped into three categories, namely low, medium and high, resulting from observations of 240 farmer respondents which are presented in Table 7

Table 7. Descriptive analysis of Gapoktan empowerment variables

Farmer Empowerment (Y_1)					
No	Indicator	Percentage (%)			Amount
		Low	Medium	High	
1	Trading Business Capabilities	16,95	59,75	23,31	100
2	Administration and Licensing Management	13,98	65,25	20,76	100
3	Facilities and Infrastructure	34,32	50,00	15,68	100
4	Business Capital Capability	33,90	53,39	12,71	100
5	Gapoktan independence	21,61	58,05	20,34	100
Average		24,15	**57,29**	18,56	100

Table 7 shows that the majority of farmers assess their empowerment in trading business capabilities at 57.29 percent in the medium category, then in administration and licensing management at 65.25 percent, in the facilities and infrastructure aspect at 50 percent, then business capital capabilities at 53.39 percent, as well as in the joint independence aspect of farmer groups (Gapoktan) at 58.05 percent. Therefore, farmers rate themselves in empowering combined farmer groups in supporting modern agriculture at 57.29 percent in the medium category, which means they are empowered.

4.2.6. Increasing Rice Production

Increased rice production can be generated due to farmer empowerment. The increase in rice production results from the empowerment of combined farmer groups to support modern agriculture, including increasing rice productivity and increasing grain prices. Research data is grouped into three categories, namely low, medium and high, resulting from observations of 240 farmer respondents which are presented in Table 8.

Table 8. Descriptive analysis of variables increasing rice production

Increasing Rice Productivity (Y_2)					
No	Indicator	Percentage (%)			Amount
		Low	Medium	High	
1	Increasing Rice Productivity	37,29	47,03	15,68	100
2	Increase in Grain Prices	36,86	47,88	15,25	100
Average		37,08	**47,46**	15,47	100

Table 8 shows that the majority of farmers assess that the increase in rice productivity of 47.03 percent is in the medium category and the increase in grain prices of 47.88 percent is in the medium category. Therefore, farmers assess that the increase in rice production as a result of empowering combined farmer groups in supporting modern agriculture is 47.46 percent in the medium category, which means there has been an increase.

4.3. Factor Analysis Results

Factor analysis was carried out through 3 analyzes which included analysis of the measurement model (outer model), structural model (inner model), and evaluation of model quality. This factor analysis

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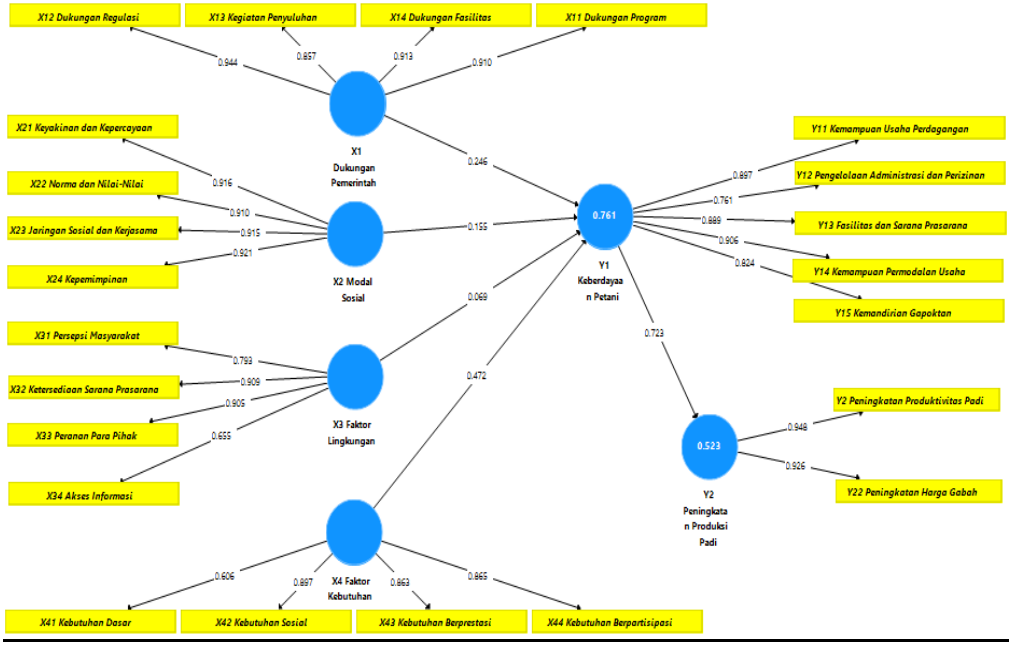
uses the help of SmartPLS 3 software to find out the results of the analysis of the selected latent variables.

4.3.1. Measurement Analysis (*Outer Model*)

The model used in testing the relationship between exogenous latent variables and endogenous latent variables uses a reflective measurement model. In the reflective measurement model, latent variables will represent the selected indicators. The variables government support, social capital, environmental factors, needs factors, farmer empowerment, and increased rice production are measured reflectively.



Gambar 2. Model SEM-PLS

Yamin [4] states that the evaluation of the reflective measurement model consists of a loading factor that must be ≥ 0.70; composite reliability ≥ 0.70; and average variance extracted (AVE) value ≥ 0.50. The results of the outer loading analysis are presented in Table 9

Table 9. Outer loading results

Indicator	Variable	*Outer Loading*	Information
Program Support	Government Support	0,910	Valid
Regulatory Support		0,944	Valid
Extension Activities		0,857	Valid
Facility Supporf		0,913	Valid
Confidence and Trust	Social Capital	0,916	Valid
Norms and Values		0,910	Valid
Social Networks and Collaboration		0,915	Valid
Leadership		0,921	Valid
Public Perception	Environmental Factors	0,793	Valid
Availability of Infrastructure		0,909	Valid
Role of stake holders		0,905	Valid
Information Access		0,655	Invalid
Basic Physiological Needs	Need Factor	0,606	Invalid
Social Needs		0,897	Valid
Need for Achievement		0,863	Valid

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Indicator	Variable	*Outer Loading*	Information
Need to Participate		0,865	Valid
Trading Business Capabilities	Farmer Empowerment	0,897	Valid
Administration and Licensing Management		0,761	Valid
Facilities and Infrastructure		0,889	Valid
Business Capital Capability		0,906	Valid
Gapoktan independence		0,824	Valid
Increasing Rice Productivity	Increasing Rice Productivity	0,948	Valid
Increase in Grain Prices		0,926	Valid

Based on Table 9, there are 2 invalid measurement items, namely the indicators of access to information and basic needs. This is said to be invalid because it has an outer loading value below 0.70 [4]. Invalid indicators are removed in the model to produce a new model and re-estimated so that the SE PLS model in the new study is presented in Figure 3.

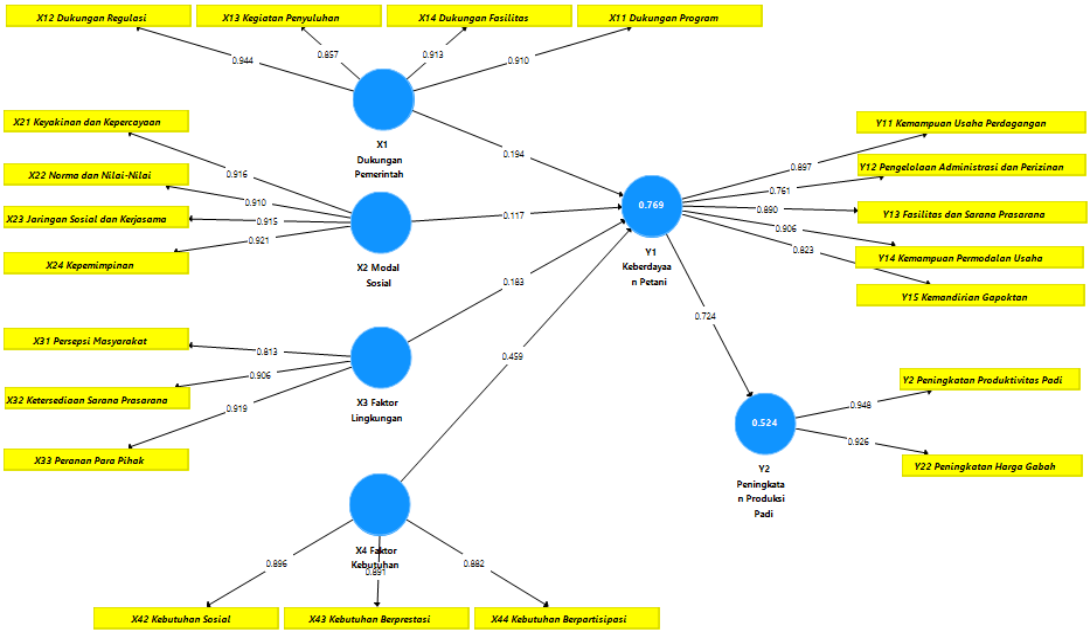

Figure 3. SEM-PLS model after estimation

Based on the re-estimation results, the results of outer loading, composite reliability, and average variance extracted (AVE) are presented in Table 9.

Tabel 10. *Outer loadings, composite reliability, average variance extracted (AVE)*

Variable	Indicator	*Outer Loading*	*Cronbach's Alpha*	*Composite Reliability*	AVE
Government Support	Program Support	0,910	0,927	0,948	0,821
	Regulatory Support	0,944			
	Extension Activities	0,857			
	Facility Support	0,913			
Social Capital	Confidence and Trust	0,916	0,936	0,954	0,838
	Norms and Values	0,910			
	Social Networks and Collaboration	0,915			
	Leadership	0,921			
Environment Factors	Public Perception	0,813	0,855	0,912	0,775
	Availability of Infrastructure	0,906			
	Role of stake holders	0,919			

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Variable	Indicator	*Outer Loading*	*Cronbach's Alpha*	*Composite Reliability*	AVE
Need Factors	Basic Physiological Needs	0,896	0,868	0,919	0,792
	Social Needs	0,891			
	Need for Achievement				
	Need to Participate	0,882			
Farmer Empowerment	Trading Business Capabilities	0,897	0,909	0,932	0,735
	Administration and Licensing Management	0,761			
	Facilities and Infrastructure	0,890			
	Business Capital Capability	0,906			
	Gapoktan independence	0,823			
Increasing Rice Productivity	Increasing Rice Productivity	0,948	0,863	0,935	0,878
	Increase in Grain Prices	0,926			

Based on Table 10, the four exogenous latent variables and two exogenous variables measured by each indicator are valid with outer loading values ranging from 0.761 - 0.948, which shows that the measurement items are strongly correlated in explaining each variable measured. The level of reliability for each variable is acceptable with a composite reliability value ≥ 0.60; Cronbach's alpha above 0.70; and convergent validity which is aimed at using an AVE value ≥ 0.50.

4.3.2. Structural Model (*Inner Model*)

Structural model evaluation is related to hypothesis testing to determine the relationship between exogenous latent variables and endogenous latent variables. Evaluation of the structural model is carried out in two stages, namely:

4.3.2.1. Uji Multikolineritas

The multicollinearity test is used to check the absence of multicollinearity between variables with the inner VIF (Variance Inflated Factor) value must be below 5 which does not indicate the absence of multicollinearity between variables [4]. Table 11 is the VIF value in the multicollinearity test.

Table 11. VIF value in the multicollinearity test

Indicator	VIF
Program Support	3,502
Regulatory Support	4,920
Extension Activities	2,573
Facility Support	3,475
Confidence and Trust	3,777
Norms and Values	3,669
Social Networks and Collaboration	3,553
Public Perception	3,911
Availability of Infrastructure	1,712
Role of stake holders	2,779
Role of stake holders	2,655
Social Need	2,406
Need for Achievement	2,201
Need to Participate	2,247
Trading Business Capabilities	3,434
Administration and Licensing Management	2,127
Facilities and Infrastructure	3,587
Business Capital Capability	4,386
Gapoktan independence	2,514
Increasing Rice Productivity	2,355
Increase in Grain Prices	2,355

The estimation results show that the VIF value is less than 5, which means that the level of multicollinearity between variables is low, which can strengthen the unbiased parameter estimation results in SEM-PLS..

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4.3.2.2. Hypothesis Testing

Hypothesis testing is carried out to determine the relationship between the selected exogenous latent variables and endogenous latent variables. Hypothesis testing is seen from the results of the t-statistic value or p-value. If the exogenous latent variable has a significant effect when the t-statistic value is > 1.96 and the p-value is < 0.05 with a confidence interval value of 95 percent. Hypothesis testing is also seen from the f-square value to see the influence of direct variables at the structural level with the criteria for an f-square value of 0.02 (low); 0.15 (moderate); and 0.35 (high) as well as in hypothesis testing indirectly or through moderation of the influence value seen from upsilon (v) with a criterion of 0.01 (low mediation value); 0.075 (moderate mediation value); and 0.175 (high mediation value) [4]. In the model of farmers assessing themselves in empowering combined farmer groups in supporting modern agriculture, there are 2 hypothesis testing analyzes namely, direct hypothesis testing and indirect hypothesis testing (through moderating variables). The results of the hypothesis test are presented in Figure 4

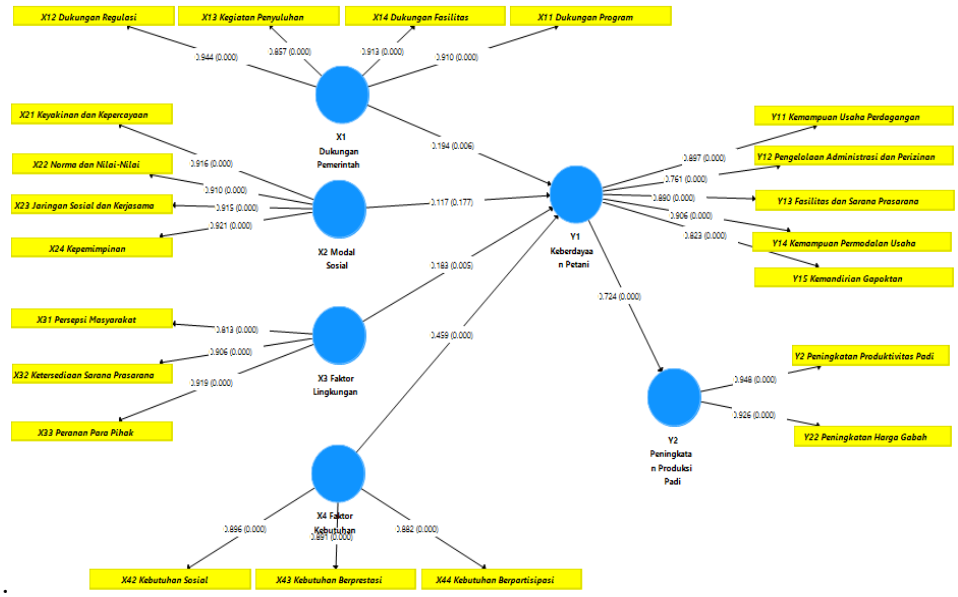

Figure 4. Hypothesis test results

4.3.2.2.1. Test Hypotheses Directly

In direct hypothesis testing, the values seen are the path coefficient, t-statistic, f-square, and p-value. The results of the direct hypothesis testing analysis are presented in Table 12.

Table 12. Direct hypothesis test

Hypothesis	Hypothesis Statement	*Path Coefficient*	*Statistic*	*Value*	*Square*
11	Government Support → Empowerment	0,194	2,739	),006	0,048
12	Social Capital → Empowerment	**0,116**	**1,353**	**),177**	**0,011**
13	Environmental Factors → Empowerment	0,185	2,848	),005	0,038
14	Needs Facts → Empowerment	0,456	7,245	),000	0,285
15	Empowerment → Increased Production	0,722	22,619	),000	1,099

Based on Table 12, the results of direct hypothesis testing can be explained as follows.

1) The Government Support Hypothesis → Gapoktan empowerment ($H_{1.1}$) is accepted, because there is a significant influence between government support and gapoktan empowerment with a path coefficient value of 0.194; t-statistic 2.739 > 1.95; and p-value 0.006 < 0.05. Government support has an influence of 0.194 on increasing the empowerment of GAPoktan. Government support has an f-square value of 0.048 which has a high influence.

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2) The Social Capital → Farmer Empowerment Hypothesis ($H_{1.2}$) is rejected, because there is no significant influence between social capital and farmer empowerment with a path coefficient value of 0.116; t-statistic 1.353 < 1.95; and p-value 0.177 > 0.05..
3) The Environmental Factor Hypothesis → Gapoktan Empowerment ($H_{1.2}$) is accepted, because there is a significant influence between environmental factors and farmer empowerment with a path coefficient value of 0.185; t-statistic 2.848 > 1.95; and p-value 0.005 < 0.05. Environmental factors have an influence of 0.185 on increasing farmer empowerment. Environmental factors have an f-square value of 0.038 which has a high influence.
4) The Hypothesis of Need Factors → Empowerment of Gapoktan ($H_{1.4}$) is accepted, because there is a significant influence between need factors and farmer empowerment with a path coefficient value of 0.456; t-statistic 7.245 > 1.95; and p-value 0.000 < 0.05. The needs factor has an influence of 0.456 on increasing farmer empowerment. The needs factor has an f-square value of 0.285 which has a high influence.
5) Gapoktan Empowerment Hypothesis → Increased Rice Production ($H_{1.5}$) is accepted, because there is: (a) significant influence between farmer empowerment and increased rice production with a path
coefficient value of 0.722; t-statistic 22.619 > 1.95; and p-value 0.000 < 0.05. Farmer empowerment has an influence of 0.722 on increasing rice production. Farmer empowerment has an f-square value of 1.099 which has a high influence, (b) Indirect Hypothesis Testing, In indirect hypothesis testing (through moderation), the values seen are path coefficient, t-statistic, p-value, and upsilon (v). Based on the results of the hypothesis test, the following values were obtained.

Table 13 Indirect hypothesis testing

Hipootesis	Pernyataan Hipotesis	*Path Coefficient*	*T-Statistic*	*P-Value*	Upsilon (v)
2.1	Government Support → Empowerment → Increased Production	0,142	2,702	0,007	0,053
2.2	Social Capital → Empowerment → Increased Production	**0,084**	**1,341**	**0,180**	**0,012**
2.3	Environmental Factors → Empowerment → Increased Production	0,133	2,895	0,004	0,042
2.4	Needs Factor → Empowerment → Increased Production	0,330	6,856	0,000	0,313

Based on Table 13, the results of indirect hypothesis testing (through moderation) can be explained as follows.

1) The hypothesis of government support → Gapoktan empowerment → Increased rice production ($H_{2.1}$) is ***accepted***, because there is a significant influence between government support on increasing rice production through farmer empowerment with a path coefficient value of 0.142; t-statistic 2.702 > 1.96; and p-value 0.007 < 0.05. Government support will have an influence of 0.142 on increasing rice production through farmer empowerment. Government support has an upsilon (v) value of 0.053, which means a low mediation value approaching moderate.
2) The Social Capital Hypothesis → Gapoktan Empowerment → Increased Rice Production ($H_{2.1}$) is ***rejected***, because there is no significant influence between social capital on increasing production through farmer empowerment with a path coefficient value of 0.084; T-Statistic 1.341 < 1.96; and p-value 0.180 > 0.05.
3) The hypothesis of Environmental Factors → Gapoktan Empowerment → Increased Rice Production ($H_{2.3}$) is ***accepted***, because there is a significant influence between environmental factors on increasing rice production through farmer empowerment with a path coefficient value

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of 0.133; t-statistic 2.895 > 1.96; and p-value 0.004 < 0.05. Environmental factors will have an influence of 0.133 on increasing rice production through farmer empowerment. Environmental factors have an upsilon (v) value of 0.042, which means a low mediation value approaching moderate.

4) The Hypothesis of Need Factors → Gapoktan Empowerment → Increased Rice Production ($H_{2.1}$) is ***accepted***, because there is a significant influence between need factors on increasing rice production through farmer empowerment with a path coefficient value of 0.330; t-statistic 6.856 > 1.96; and p-value 0.000 < 0.05. The needs factor will have an influence of 0.330 on increasing rice production through farmer empowerment. The needs factor has an upsilon (v) value of 0.313 which means a high mediation value.

4.3.3. Model Quality Evaluation

Evaluation of the quality of models analyzed using SEM-PLS aims to test model theory which focuses on predictions. There are three model quality evaluations in SEM-PLS according to [4], namely R-Square, Q-Square, and SRMR.

4.3.3.1. *R-Square*

R-Sqaure is used to describe how much endogenous latent variables can be explained by exogenous latent variables. [4] says in his book that the R-Square interpretation is 0.75 (high); 0.50 (moderate); and 0.25 (weak). Table 14 is the R-Sqaure value in the research.

Tabel 14. Nilai *R-Square*

	R-Square	***R-Square Adjusted***
Farmer Empowerment	0,769	0,765
Increasing Rice Production	0,524	0,521

Based on Table 14, the R-Square value for the farmer empowerment variable is 0.769 or 76.9 percent in the high category and for the variable increasing rice production it is 0.524 or 52.4 percent in the moderate category. This value means that the contribution of the selected variables represents 76.9 percent and 52.4 percent of the research results, while the other 23.1 percent and 47.6 percent are outside the research focus.

4.3.3.2. *Q-Square*

Q-Square is used to describe a measure of prediction accuracy which measures how well each change in an exogenous latent variable or endogenous latent variable is able to predict an endogenous latent variable. [4] wrote in his book that the Q-Sqaure value is 0 (low); 0.25 (moderate); and 0.50 (high) in predictive accuracy. Table 15 presents the research Q-Sqaure values.

Tabel 15 Nilai *Q-Square*

	Q-Square
Farmer Empowerment	0,769
Increasing Rice Production	0,524

Based on Table 15, the Q-Square value for farmer empowerment is 0.769 and the increase in rice production is 0.524 and each has a value of more than 0.50 with a high prediction accuracy value. Therefore, it indicates that the SEM-PLS model used in the research is able to explain the diversity of data well.

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4.3.3.3. SRMR

SRMR or standardized root mean square residual is a measure of model fit or model suitability between the data correlation matrix and the model estimate. Yamin [4] said that if the SRMR value is ≤ 0.08 then the model is fit. Based on the research results, the saturated value of the SRMR model in the research was 0.069 ≤ 0.08. Therefore, the model used in the research has an adequate level of suitability and is suitable for use in the process of interpreting and analyzing the relationship between variables in the SEM-PLS model being built.

5. Discussion

Based on the results of both direct (Table 12) and indirect (Table 13) hypothesis tests, it was found that Government Support (X_1) had a direct effect on Gapoktan Empowerment (Y_1), and indirectly also had an effect on increasing production (Y_2). Likewise, environmental factors (X_3) have a direct effect on the empowerment of Gapoktan (Y_1) and have an indirect effect on increasing production (Y_2). The Needs Factor (X_4) also has a direct effect on Gapoktan Empowerment (Y_1) and has an indirect effect on Increasing Production. The test results can be presented as in Figure 5.

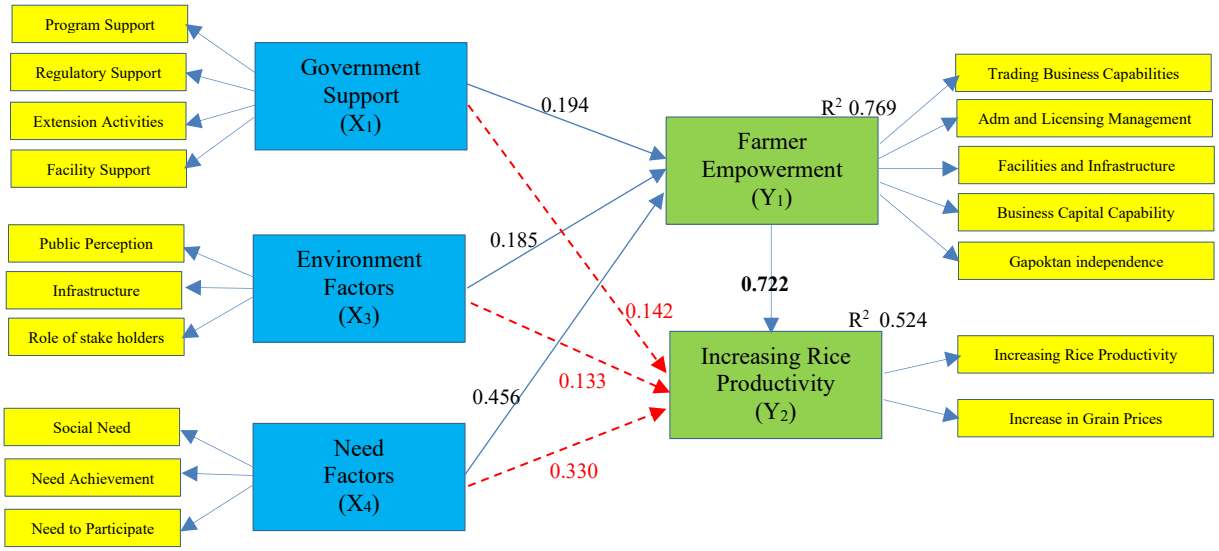

Figure 5. Factors that influence the empowerment of Gapoktan

5.1. The Effect of Government Support on the Empowerment of Gapoktan

Figure 5 shows that government support (X_1) has a direct effect on Gapoktan's empowerment (Y_1), with an influence coefficient of 0.194, meaning that every increase in government support will increase Gapoktan's empowerment. Government support is represented by the existence of programs, regulations that favor the development of Gapoktan, the existence of outreach activities, and the availability of supporting facilities. Government support also has an indirect effect on increasing rice production, which means that programs, regulations that favor the development of Gapoktan, the existence of extension activities, and the availability of supporting facilities indirectly contribute to increasing rice production (Y_2).

Government support in the form of the availability of programs that support the development of gapoktan has an effect on empowerment, this result is in accordance with the research results of [5], who concluded that the existence of policy and regulatory support influences the empowerment of women farmer groups (KWT) in utilizing their home gardens. Likewise, the results of research by [6] concluded that the empowerment of KWT is influenced by government support in the form of availability of facilities and infrastructure and ease of access

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to information. Meanwhile, the results of research by [7] concluded that government support in the form of availability of infrastructure and sources of information influences the adoption of innovation.

Meanwhile, according to Sugiri, L [8]. in an article published by Neliti.com stated that there are three factors supporting community empowerment, namely; there is community participation, level of education, and support from the local bureaucracy. There are at least 4 (four) factors that hinder the community empowerment process, namely: (1) structural problems, (2) geographical isolation of society, (3) negative norms, and (4) perceptions formed in society. Meanwhile, according to [9]. the role of regional government in increasing empowerment (strengths from community weaknesses), or preparing the community in the form of resources, opportunities, knowledge and expertise to increase the capacity of the community itself in determining their future, as well as being able to participate and influence the lives of the people in the region itself. The government's role in community empowerment is: 1) Government as Regulator, 2) Government as Dynamisator, 3) Government as Facilitator [10]

5.2. The Influence of Environmental Factors on the Empowerment of Gapoktan

Figure 5 shows that environmental factors (X_3) have a direct effect on Gapoktan's empowerment (Y_1), with an influence coefficient of 0.185, meaning that every increase in environmental factors will increase Gapoktan's empowerment. Environmental factors are represented by community perception, infrastructure, and the role of related agencies. Environmental factors also have an indirect influence on increasing rice production, which means that community perception, availability of facilities and infrastructure, as well as support from related agencies indirectly contribute to increasing rice production (Y_2).

Community perception plays a role in empowerment, this result is in line with the research results of [11] which concluded that community perception has an influence on increasing farmer participation in the use of superior seeds. Likewise, capital infrastructure contributes to empowerment; This result is in line with several studies such as: [12] who concluded that the availability of infrastructure has an influence on farmers' participation in applying balanced fertilizer, [13] in their research concluded that the availability of infrastructure has a significant effect on the interest of rural youth in implementing jajar legowo plant technology. These results are also in accordance with the findings of [14] who found that infrastructure has an influence on farmers' tendencies to apply cross technology to lowland rice crops. Furthermore, it was also mentioned by [15] who concluded that the availability of infrastructure had a real influence on the use of sex pheromones in controlling the pest *Spodoptera exigua*. Meanwhile [16] stated that the availability of infrastructure has an influence in encouraging students' interest in entrepreneurship in the agricultural sector.

Environmental factors in the form of the role of community leaders have a real influence on the gapoktan empowerment model; This result is in line with [17] who concluded that the support of local community leaders influences the empowerment of young farmers in red chili farming. Likewise, the research results of [18] who concluded that environmental factors in the form of parental support have a real influence on millennial farmers' interest in continuing their family business in agriculture.

5.3. The Influence of Need Factors on the Empowerment of Gapoktan

Figure 5 shows that the Need Factor (X_4) has a direct effect on Gapoktan Empowerment (Y_1), with an influence coefficient of 0.456, meaning that every increase in the need factor will increase. The need factor in question is represented by the existence of social needs, the need to want to succeed and excel in business as well as the need to participate. The need factor also has an indirect effect on increasing rice production, which means that programs, social needs, the need to succeed and excel in business as well as the need to participate indirectly contribute to increasing rice production (Y_2).

The results of this research show that the needs factor has a significant influence on the empowerment of gapoktan, this is in line with the needs theory put forward by [19]. The need factor is represented by social needs, the need for success, and the need for achievement. These results are in accordance with Maslow who stated that the relationship between empowerment and needs theory lies in empowerment as a process of fulfilling human needs as a whole, as is known, human needs are obtained in stages starting from basic physiological needs as a requirement to higher needs, namely security, social needs, esteem and self-

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actualization. Social needs are a sense of affection and a sense of belonging, thus it can be interpreted that in achieving empowerment a sense of belonging is needed so that one is emotionally connected to increase empowerment. These results are in line with Prawirasworo, who stated that increasing awareness and willingness to participate in community empowerment programs is a necessity for organizational development. In line with this, [17] stated that youth empowerment is influenced by the needs and support of the family and the need to collaborate with various parties. This is also in line with [7] who concluded that success in farming determines capacity in the empowerment process.

5.4. The Effect of Gapoktan Empowerment on Increasing Rice Production

Figure 5 shows that Gapoktan Empowerment (Y_1) has a direct effect on Gapoktan Empowerment (Y_2), with an influence coefficient of 0.722, meaning that every increase in Gapoktan empowerment will increase rice production. Gapoktan's empowerment is represented by trading business capabilities, favorable regulations, administration and licensing management, facilities and infrastructure, business capital capability, and Gapoktan independence. Gapoktan's empowerment also has an indirect effect on increasing rice production, which means trading business capabilities, favorable regulations, administration and licensing management, facilities and infrastructure, business capital capability, and Gapoktan independence indirectly contribute to increasing rice production (Y_2).

The results of the research can be explained that empowerment has a real and positive effect on increasing rice production, meaning that the increasing empowerment of individuals, groups and communities will provide space and opportunities to be involved in development, which if this happens continuously then the goal of increasing business will in turn be achieved. The higher level of empowerment of gapoktan can have a positive impact on various aspects such as; increasing prosperity, economic independence, increasing participation, strengthening social and economic resilience, and creating partnerships. This is in line with [17] who stated that increasing youth participation in building partnerships so that resource management can be more effective and efficient. Likewise, it is in line with [5] which states that KWT diversity can increase the production of various vegetables in home gardens, which is supported by [19], who conclude that farmer institutions including gapoktan have a positive and real effect on increasing rice production.

6. Conclusion

The conclusions obtained from this research are: (1) the level of empowerment of Gapoktan is assessed by the majority of farmer members (57.29%), covers Trading Business Capabilities, Administrarion and Licensing Management, Facilities and Infrastructure, Business Capital Capability, Gapoktan independence as still relatively powerless. Likewise, the variables of government support, community social capital, environmental factors and needs factors are considered by most farmers to be still unsatisfactory or not in line with expectations. Meanwhile, for the variable increasing production, 47.46 percent of respondent farmers rated it as unsatisfactory. Gapoktan characteristics; age between 19 – 79 years (age ≥35 = 88.75%), farming land ownership 20 – 1,110 Ha (52.08% = ≤ 370 Ha, joining Gapoktan 1 – 35 years (36.67% = ≤ 10 years), distance from Gapoktan to sub-district city between 1 – 80 Km (26.25% = 24 – 39 Km), and the distance to district cities ranges from 1 – 200 Km (76.42% distance ≥ 10 Km), and the level of machinery ownership is relatively low (3.26 – 50%), (2) factors that directly influence the empowerment of gapoktan (R2 = 0.769) are need factors, government support, and environmental factors, with influence coefficients of 0.456, 0.194 respectively. and 0.185, while these three variables also indirectly influence increasing rice production (R2 = 0.524), (3) the strategy to increase empowerment while increasing the readiness of gapoktan as a delivery point for subsidized fertilizer is to encourage member farmers to have more taste or enthusiasm for developing gapoktan, increase member participation in developing gapoktan so that gapoktan advances and achieves, increase and maintain support from the government, especially the availability of programs that encourage gapoktan development, the availability of supporting facilities, policies and regulations, while maintaining the relationship or role of the parties, community support and adequate infrastructure.

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