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Farmer's Capacity of Palm Integrated Beef Cattle Businesses on Manokwari District, Indonesia

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Abstract. The research aims to analyze the capacity of farmers and the factors that influence the capacity of farmers in the integrated palm oil beef cattle business in Manokwari Regency. The research was carried out in Manokwari Regency, West Papua. The sample was 228 breeders using the proportional cluster random sampling technique. Primary data was collected using questionnaires, in-depth interviews, and FGD. Independent variables consist of individual characteristics, support from external factors, and the role of agricultural instructors. The dependent variable of this research is farmer capacity. Analysis techniques used descriptive statistics and SEM (Structural Equation Models). The results show that the business capacity of farmers in the palm oil integrated beef cattle business is in the low category, which is indicated by the ability of farmers who do not pay attention to the technicalities of integrated cattle cultivation, such as the majority of cattle breeds whose mothers and bulls are unknown, raising livestock in oil palm plantations with lack of supervision, the mating system naturally, with any male, no health checks and deworming are ever carried out, easy marketing conditions mean that efforts to establish cooperation are not a concern. The capacity of farmers in the integrated beef cattle business on oil palm plantations is directly influenced by (1) the individual characteristics of the farmer as reflected by formal education, number of livestock, perception and motivation of the farmer; (2) External support reflected by government, family, institutional and market support; (3) the role of agricultural instructors as facilitators, communicators and consultants.

Keywords: beef cattle businesses; farmers' capacity; palm integrated

INTRODUCTION

The increasing consumption of beef and the existence of a domestic beef cattle population which is suspected of not being able to provide for meat needs, has become a consideration for many parties to make various efforts to increase beef cattle production. These efforts can be carried out through profitable integrated livestock farming, increasing farmers' income and welfare, one of which is implementing a model of integrating cattle livestock with oil palm plantations (Sari & Silalahi, 2022). The concept of the palm oil-cattle integration system is to mutually utilize the resources of the plantation and palm oil factory subsystems with the cattle livestock business subsystem so that multiple benefits are produced. Oil palm plantations can utilize by-products from cattle farming in the form of organic fertilizer, increase oil palm productivity, improve the ecosystem of oil palm plantation land, and increase the supply of meat (Edwina et al., 2019).

Manokwari Regency is an area with potential for oil palm plantations and beef cattle farming in West Papua. The area of oil palm plantations in Manokwari Regency in 2019 was 9,985.18 Ha with a production of 175,941.56 tons of palm oil. The population of beef cattle in Manokwari Regency in 2019 was 16,987 heads, then increased in 2020 to 17,234 heads (Badan Pusat Statistik, 2021; BPS West Papua, 2021). Most of the beef cattle in Manokwari are dominated by Bali cattle. Livestock activities in Manokwari Regency are still categorized as smallholder farming. The beef cattle farming business is carried out to help or support other farming activities, as well as for savings.

The existence of oil palm plantations and the increasing cattle population and demand for beef are potential opportunities that can be integrated. Integrated farming systems, such

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as oil palm–cattle integration, offer significant benefits. From the livestock perspective, cattle provide organic fertilizer through manure and urine, which serve as valuable nutrients for oil palm cultivation. Conversely, oil palm plantations benefit cattle farming by supplying feed resources and grazing areas. This creates a mutually beneficial symbiotic relationship between the two sectors. The Ministry of Agriculture has issued this policy as Regulation of the Minister of Agriculture of the Republic of Indonesia Number 105/Pementan/PD.300/8/2014 regarding the integration of oil palm plantation businesses with beef cattle cultivation businesses. The development of beef cattle farms that are integrated with oil palm plantations is expected to improve the welfare of the farming community by increasing income (Saragih et al., 2021). In line with the increasing trend between the beef cattle population and oil palm plantations, carrying out palm oil cattle integration efforts has great potential for farmers to carry out (Nainggolan et al., 2021).

Some smallholder oil palm planters have run beef cattle businesses on oil palm plantations. However, the integration of beef cattle farming with oil palm plantations is not yet running optimally. Based on a preliminary survey, the plasma's oil palm land has not been fully utilized as a location for beef cattle farming. Likewise, the use of new oil palm plantations is based on trial and error by some plantation owners. Based on investigations, the performance indicators for beef cattle were low, with a birth interval of 2.5 years. This is suspected of the need to develop the business capacity of beef cattle breeders that are integrated with oil palm plantations. The research aims to descriptively analyze the capacity of farmers and the factors that influence the capacity of farmers in the integrated palm oil beef cattle business in Manokwari Regency. Thus, this research can be beneficial for policymakers and practitioners in developing the capacity of agricultural human resources, particularly oil palm-integrated livestock farmers.

METHODS

Research on the capacity of farmers in the palm oil integrated beef cattle business in Manokwari Regency used a quantitative approach carried out through surveys. This research is explanatory research to analyze the relationship between variables. This research was conducted to answer research questions regarding descriptive variables and the relationship between variables.

The research was carried out in Manokwari Regency, West Papua. This location was chosen deliberately with the consideration that it is the highest area for oil palm plantations in West Papua. Furthermore, from several districts in Manokwari Regency, three districts were selected, namely Prafi, Masni, and Sidey Districts. The three represent the spread of oil palm plantations in Manokwari Regency.

The population in this study was 510 heads of families (KK) of integrated beef cattle farming practitioners in oil palm plantations. Determining the number of samples in this study was carried out using the Slovin formula (Kurniullah, 2021). The calculation results obtained a sample size of 228 people. The sampling technique uses proportional random sampling. This technique is used when selecting samples from the population based on the portion in each district. The sample was distributed in Prafi District 128, Masni 58, and Sidey 49 people.

The data collected in this study consists of primary and secondary data. Primary data refers to information collected directly by the researchers from the main source, namely, cattle farmers integrated with oil palm plantations, who served as the research sample. Primary data were gathered through questionnaires, in-depth interviews, and Focus Group Discussions (FGD). Secondary data refers to supporting information related to the focus of the research.

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The research variables consist of individual farmer characteristics (X1) with indicators including age, formal education, length of business, number of livestock ownership, non-formal education (training/ counseling), access to Information and Communication Technology (ICT), perception and motivation to try integrated cattle farming. palm; external factor support (X2) with indicators consisting of government support, family support, farmer institutional support and market support; the role of extension agents (X3) as facilitators, communicators, motivators and consultants; and farmer capacity (Y1) with indicators including adaptation capacity, technical capability for beef cattle cultivation, technical capability for oil palm cultivation, business management capability and ability to establish cooperation. The research instruments used in collecting primary data consisted of questionnaires and interview guides. The questionnaire consists of a list of closed and open statements/questions for structured interviews. A guide is used for in-depth interviews**.** The instrument in the form of close-ended statements/questions has been tested for validity and reliability, with results indicating that it is valid and reliable.

The data analysis techniques used in this research are descriptive and inferential statistical analysis techniques. Descriptive statistical analysis is used to describe research variables. Inferential analysis, namely SEM (Structural Equation Models) to analyze the factors that influence the capacity of farmers in the integrated palm oil beef cattle farming business.

RESULTS AND DISCUSSION

Table 1 shows that the majority of respondents, based on age group, are in the middle category, namely 35 to 54 years. When compared, the younger age group is larger than the older age group. This condition is very good for the regeneration of farmers, because the younger generation has the potential to have a larger portion to replace agricultural business actors who will soon be nearing retirement. This is because in several places and in other business commodities, many young people are reluctant to replace the position of breeders because they are more interested in other professions outside of animal husbandry or agriculture. This was also conveyed by (Nita et al., 2020) that farmers' children after formal school prefer to migrate outside the region rather than work in the livestock or agricultural sector. The results of this research support the reports of (Harniati dan Anwarudin, 2018) and (Anwarudin et al., 2020) who stated that the younger generation is starting to be interested in engaging in agricultural business activities in several economically promising commodities.

Table 1 shows the number of respondents based on education level groups, mostly elementary school. However, it is unfortunate that there are still those who do not go to school or have not finished elementary school. This shows that the majority of breeders still have basic formal education because economic conditions and awareness of pursuing education are still low. The results of this research are in line with (Putri et al., 2019) that the education level of the majority of farmers is still low, namely elementary school graduates due to economic limitations and awareness of pursuing education in the past was still lacking. Education has an important role in a person's farming process because the higher the farmer's education, the greater the opportunity for farmers to understand the technology provided and apply it well. Therefore, judging from the level of formal education, farmers still need additional education, both formal and informal, to open up and make it easier for them to accept technology in their farming business.

Table 1 shows that the average length of business for respondents is 10.38 years, but most are in 10 - 20 years. The longer the livestock business is, the more experienced the farmer tends to be and thus has broader skills and knowledge regarding the livestock business. Based on the results of interviews,

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there are breeders who continue the business of their parents. However, there are also respondents who have more than 20 years of experience running an integrated livestock business on palm oil plantations, especially for those who are currently entering the older age group because they have been young since they were young.

Table 1. Characteristics of age, formal education, length of farmer business, ownership, agricultural extension, internship, TIK access, perception, and motivation

No.	Farmer Characteristics	District						Total	
		Prafi		Masni		Sidey			
		n	%	n	%	n	%	n	%
1.	Age (year)								
	Young (< 35)	43	35.54	31	63.27	7	12.07	81	35.53
	Middle (35 – 54)	62	51.24	17	34.69	42	72.41	121	53.07
	Old (> 54)	16	13.22	1	2.04	9	15.52	26	11.40
	Amount	121		49		58		228	100
	Average								43.6
2.	Formal Education								
	≤ 6 years (Elementary School)	46	38.02	8	16.33	36	62.07	90	39.47
	> 6 - 9 years (Junior HS)	34	28.10	9	18.37	16	27.59	59	25.88
	> 9 - 12 years (Senior HS)	39	32.23	31	63.27	4	6.90	74	32.46
	> 13 years (collage)	2	1.65	1	2.04	2	3.45	5	2.19
	Amount	121		49		58		228	100
	Mode								Elementary School
3.	Length of Farmer Business (years)								
	New (<10)	62	51.24	25	51.02	30	51.72	117	51.32
	Middle (10 - 20)	54	44.63	20	40.82	25	43.10	99	43.42
	Old (>20)	5	4.13	4	8.16	3	5.17	12	5.26
	Amount	121		49		58		228	100
	Average								10.38
4.	Ownership (head)								
	Few (< 8)	92	76.03	42	85.71	41	70.69	175	76.75
	Medium (8 – 16)	23	19.01	4	8.16	13	22.41	40	17.54
	Lots (>16)	6	4.96	3	6.12	4	6.90	13	570
	Amount	121		49		58		228	100
	Average								7.36
5.	Agricultural Extension								
	Never	105	86.78	31	63.27	51	87.93	187	82.02
	1 - ≤ 3 times	15	12.40	16	32.65	6	10.34	37	16.23
	>3 – 7 times	1	0.83	2	4.08	1	1.72	4	1.75
	> 7 times	0	0.00	0	0.00	0	0.00	0	0.00
	Amount	121		49		58		228	100
	Mode								Never
6.	Internship								
	Never	117	96.69	43	87.76	58	100.00	218	95.61
	1 - ≤ 3 days	4	3.31	6	12.24	0	0.00	10	4.39
	>3 – 7 days	0	0.00	0	0.00	0	0.00	0	0.00
	> 7 days	0	0.00	0	0.00	0	0.00	0	0.00
	Amount	121		49		58		228	100
	Mode								Never
7.	ITC Access								

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No.	Farmer Characteristics	District						Total	
		Prafi		Masni		Sidey			
		n	%	n	%	n	%	n	%
	≤ 3 times/week	118	97.52	47	95.92	56	96.55	221	96.93
	>3 - 6 times/week	3	2.48	2	4.08	2	3.45	7	3.07
	>6 - 9 times/week	0	0.00	0	0.00	0	0.00	0	0.00
	Amount	121		49		58		228	100
	Average								0.89
8.	Perception								
	Very low (≤ 25/Q1)	0	0.00	1	2.04	0	0.00	1	0.44
	Low (>25 - 50/Q2)	9	7.44	10	20.41	6	10.34	25	10.96
	High (>50 - 75/Q3)	105	86.78	35	71.43	49	84.48	189	82.89
	Very high (> 75/Q4)	7	5.79	3	6.12	3	5.17	13	5.70
	Amount	121		49		58		228	100
	Mode								High (Q3)
9.	Motivation								
	Very low (≤ 25/Q1)	33	27.27	16	32.65	27	46.55	76	33.33
	Low (>25 - 50/Q2)	73	60.33	25	51.02	23	39.66	121	53.07
	High (>50 - 75/Q3)	15	12.40	8	16.33	8	13.79	31	13.60
	Very high (> 75/Q4)	0	0.00		0.00	0	0.00	0	0.00
	Amount	121		49		58		228	100
	Mode								Low (Q2)

Table 1 shows that most livestock ownership is small with an average of 7.3 heads. The majority of farmers in Prafi, Masni and Sidey Districts have less than 8 head of cattle. However, some breeders have more than 8 or even more than 16 livestock. Most breeders keep their livestock on oil palm land; however, there are some breeders who are trying to transition from oil palm land and then pen it for sick livestock or fattening male livestock.

Most farmers stated that they had never received information or extension materials about cattle-oil palm integration through extension activities. Only a small percentage stated that they had attended counseling with specific material regarding the use of oil palm plantations as cattle grazing land. Likewise, with training or internships, the majority stated that they had never been involved. Based on observations in the field, extension activities are prioritized more for food crop commodities. Another reason is that the use of oil palm land as livestock grazing land is considered prone to disputes between oil palm plantation owners/companies and breeders. As a result of field investigations, information was obtained that the use of oil palm land for livestock was based on the initiative of breeders, especially breeders who had their own oil palm plantations.

All farmers have access to ICT with most accessing it up to 3 times per week. This ICT access includes chat via short messages and WhatsApp, telephone and browsing on internet channels. The most frequently accessed media channel is WhatsApp. However, access for these breeders is very low compared to the report by (Ardelia et al., 2020) that currently many farmers are making use of ICT. This is because it is hampered by unstable network availability and is marginalized by the use of other content. However, in the future, when a stable network is available, it is possible that access will increase because information and communication technology (ICT), especially the internet and social networks, are potential alternatives for empowering rural communities. Information technology has made the socio-economic system simpler, more practical, broader, faster and multitasking. Through multimedia, wireless networks, cellular technology, the internet,

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and all-digital access, everyone in the world can connect, communicate, collaborate, and do business online or via instant messengers and social networks.

Farmers who were respondents to this research had a high perception of the palm oil integrated beef cattle farming business. This is shown by the average and the majority of breeders have a perception in the high category. Only a small number of them still have a bad perception of this business, even though all this time they have been involved in farming activities on oil palm land. The reason that emerged when investigated turned out to be due to security factors. This high level of perception needs to be appreciated, which means that the use of oil palm land has been responded to positively by breeders who have been active. Cost, energy and time efficiency as well as decent profits have become the reasons for breeders considering this type of business pattern.

Table 2. External Support

No	External Support	No		Yes	
		n	%	n	%
1.	Facilitate training/counseling/internships	184	80.70	44	19.30
2.	Capital assistance	205	89.91	23	10.09
3.	Infrastructure assistance	213	93.42	15	6.58
4.	Livestock health services	165	72.37	63	27.63

Table 3. Family, institutional, and market support

No	Family Support	Never		Disagree/ ever		Not agree/often		Agree/always	
1.	Approve palm oil cattle integration efforts	1	0.44	2	0.88	41	17.98	184	80.70
2.	Exchange experiences in trying to integrate palm oil cattle	0	0.00	21	9.21	116	50.88	91	39.91
3.	Facilitate assistance/grants/inheritance of capital for palm oil cattle integration businesses	118	51.75	79	34.65	26	11.40	5	2.19
4.	Facilitate assistance/grants/inheritance of facilities/infrastructure	217	95.18	11	4.82	0	0.00	0	0.00
5.	The palm oil company agrees that you are trying to integrate palm oil cattle	167	73.25	45	19.74	16	7.02	0	0.00
6.	Institutions provide knowledge	17	7.46	84	36.84	91	39.91	36	15.79
7.	Institutions provide skills	21	9.21	117	51.32	82	35.96	8	3.51
8.	Friends or group members motivate each other	34	14.91	129	56.58	65	28.51	0	0.00
9.	Friends or group members share information with each other	0	0.00	45	19.74	169	74.12	14	6.14

Table 2 shows that the majority of farmers do not feel that there is government support for integrated palm oil cattle farming businesses. However, a small number of breeders stated that government support could be felt, such as business assistance and capital assistance, but it was not optimal and was not evenly distributed. Assistance in the form of cattle seeds has been provided, but availability is limited. Likewise, livestock health services are carried out by Polbangtan Manokwari (Ministry of Agriculture) in

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collaboration with the Manokwari Regency Agriculture Service, but have not been able to reach all breeders.

Table 3 shows that the institutional support indicator data varies. Most respondents did not know about the palm oil company's agreement if their oil palm land was used as cattle ranching. A small number of respondents suspected that the company did not or did not agree with their land being used as a cattle grazing location. Therefore, for breeders whose cows are on company oil palm land, breeders often do not want to be open about their ownership of cows on oil palm land. For other indicators, farmers agree that farmer institutions, such as farmer groups, provide a lot of good. Farmer institutions can be a means of sharing knowledge and skills both between members and from resource persons. Farmer institutions are also a place to share important information, remind each other, and motivate each other if problems occur.

Another external support felt by breeders is the market. Most respondents stated that market support was very good. It is very easy or very fast for farmers to get selling prices for beef cattle. This is because, apart from livestock prices, which tend to be stable, the flow of livestock market information is also commonly known to breeders. Likewise, information on how much livestock is needed and buyer information is easy or quick to find out. This is because the need for large quantities is usually related to certain times such as Eid al-Fitr, qurban, and Christmas. The same conditions apply to market absorption capacity; cattle that are ready to be sold are very easily and very quickly absorbed by the market. Direct information from breeders suggests that whatever number of cattle are to be sold, they can be sold that day.

Most farmers assess that the role of agricultural extension is in the low category. Several breeders stated that the attention of agricultural instructors had not prioritized livestock breeders and planters as targets for extension services. Agricultural extension is carried out using a group approach whose members are mostly adult farmers with agricultural commodities. Some breeders are part of existing farmer groups. One of the reasons for the lack of livestock breeders and planters as priority targets for extension is the priority of commodities, namely food crops and horticulture. Another cause is the limited number of extension workers, according to the report by Haryanto et al. (2017). Efforts that have been made to address the limited number of government agricultural instructors are to recruit advanced farmers to become independent instructors.

The low role of agricultural extension must be a concern, so that it can then become a driving force for agricultural extension workers to intensify the delivery of messages both directly and indirectly. The message conveyed in agricultural extension is, of course, in the form of extension material or innovation. The low role of agricultural extension also reflects the suboptimal use of extension media. This shows the need to optimize the use of media, whether print, physical objects, or electronic media, which can stimulate more of the five senses so that more counseling material can be absorbed by the beneficiaries. Likewise, the low role of extension workers shows that the use of extension methods has not been optimal. Based on observations in the field, there are several cases where extension workers cannot visit farmers routinely. The lacusussi system requires extension workers to visit farmers once every 2 weeks. The small number of agricultural extension workers is an obstacle to not carrying out optimal implementation.

Capacity Farmers

Table 4 shows that the majority of livestock farmers have low integrated palm oil livestock business capacity. This condition is supported by the technical capabilities of integrated cattle farming and business management, as well as the low ability to establish cooperation. This is in contrast to good adaptability. However, information from breeders has so far been

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made easier or spoiled by efficient costs and energy, as well as a very fast market, causing breeders to not pay attention to livestock quality and business management. Livestock raised from the integration of palm oil cattle, whatever their condition, can be guaranteed to be sold. Therefore, farmers are not challenged to produce good-quality livestock.

Table 4. Distribution of indicators for the role of agricultural instructors in palm oil cattle integration

Indicator	District						Total	
	Prafi		Masni		Sidey			
	n	%	n	%	n	%	n	%
The role of agricultural instructors								
Very low (≤ 25/Q1)	23	19.01	19	32.76	20	40.82	62	27.19
Low (>25 - 50/Q2)	81	66.94	30	51.72	27	55.10	138	60.53
High (>50 - 75/Q3)	17	14.05	9	15.52	2	4.08	28	12.28
Very high (> 75/Q4)	0	0.00	0	0.00	0	0.00	0	0.00
Amount	121		58		49		228	
Facilitator								
Very low (≤ 25/Q1)	23	19.01	23	39.66	33	67.35	79	34.65
Low (>25 - 50/Q2)	95	78.51	34	58.62	16	32.65	145	63.60
High (>50 - 75/Q3)	3	2.48	1	1.72	0	0.00	4	1.75
Very high (> 75/Q4)	0	0.00	0	0.00	0	0.00	0	0.00
Amount	121		58		49		228	
Communicator								
Very low (≤ 25/Q1)	12	9.92	13	22.41	1	2.04	26	11.40
Low (>25 - 50/Q2)	94	77.69	39	67.24	48	97.96	181	79.39
High (>50 - 75/Q3)	15	12.40	6	10.34	0	0.00	21	9.21
Very high (> 75/Q4)	0	0.00	0	0.00	0	0.00	0	0.00
Amount	121		58		49		228	
Motivator								
Very low (≤ 25/Q1)	29	23.97	24	41.38	25	51.02	78	34.21
Low (>25 - 50/Q2)	75	61.98	22	37.93	19	38.78	116	50.88
High (>50 - 75/Q3)	17	14.05	12	20.69	5	10.20	34	14.91
Very high (> 75/Q4)	0	0.00	0	0.00	0	0.00	0	0.00
Amount	121		58		49		228	
Consultant								
Very low (≤ 25/Q1)	28	23.14	15	25.86	18	36.73	61	26.75
Low (>25 - 50/Q2)	61	50.41	24	41.38	25	51.02	110	48.25
High (>50 - 75/Q3)	32	26.45	19	32.76	6	12.24	57	25.00
Very high (> 75/Q4)	0	0.00	0	0.00	0	0.00	0	0.00
Amount	121		58		49		228	
Business Capacity								
Very low (≤ 25/Q1)	53	43.80	28	48.28	20	40.82	101	44.30
Low (>25 - 50/Q2)	39	32.23	13	22.41	10	20.41	62	27.19
High (>50 - 75/Q3)	24	19.83	14	24.14	15	30.61	53	23.25
Very high (> 75/Q4)	5	4.13	3	5.17	4	8.16	12	5.26
Amount	121		58		49		228	
Adaptability								

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Indicator	District						Total	
	Prafi		Masni		Sidey			
	n	%	n	%	n	%	n	%
Very low (≤ 25/Q1)	10	8.26	7	12.07	2	4.08	19	8.33
Low (>25 - 50/Q2)	54	44.63	18	31.03	8	16.33	80	35.09
High (>50 - 75/Q3)	48	39.67	29	50.00	28	57.14	105	46.05
Very high (> 75/Q4)	9	7.44	4	6.90	11	22.45	24	10.53
Amount	121		58		49		228	
Integration of palm cattle								
Very low (≤ 25/Q1)	73	57.03	37	63.79	28	57.14	138	58.72
Low (>25 - 50/Q2)	41	32.03	17	29.31	14	28.57	72	30.64
High (>50 - 75/Q3)	12	9.38	3	5.17	7	14.29	22	9.36
Very high (> 75/Q4)	2	1.56	1	1.72	0	0.00	3	1.28
Amount	128		58		49		235	
Business management								
Very low (≤ 25/Q1)	15	12.40	12	20.69	9	18.37	36	15.79
Low (>25 - 50/Q2)	59	48.76	15	25.86	12	24.49	86	37.72
High (>50 - 75/Q3)	36	29.75	23	39.66	23	46.94	82	35.96
Very high (> 75/Q4)	11	9.09	8	13.79	5	10.20	24	10.53
Amount	121		58		49		228	
Establish cooperation								
Very low (≤ 25/Q1)	117	96.69	53	91.38	40	81.63	210	92.11
Low (>25 - 50/Q2)	3	2.48	3	5.17	7	14.29	13	5.70
High (>50 - 75/Q3)	1	0.83	2	3.45	2	4.08	5	2.19
Very high (> 75/Q4)	0	0.00	0	0.00	0	0.00	0	0.00
Amount	121		58		49		228	

Table 4 shows that the majority of livestock farmers have low integrated palm oil livestock business capacity. This condition is supported by the technical capabilities of integrated cattle farming and business management, as well as the low ability to establish cooperation. This is in contrast to good adaptability. However, information from breeders has so far been made easier or spoiled by efficient costs and energy, as well as a very fast market, causing breeders to not pay attention to livestock quality and business management. Livestock raised from the integration of palm oil cattle, whatever their condition, can be guaranteed to be sold. Therefore, farmers are not challenged to produce good quality livestock. Most breeders' adaptability is in the high category. Based on in-depth interviews, breeders can easily follow price developments. The price of Bali beef cattle in Manokwari is relatively stable except at certain times such as Eid al-Fitr, Qurban and Christmas.

This condition is different from the ability regarding palm oil integrated cattle cultivation, the majority of breeders are in the very low category. Most breeders take seeds resulting from natural mating whose parents and males are unknown. In terms of maintenance, most farmers keep livestock in oil palm plantations with routine supervision, namely 3 to 4 times a week. Likewise, the mating system is carried out naturally with any male. Most of the livestock that have been kept openly in oil palm plantations have never had a health check or worm treatment (Bertoni & Cavicchioli, 2016). The same thing applies to the ability to collaborate, easy marketing conditions mean that collaborative

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efforts are not a concern so that the majority of breeders are in the very low category.

Factors that influence the Capacity of Farmers in the Palm Oil Integrated Beef Cattle Business

Factors that influence the business capacity of beef cattle breeders integrated with oil palm plantations in Manokwari Regency were analyzed using SEM. The assumptions that are fulfilled in this study are the assumption of normality of normally distributed data and that there are no symptoms of multicollinearity, that is, there is no perfect correlation of 0.9 or more. After fulfilling these assumptions, the model fit is then assessed using the assessment criteria. Furthermore, the fit model is used as a reference in formulating a model for developing the capacity of beef cattle breeders integrated with oil palm plantations in Manokwari Regency. Analysis of factors that influence the business capacity of beef cattle breeders integrated with oil palm plantations was carried out to test the influence of the independent and moderator variables on the dependent variable. Validity measurement in SEM analysis is carried out through Confirmatory Factor Analysis (CFA). The results of data analysis using SEM are presented in Figure 1.

Based on the results of the SEM analysis, it was found that the business capacity of beef cattle breeders integrated into oil palm plantations was directly influenced by the individual characteristics of the breeders, external support and the role of agricultural instructors. Furthermore, the characteristics of individual breeders have a direct or indirect influence on the sustainability of the breeder's business. Likewise, business capacity has a direct influence on the sustainability of the integrated beef cattle farmer's business on oil palm plantations.

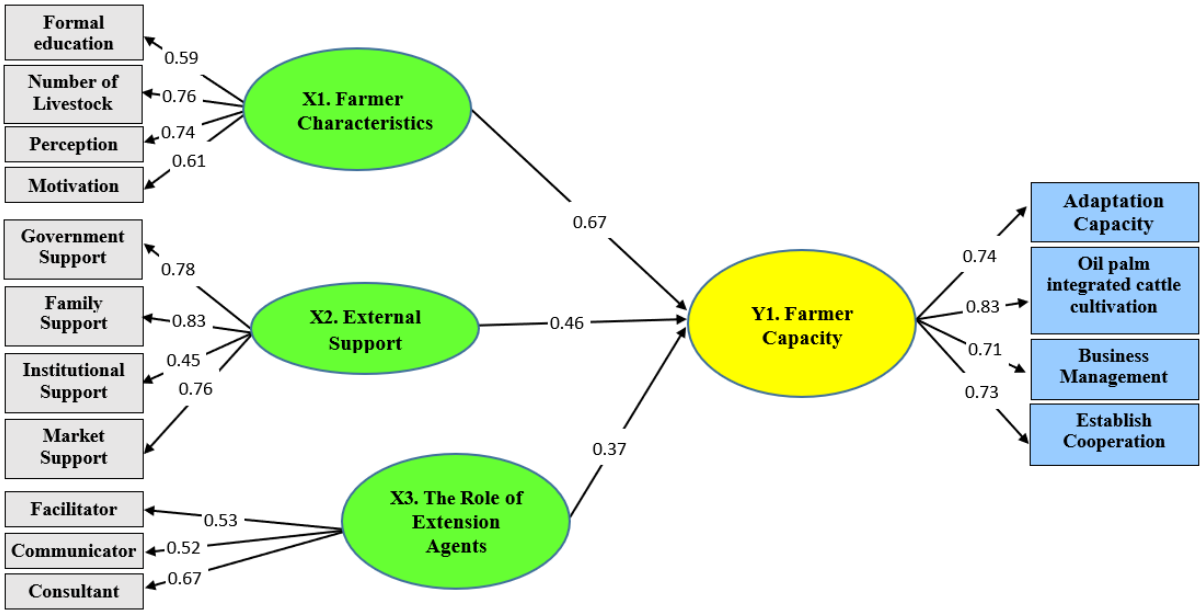

Figure 1. Model of factors determining farmer capacity in integrated palm oil beef cattle farming business.

SEM analysis is used to analyze factors that influence farmer capacity. The results of the analysis show that the farmer's capacity is directly and positively influenced by (1) the individual characteristics of the farmer as reflected by the level of education, number of livestock, perception and motivation of the farmer; (2) External support reflected by government, family, institutional and market support; (3) the role of agricultural extension workers which is reflected in their roles as facilitators, communicators and consultants. The farmer's own business capacity is reflected by indicators of adaptability,

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integrated palm oil cattle cultivation, business management and the ability to collaborate. Mathematically, the equation of factors that influence the capacity of breeders is presented in Equation 1.

$Y1 = 0.67*X1 + 0.46*X2 + 0.37*X3$ …. (1)

$R^2 = 0.81$

The positive value reflects the influence of individual characteristics, external support and the role of agricultural instructors on the business capacity of farmers in direct proportion. This means that strengthening the capacity of farmers can be achieved by optimizing individual characteristics, external support and the role of agricultural instructors. The higher the individual characteristics, external support and role of agricultural instructors, the higher the capacity of integrated palm oil farmer businesses. In detail, this equation means that an increase in individual characteristics by one point can increase 0.67 points in the farmer's business capacity. An increase in external support of one point can increase the farmer's business capacity by 0.46 points. Likewise, increasing the role of agricultural instructors by one point can increase the business capacity of farmers by 0.37 points. This equation also shows that simultaneously the influence of these three variables on farmer business capacity can be explained by the model with a data diversity of 81 percent, while the rest is explained by other factors and error.

The individual characteristics of breeders are reflected positively by formal education. This measurement model shows that the level of formal education is an important factor in shaping the characteristics of individual breeders. The higher the level of education, the higher the individual characteristics of the breeder. Because the level of formal education is a positive reflector of individual characteristics, increasing the level of formal education can have an impact on developing the business capacity of breeders. The learning process through formal education can be used to improve knowledge, attitudes and skills (Zuzana Bednaříková et al., 2016). This is important because capacity businesses have a good capacity of knowledge, skills and attitudes. The potential for increasing the level of formal education for the next generation is still very potential considering the compulsory education program and support for increasingly better educational infrastructure.

The individual characteristics of breeders can be built through their perceptions and motivations. This is because individual characteristics are reflected in a positive value by the farmer's perception and motivation. In connection with business capacity being influenced by individual characteristics, perception and motivation can encourage farmers to increase their business capacity. This research proves that the higher the perception and motivation of farmers to pursue integrated palm oil farming, the greater the capacity of their business. Field findings show that breeders are interested and have the desire to start an integrated palm oil livestock business, and aspire to become successful farmers, because by working independently they can be freer to manage themselves (Anne Cassidy & Brian McGrath, 2015). Palm oil integrated livestock farming is profitable and contributes to many people, such as providing sacrificial animals and stabilizing meat prices in the eastern region of Indonesia. This motivation also makes breeders try to adapt to developing situations and conditions and be proactive about new events they face. The results of this research are in accordance with the report by (Nazaruddin, 2017) that motivation can encourage agricultural business actors to strive to improve their abilities.

The role of agricultural extension workers is reflected positively by their role as facilitators, communicators and consultants. Findings in the field, extension services conducted by government extension workers currently often use a group approach so that the target of extension services is focused on members of adult farmer groups. However,

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some young farmers are part of this group of adult farmers so that the role of extension workers can still be felt by young farmers. According to (Anwarudin & Haryanto, 2018), the targets for extension are ideally adult farmers, female farmers and farming cadets. Law Number 16 of 2016 states that the targets of counseling are the main actors and business actors.

The implication of the results of this research is that developing the capacity of farmers in the palm oil integrated beef cattle business can be done in several ways. First, farmer capacity development can be done by improving the individual characteristics of farmers, including increasing formal education, number of livestock ownership, farmer perceptions and motivation. This is based on the large and positive contribution of the level of formal education, number of livestock, perception and motivation to the individual characteristics of breeders in influencing the capacity of breeders. The positive contribution value shows that efforts to develop breeder characteristics are being pushed towards increasingly higher levels. Formal education that farmers have is very important to develop their capacity. The learning process through formal education can be used to improve knowledge, attitudes and skills. The education that farmers have influences their thinking and reasoning patterns in making decisions and in acting. The level of formal education of breeders cannot be changed in a short time. Because of the greater opportunity for breeders with a higher level of education as pioneers to develop their business capacity, which is then followed by other breeders. Likewise, breeders can prepare the next generation with better education.

Second, farmer capacity development can be done through increasing external support. Based on the results of the analysis, at least four parties must be optimized, namely the government, family, related institutions, and the market. The government parties identified during the FGD were the central government through the Ministry of Agriculture, along with institutions within the Ministry of Agriculture located in the region (West Papua), namely Manokwari Agricultural Development Polytechnic (Polbangtan), Agricultural Research and Technology Center, and agricultural quarantine. Furthermore, the West Papua Provincial Government, through the Animal Husbandry Service, and the Regency Government, through the Agriculture Service. Government support is directed at efforts to create programs and activities that can develop the capacity of farmers in managing beef cattle farming businesses, according to the report by (Herawati, M., 2023). Entrepreneurship, technical and agribusiness training carried out by agricultural training centers is intended to reach more farmers, but it turns out that only a little has been facilitated.

The next external factor is the farmer's family, including the parents, children, and siblings. Socialization activities regarding agricultural activities from parents to their children can be carried out through their involvement in the parents' farm. Likewise, parental support for their children who are interested in becoming breeders can be done through assistance or grants for business capital or infrastructure, according to their respective abilities in accordance with the recommendations of (Joosse & Grubbström, 2017), (Harniati dan Anwarudin, 2018) and (Ardelia et al., 2020). The next external parties are institutions such as farmer institutions, companies and other institutions. The existence of institutions at the farmer level can be in the form of farmer groups, combinations of farmer groups. Another important institution is the company that owns the oil palm plantation. The existence of this company is important, considering that the largest area of oil palm plantations is owned by companies, and the breeders who use these oil palm plantations are not necessarily employees of the company.

Third, the role of agricultural instructors. Increasing the role of agricultural extension workers as facilitators, communicators and

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consultants. This is based on the large and positive contribution of his role as facilitator, communicator and consultant to the role of agricultural instructors in influencing the business capacity of breeders. The positive contribution value shows that efforts to develop the role of agricultural instructors are being pushed to a higher level, so that the process runs better, and the capacity of farmers in the palm oil integrated beef cattle business increases. Extension agents can also facilitate farmers with sources of innovation, consumers and capital lending institutions as stated by (Nurholis et al., 2020).

As a communicator, the role of agricultural instructors must be optimized to communicate in learning together with breeders. Extension materials are tailored to the needs of breeders by taking into account real and perceived needs. The use of extension media adapts to the situation and conditions of the location and target by using a variety of extension media so that the material can be packaged more attractively and easily understood, including, in this case, the use of digital media, which can be distributed online. Furthermore, the selection of an extension approach also adapts to location conditions and the number of targets such as individual, group or mass approaches in accordance with the recommendations of (Yoyon Haryanto & Anwarudin, 2021).

As consultants, ideally, agricultural instructors can help solve problems or provide alternative solutions to problems being faced by farmers. As a consultant, agricultural extension workers must be ready to receive complaints and agribusiness problems submitted by agribusiness actors and immediately respond, take action to solve the problem or convey alternative solutions to the problem. In carrying out this consultation function, extension workers must not just wait but must actively visit breeders. This is in accordance with the statement of (Herawati, M., 2023), extension is directed at building awareness, responsibility, focus on solutions, challenges and actions. Regarding the development of information and communication technology, the new perspective of extension currently has a cafeteria system which is based on farmers' freedom to choose information according to the needs and problems faced by farmers in accordance with the report by (Yoyon Haryanto & Anwarudin, 2021).

Therefore, as a strategy to optimize external support, change actors can provide greater opportunities to breeders with better market support. Likewise, change actors can strive to increase market support by making it easier to obtain information on selling prices, demand volume, consumers and market absorption capacity as stated by (Lilis Iriyanti et al., 2023). The expected output is increased business capacity of breeders, including increased adaptability, increased capacity for integrated palm oil cattle cultivation, increased business management capabilities and increased cooperation between breeders and various parties. Farmers must be able to follow developments in prices, innovation, changes in weather or climate and business capital opportunities. Likewise, the ability to adapt to the development of innovations such as superior seeds, cultivation techniques, disease prevention and treatment and feed greatly determines the resulting production.

Breeders must have knowledge of superior livestock seeds and how to obtain them. Breeders also have the ability to raise cattle in the integration of oil palm cattle, reproductive management, quality and timing of use of bulls. Farmers are also expected to be able to access and obtain livestock health examination services and carry out disease prevention and treatment for several mild livestock diseases such as worms. Several collaborations have been established, such as with collectors, butchers, sacrificial committees and slaughterhouses. Field findings show that this collaboration means that breeders do not have problems with the market. However, cooperation needs to be expanded to other components, for example access to health checks, access to other oil

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palm plantation land, feed, transportation and security.

CONCLUSION

The majority of farmers have the capacity for integrated beef cattle farming with palm oil in the low category. This condition is characterized by the ability of breeders who do not pay attention to the technicalities of integrated cattle cultivation, such as the majority of cattle breeds whose parents are unknown, the rearing of cattle in oil palm plantations lacks supervision, the natural mating system with bulls of unknown origin, health checks and deworming have never been carried out. as well as a lack of regular work relationships. However, marketing is very easy and fast. The capacity of farmers in the integrated beef cattle farming business on oil palm plantations is directly influenced by (1) the individual characteristics of the farmer as reflected by formal education, number of livestock, perception and motivation of the farmer; (2) External support reflected by government, family, institutional and market support; (3) the role of agricultural instructors as facilitators, communicators and consultants.

The implication of the results of this study is that the development of farmers' capacity in the integrated beef cattle business with oil palm can be achieved through several approaches. First, by improving the individual characteristics of farmers, including enhancing formal education, livestock ownership, perceptions, and motivation. Second, by increasing external support that benefits the livestock business. Finally, through optimizing the role of agricultural extension workers as facilitators, communicators, and consultants.

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