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# The importance of aquaculture community group (ACG) in social media (Facebook) towards the aquaculture knowledge and financial improvement of small scale fish farmers (SSFF) in rural areas of Central Java

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**Abstract.** Internet is now widely used by people all over the world, including small scale fisheries communities such as fish farmers. Many applications are being created including social media Facebook which are used by small scale fish farmers (SSFF) for its ease and convenience. The objective of this research is to identify the impact of aquaculture community group (ACG) in social media Facebook towards the improvement of aquaculture knowledge and financial condition of small scale fish farmers in Central Java. This research used quantitative approach where questionnaires were distributed into two groups: SSFF who are member of ACG in social media Facebook and who are not. Sampling technique used random sampling, used 60 samples of SSFF in Central Java. Data obtained were tested using the test statistic Independent t-test using SPSS v.20. Result showed a significant effect of group who are member of ACG in social media Facebook and those who are not, towards the aquaculture knowledge (t count -7.424 and sig 0.000) and financial improvement (t -3.775 and sig 0.000). The results of the average value of the SSFF who are ACG member in Facebook are also higher than farmers who are not.

## 1. Introduction

In this modern era, internet has reached all levels of society including small scale fish farmers (SSFF). Nowadays, the utilisation of internet is much easier. Moreover, the price of internet package is getting more affordable and there are more varieties of technological hardware to access the internet (computers, smart phones, and tablets) are available in markets.

There are more than 38 million users of internet in Indonesia, with 75 % of them are active on social media [1]. One of the well known and most used social media in Indonesia is Facebook. Indonesia is one of the largest users of Facebook in the world with user reaching up to almost 18 million people [2]. From all Facebook users in Indonesia, 26 % worked as entrepreneurs, where 68 % are entrepreneurs in the area of trade, services and agro industry including fisheries [3]. Facebook are chosen by small scale fish farmers for its easy use, wide network, and availability of groups to give opportunities to interact with other users with similarities in aquaculture commodity or location. Each year, Facebook aquaculture communities are getting larger and the number of members increases and distributes widely in Indonesia. The fact that there is no social limitation in social media has made



SSFF to become more open to share information and issues. Fish farmers can also widen their network since member of the fisheries community on Facebook came from different areas in Indonesia.

Currently one of the obstacles in aquaculture business is the slow distribution of information from the government to fish farmers, which results in lack of information to increase aquaculture production. Moreover, information on potential market cannot be easily accessed by small scale fish farmers. This has resulted in inability of most fish farmers to sell directly to market and it forces them to have to sell to middle men with lower selling price.

Social Media like Facebook offers speed, accuracy, validity, and reliability, and it has the solution for one the grounding issues faced by small scale fish farmers that is limitation in information and market. An SSFF utilizes community group to interact with other SSFF who have similar interest. It helps them to share information and knowledge on new technology, price and market. To date, there have been no formal studies on the potential and effect of aquaculture community group on Facebook towards the enhancement of SSFF quality in Indonesia.

## **2. Methodology**

This research used quantitative approach in order to observe the impact of fisheries communities in social media Facebook towards the enhancement of knowledge and financial condition of SSFF.

This research used the following four variables:

1. Independent variable: SSFF that were Aquaculture Community Group members on Facebook
2. Independent variable: SSFF that were non ACG members on Facebook
3. Dependent variable: improvement on aquaculture knowledge and information among SSFF
4. Dependent variable: improvement on financial condition of SSFF

Population for this research were active SSFF member of fisheries community on Facebook and SSFF that do not utilize Facebook. This research limited the population to only SSFF that were located in Central Java, however the type of fish they farmed, their educational level, land width, and aquaculture system used were not limited, therefore it was assumed that the sample could represent the aquaculture population in Central Java.

The sampling technique used was purposive random sampling based on certain considerations. The Number of samples taken 15 % of the population according to Taro Yamame's theory where if the number of a population was 200 and the maximum error was set at 5 % (0.05) therefore, there should be 30 samples taken from each group. The questionnaire consisted of 40 questions, with 20 questions were related to aquaculture knowledge and 20 questions were related to economical aspects. The questions indicators in the questionnaire are as shown in table 1.

**Table 1.** Questions indicator.

Measurement indicator	Percentage	# of Questions
<b>Aspect on aquaculture knowledge</b>		
1. Aquaculture cultivation technique indicator	40 %	8
a. Aquaculture production preparation		2
b. Feeding method		1
c. Water quality management		2
d. Disease and parasite management		1
e. Production control		1
f. Harvest		1
2. Aquaculture problem solving indicator	20 %	4
a. Fish larvae issues		1
b. Fish disease issues		1
c. Water quality issues		1
d. Feed issues		1
3. Aquaculture latest information indicator	20 %	4
a. Aquaculture commodity		1
b. System and technology		1
c. Current issues on aquaculture		1
d. Selling price on aquaculture commodity		1
4. Aquaculture information resources indicator	20 %	4
a. When information are needed		1
b. How often information are needed		1
c. Information needed are important		1
d. Easy to find information		1
<b>TOTAL</b>	<b>100 %</b>	<b>20</b>
		<b>Questions</b>
<b>Financial Aspects</b>		
1. Welfare indicator	30 %	6
a. Income		3
b. Cost for food		1
c. Household purchasing		1
d. Food security		1
2. Marketing indicator	40 %	8
a. Advertising		2
b. Marketing promotion		3
c. Direct selling		3
3. Social network indicator	30 %	6
a. Welfare		2
b. Marketing		3
c. Social network		3
<b>TOTAL</b>	<b>100 %</b>	<b>20</b>
		<b>Questions</b>

The percentages of questionnaire were given according to priorities and the importance of indicators in each aspect. Validity of the questionnaire was then analysed using the Pearson Product Moment correlation, while reliability was analysed using split-half technique from Spearman-Brown.

During questionnaire distribution for the non-Facebook users group and data collection for the Facebook users, the background of respondent were taken into account such as education level and the width of ponds used for aquaculture business, in order to minimise differences between the two groups. Thus, it was expected that the results of the comparative study were purely based on the impact of utilising fisheries community network on Facebook.

Data collected were analysed using (1) descriptive analysis to analyse raw data and followed by normality and homogeneity tests, (2) inferential analysis to analyse sample data and the results were used for population and (3) independent t-test, to compare and find significant differences between the two sample groups in order to develop final conclusions.

### 3. Result and Discussion

#### 3.1. Result

Demographic condition of the respondents included age groups, educational level, and types of commodity. The results are shown in table 2-4.

**Table 2.** Distribution of respondent's age.

Age (year)	ACG-FB member	Non member
21 – 30	20 %	0 %
31 – 40	30 %	33 %
41 – 50	40 %	30 %
51 – 60	10 %	33 %
>60	0 %	3 %

Table 2 shows that fish farmers, who were ACG members on Facebook, had a younger age group (21-30 years old), while fish farmers who were not ACG members on Facebook came from an older age group (31 years old and above).

Education level is one of the indicators that influence a small scale fish farmer in accepting, accessing, and understanding information on aquaculture production. Level of education can also influence the ability to access information technology. The education levels of respondents for both groups are shown in table 3.

**Table 3.** Distribution of educational level.

Education	ACG-FB member	Non member
Primary School	0 %	10 %
Junior High School	13 %	30 %
Senior High School	67 %	50 %
University Graduate	20 %	10 %

Table 3 shows that fish farmers, who were ACG-FB members, had a slightly higher educational level compared to those who were not members. Fish farmers who are utilizing ACG in FB for business are at least junior high school graduate with most population of senior high school graduates (67%).

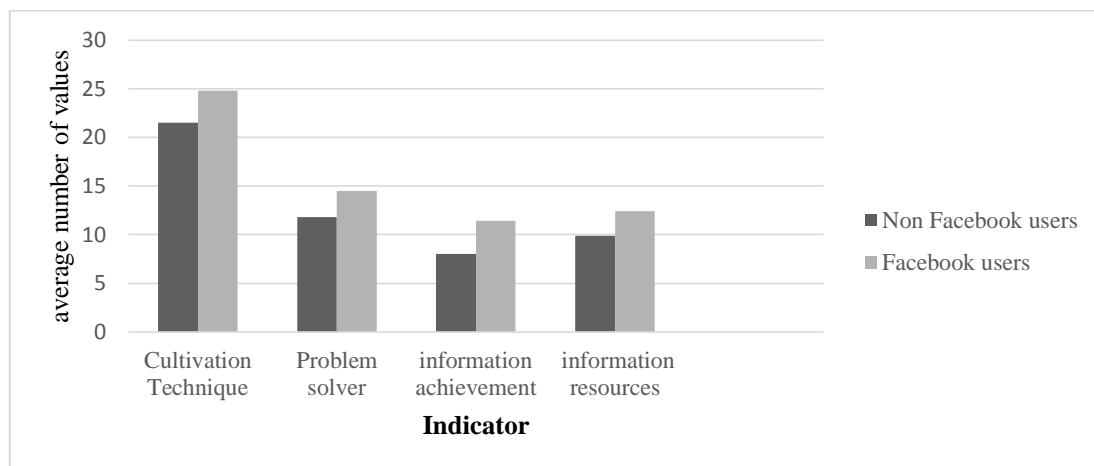
The commodities cultured by respondent are various. The data shows the species of fish that are mostly cultured in Central Java as shown in table 4.

**Table 4.** Distribution of aquaculture commodity.

Type of commodity	ACG-FB member	Non member
Catfish	53 %	43 %
Tilapia	27 %	27 %
Milkfish	7 %	10 %
Gouramy	10 %	20 %
Others (ornamental, etc)	3 %	0 %

Data shown in table 4 suggested that there were similar pattern for respondents who were ACG members on Facebook with those who were not members. It indicated that catfish remained the top most favoured type of fish to be cultured in Central Java, followed by tilapia.

The knowledge aspects of small scale fish farmer comprises of several indicators: culture technique, problem solving, obtained information, and sources of information. Based on the data collected, scores of each indicator are shown in figure 1.



**Figure 1.** Histogram of knowledge aspect indicators.

The histogram showed that the scores for knowledge aspect for SSFF that were members of ACG on Facebook. All four indicators were found higher than the score for SSFF who were not members. Furthermore, the result of t-test shown in table 6 indicated there was significant difference between SSFF who were ACG members on Facebook and non-members for their aquaculture business in the knowledge aspect.

**Table 5.** Result of t-test for knowledge aspect of SSFF.

		Result	
		<i>Equal variances assumed</i>	<i>Equal variances not assumed</i>
<i>Levene's Test for Equality of Variances</i>	F	15.803	
	Sig.	.000	
<i>t-test for Equality of Means</i>	T	-7.424	-7.424
	Df	58	42.321
	Sig. (2-tailed)	.000	.000
	Mean Difference	-11.33333	-11.33333
	Std. Error Difference	1.52652	1.52652
	95% Confidence Interval of the Difference	Lower Upper	-14.38900 -8.27767

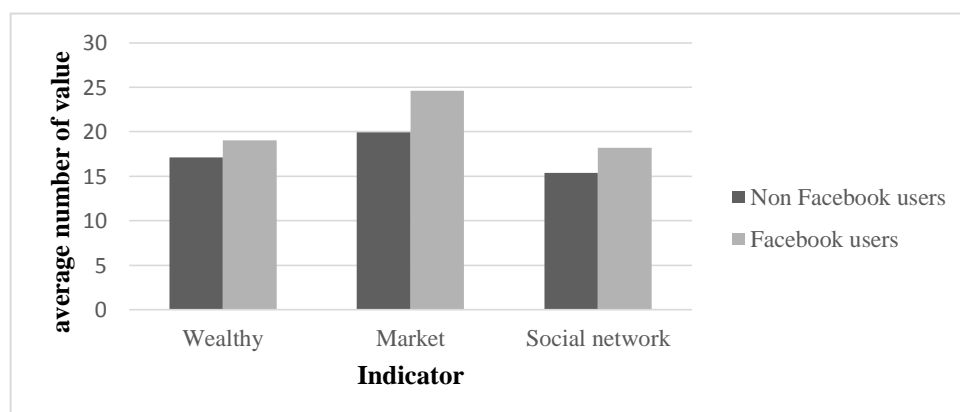
Result of t-test showed that the significance value was 0.000, pointing to the significant difference between SSFF that were ACG members on Facebook with those who were not members in terms of enhancement of aquaculture knowledge.

**Table 6.** Average value of knowledge aspect of SSFF.

Knowledge Aspects	N	Mean	Std. Deviation	Std. Error Mean
Non member	30	49.3333	7.49866	1.36906
ACG members	30	60.6667	3.69840	.67523

Results showed that ACG members had a higher mean (60.6667) compared to SSFF that were not members of ACG (49.3333). This suggested that SSFF who utilized Facebook had higher aquaculture knowledge than SSFF that did not utilize Facebook.

The economic aspect for SSFF consists of 3 indicators: welfare, market, and social network. Results of data analysis are shown in figure 2.

**Figure 2.** Histogram of economic aspects indicators in SSFF.

The economic aspect of SSFF, which is shown in figure 2, indicate that SSFF who were ACG members were found to have a higher score compared to SSFF that were not ACG members in all three indicators (welfare, marketing, and social network). Further analysis using t-test was performed to observe whether the two respondent groups had significant difference (table 7).

**Table 7.** T-test of economic aspects of SSFF.

		Result	
		<i>Equal variances assumed</i>	<i>Equal variances not assumed</i>
<i>Levene's Test for Equality of Variances</i>	F	7.696	
	Sig.	.007	
	T	-3.775	-3.775
	Df	58	44.420
<i>t-test for Equality of Means</i>	<i>Sig. (2-tailed)</i>	.000	.000
	<i>Mean Difference</i>	-9.43333	-9.43333
	<i>Std. Error Difference</i>	2.49859	2.49859
	<i>95% Confidence Interval of the Difference</i>	<i>Lower</i> -14.43480	-14.46756
		<i>Upper</i> -4.43186	-4.39910

Analysis using t-test suggested that there was significant difference between the two SSFF groups (significance value of 0.000ACG members) in terms of economic aspect.

**Table 8.** Average value of economic aspect of SSFF.

Economic aspect	N	<i>Mean</i>	<i>Std. Deviation</i>	<i>Std. Error Mean</i>
Non member	30	52.4000	12.05905	2.20167
ACG-FB member	30	61.8333	6.47053	1.18135

The average value shown in table 8 suggests that SSFF who were ACG members on Facebook had a higher value (61.8333) compared to SSFF who were not ACG members (52.4000). This indicates that there were significant differences between both groups in terms of economic condition. Therefore, the results confirmed that Facebook gave significant impact towards the economic aspect and it could help to improve welfare, marketing, and social network of SSFF.

### 3.2. Discussion

#### 3.2.1 Knowledge of SSFF.

The knowledge level of SSFF who utilized Facebook by becoming ACG members (hereafter referred as Group 1) was higher compared to SSFF who did not utilize Facebook (hereafter referred as Group 2). This is due to the possibility that Group 1 obtain more information regarding better aquaculture techniques available from other the aquaculture community members on Facebook. On the contrary, Group 2 had limitation in obtaining new information on sustainable aquaculture system and other related issues. This indicates that there is an important role of information technology to increase the knowledge of SSFF through fast access to information. The development of Facebook community groups allows its members to share information, sell products and communicate with each other in order to increase social network and enhance the quality of business [1]. Similar opinion was emphasized by rural communities that confirmed that the internet and social media had widen and expand their knowledge by providing latest information that could increase their skills [4].



Group 1 also seemed to have more problem solving skills compared to those in Group 2. This was shown by the score of SSFF where Group 1 had higher score (14.5) than Group 2 (11.8). This phenomenon may be due to the fact that SSFF who belonged in Group 1 had more opportunities to interact and share issues and discuss how to solve problems with other members of the aquaculture community, who might have experience similar problems or who had expertise in dealing with such issues. On the other hand, SSFF in Group 2 did not experience this kind of exposure, thus they did not have access to share and discuss their problems with wider community and consequently, it limited their ability to solve aquaculture related issues. This was in line with the research from [4] who asserted that the internet and Facebook had help to ease communication for rural community to connect with the world beyond their area and increase their skills and knowledge in technology, culture, agriculture, etc.

Based on the results collected through questionnaire, it was found that SSFF in Group 1 were more “up to date” and they followed the latest information regarding technology and other aquaculture related information compared to Group 2. One of the examples was from one of the questions where SSFF were asked regarding latest information. SSFF in Group 1 obtained higher score than those in Group 2. This means that SSFF who were active on Facebook aquaculture community group were more aware on issues and development related to aquaculture while SSFF who did not follow latest information remain uninformed. This shows that community groups on Facebook gave positive impact towards rural society, such as better understanding of a particular issue [5]. Many Facebook users like to write an updated status that makes other Facebook users obtain information on that related topic. Therefore, virtually, people who use social network are connected with each other for social searching of information.

SSFF in Group 1 had a better and reliable source of information. Social media had wider scope and advanced technology that makes it possible for its users to access information accurately and instantly when needed. This has made SSFF in Group 1 were faster in obtaining information on aquaculture related issues. Social network is one of the social media that fulfils the various needs of its users, including communicating with other users with similar interest or background and discuss issues that are of interest for them [5]. The easy access to information is the aspect that was not experienced by SSFF in Group 2 considering that their only intensive interaction and source of information were limited to extension services and other SSFF peers located closely within their area.

### *3.2.2. Financial condition of SSFF.*

Group 1 showed a significant difference in the level of welfare compared to Group 2. This may be due to the possibility that SSFF in Group 1 who were active members of ACG on Facebook had a wider social network and were more advanced in marketing. The scores for marketing indicator and social network were higher in Group 1 (marketing score of 24.6 and social network score of 18.6) compared to Group 2 (marketing score of 19.9 and social network score of 15.4). Better marketing skills and wider social network plays a role in determining the level of welfare of SSFF. This was supported by previous research that confirmed welfare is associated with economy, where one of the focuses is marketing [6]. Similar research also found that the key to enhance the economy is to increase income, whereas in marketing, the key is to employ a good promotional media and a wide social network [7].

SSFF in Group 1 also resulted in a higher value in the marketing indicator compared to SSFF Group 2. The higher value in marketing was influenced by the advertisement and promotion that were carried out by SSFF through ACG on Facebook. They uploaded photos of their product online through Facebook and through this marketing strategy they are able to increase selling by getting more new customers compared to the opposite group. Advertising through social media are statistically proven to influence the decision of customer to buy product, also the usage of commercial advertisement through creative media is important to influence customers to buy product [7]. Similar opinion was asserted [8] that social media based promotion is very effective to increase sales of product and services.

Result also showed that Group 1 scored higher (value score 18.2) in the social network indicator compared to Group 2 (value score 14.4). This means that SSFF who were ACG members on Facebook had a wider social network and good relationship with SSFF from other areas in Indonesia. Wider network and good communication and relation help ACG members to easily obtain information regarding latest aquaculture technique, problem solving, issues, as well as market development and opportunities. This has made this group of SSFF to be more advanced compared to SSFF who were not ACG members on Facebook. Social network on the internet is used widely by companies to attract customers [9]. Social media are used for its incredible connectivity between users and communities or groups that have been developed. It has also been emphasized that developing business network in social media is a sustainable marketing strategy. This was proven from the result of previous research that used two community groups on Facebook, where after one year; there was substantial growth in number of selling followed by an increase in the number of group members [1].

ACG on Facebook proved to have a significant effect towards the overall quality of SSFF. Social media is an efficient, effective and fast way to communicate and it covers a wide range of society regardless of their background [10]. ACG on Facebook is a communication media that provides information for SSFF regarding aquaculture techniques, problem solving methods, and current information on aquaculture. The aquaculture knowledge indicator was higher since Facebook assisted SSFF to communicate, in low cost, more easily and openly for everyone. Thus it had made the aquaculture society to develop a good and profitable discussion forum. The principle of openness in social media had made SSFF feel free to choose communities in which they wanted to join according to their interest and needs. The ease in communication has been successfully utilized to improve financial condition. It is effective to attract new consumers; therefore it has been used widely as means of promotion and advertising with economical value [11]. Based on the above discussion, it is fair to say that social media have now become one of the most important tools for SSFF to encounter business challenges and competitions, especially in improving the aquaculture knowledge and financial condition.

#### 4. Conclusion

Based on the result of this research, it can be concluded that the SSFF in Central Java who were ACG members on Facebook had a significant improvement in aquaculture knowledge if compared to SSFF that were not members of ACG on Facebook. The score of SSFF knowledge for those who did not utilize Facebook was only 49.33, while those who utilized Facebook had a higher mean value of 60.66.

The SSFF who utilized Facebook also showed a significant improvement of their financial condition. A higher mean value score (61.83) was identified in SSFF who utilized Facebook, compared to SSFF who did not utilize Facebook (52.4). This research confirms that ACG on Facebook had a high level of importance in improving quality of knowledge and financial condition of SSFF in Central Java.

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