Analysis of the benefits of information and communication technology in extension activities in the District and City of Cirebon, West Java Province, Indonesia

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Abstract. This study aims to analyze the relationship between the characteristics of fisheries instructors related to the use of Information and Communication Technology (ICT), and their implementation in fisheries extension activities carried out in the District and City of Cirebon, West Java Province, Indonesia. Data is tabulated and categorized and then analyzed using the Rank Spearmen test. The results of Rank Spearmen analysis conclude that there is a real relationship between the characteristics of fisheries instructor characteristics related to information technology, the level of ICT use and the implementation of fisheries extension activities in the Regency and City of Cirebon. The internal characteristics of fisheries instructors related to the use of ICTs are age, through the frequency of accessing ICT parameters (rs = 0.361), showing that there is a non-linear relationship associated with fisheries of older age (>45 years) who do more, more often even longer in accessing ICTs than middle and young extension workers. The external characteristics variable of fisheries instructors that is significantly related to the use of ICTs is the motivation of extension workers with the type of ICT information that is accessed (r_s = 0.434); extension instructors with the type of ICT information accessed (r_s = 0.333); and ownership of ICT infrastructure with the duration of accessing ICT (r_s = 0.322). These three factors are the strength of fisheries instructors in the use of ICT in their main tasks and functions as fisheries instructors. On the other hand, factors that are significantly related to the implementation of fisheries extension activities (planning, implementation, development and supporting activities) in the City and Regency of Cirebon are the external characteristics of fisheries instructors including motivation with development activities (r_s = 0.359), environment with planning activities (r_s = 0.359) environment with implementation activities (r_s = 0.349), perceptions of instructors with plans (r_s = 0.384), and perceptions of instructors with extension activities (r_s = 0.537).
Key Words: industrial revolution, information technology, ICT, implementation, fisheries counseling.

Introduction. Currently, the use of computers in a wide variety of fields and types of systems is very important, such as in educational systems using projector aids, smart board, digital processor, and so on. Likewise, as a multimedia system such as TV, radio, recording system, home cinema, and so on, using a computer as the main device (ShekarAra 2013). This shows that nowadays almost all areas of life really need a computer for supporting works. Innovation models have changed from simple linear to networking interactions and concepts such as open innovation and innovation network have become important to both academic and market society due to intensive global competition in Teheran, Iran (Phirouzabadi 2014). This means that the use of computers as a support program for information technology in the field of fisheries extension which is identical to the delivery of fisheries extension innovations will require a fundamental change towards computerization.

The Ministry of Marine Affairs and Fisheries of the Republic of Indonesia, starting in September 2013, has developed the use of technology and information through the management of the Cyber Extension page so that fisheries extension agents can easily access information about extension materials, regulations and other information related to fisheries extension services as a problem solver for major fisheries actors. The Cyber Extension approach is recipient-oriented, individual in nature, and can save costs, time

and energy (Adekoya 2007). In its development, the use of information technology among fisheries extension agents is currently using the e-extension application, which requires fisheries extension agents to master the use of information technology in carrying out their duties and functions.

Along with information technology that is increasingly developing now and the challenges faced with the 4.0 industrial revolution, fisheries extension people should be able to utilize digital facilities to conduct their extension activities. Now fisheries extension activities are expanded, including supporting subsectors in the form of technology and fisheries resource management to meet the financial needs of the main actors. Through the use of digital facilities, it is expected to be able to overcome the problem of the wide reach of the work area while the resources for fisheries are limited.

In connection with the limitations of Fisheries Extension personnel and the financial limitations of the central and regional governments (perfecture), now in Japan the formulation of information dissemination as a promotion, initiates information technology extension and communication activities, relying on the use of computers and information technology more effectively and efficiently. With information technology tools, extension guides can quickly exchange location-specific information to other fisheries sector development areas. The devices used develop over time. If in 1975 the initial application was to use a "Snail Letter", then in 1985 it was promoted by promoting the use of facsimile, and in 1990 it was enlivened by the use of a personal communication network named: Value Added Counseling Network (Fukyu/Extemion) Value Added. The most popular communication network implemented in 2000 to date, the system was named the Extension Information Network or abbreviated to El-Net, integrated with the internet, home page, and operated by the Japanese Information Technology Center (Kamaruddin & Azis 2006).

Counseling is oriented towards behavioral change that is increasing knowledge, skills and attitudes. Law 16/2006 of Republic of Indonesia is the basis that Fisheries Instructors are the subject of extension activities to the main actors and business actors in their locations.

Regulation of the Ministry of State for Administrative Reform of the Republic of Indonesia PER/19/M.PAN/10/2008, explains that a counselor must conduct fisheries extension activities which include preparation, implementation, evaluation and reporting and development of fisheries extension. Extension agents as individuals who have internal and external characteristics in the implementation of their main duties and functions according to the decree will be greatly influenced by the level of use of Information and Communication Technology (ICT) that they use as instruments in the field, so it is very important to equip themselves with infrastructure and equipment information technology that is able to facilitate the transfer of knowledge and skills of innovations in the field of fisheries. The level of use of ICT in the implementation of fisheries extension activities which is motivated by the characteristics of individual instructors will be one of the parameters of the success of fisheries extension.

The problems that need to be answered in this study are factors of fisheries extension characteristics and indicators related to the level of ICT use, as well as factors of fisheries extension characteristics in relation to the implementation of fisheries extension activities.

This study aims to analyze the relationship between the characteristics of fisheries instructors related to the use of information and communication technology (ICT), and their implementation in fisheries extension activities, and also to know how far the extension instructors adopt the media in their implementation task of extension activities in the Regency and City of Cirebon. The benefits of the research are expected to be able to provide input in the framework of disseminating the results of research studies, as well as input for the District and City of Cirebon Maritime and Fisheries Office in facilitating the provision of ICT infrastructure for fisheries extension workers.

In this study, there are several variables that become units of measurement, namely determining the level of ICT use. Determination of the level of use of ICT variables is based on the theory of De Fleur (2010) that in mass communication, there are sources, transmitters and recipients of messages. The source plays a role in the

selection of various messages while the transmitter converts messages into signals sent through certain communication channels while the recipient of the message plays a role in receiving information and encoding the received message. In addition the existence of feedback devices will help the source to analyze the target audience in this case the communication process that occurs as a separate part of the recipient of the message.

Furthermore Elian et al (2014) measured the behavior of the use of mass media by agricultural instructors through frequency and duration variables. Referring to the theory, there are three factors used in this study to measure the level of ICT use by fisheries instructors, namely the duration of accessing ICT (duration), frequent access to ICT (frequency) and the type of ICT accessed. Then there are variable factors that are thought to be related to the use of ICT determined based on Slamet (1978) theory, namely age, level of formal education, environmental factors, instructor perceptions, institutional/institutional support, ownership of ICT facilities, and added motivation based on Herzberg's theory (theory Two Factors) in Siagian (2004) and perceptions based on Soekartawi (1988) theory as showed in Figure 1.

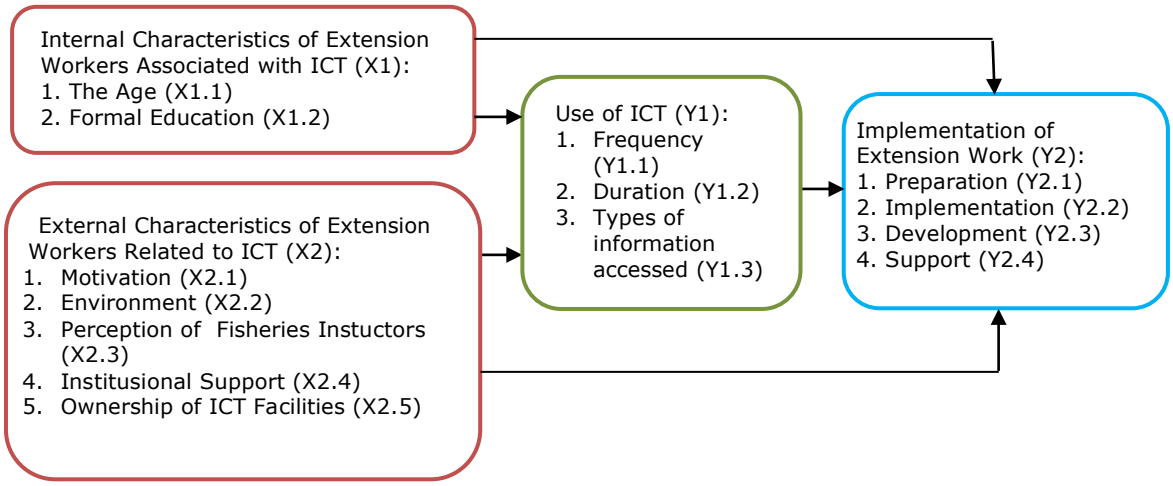


Figure 1. Thinking framework.

Based on this framework, the hypotheses of the present study are:

H1 = There is a significant relationship between the variables of fisheries instructors characteristics, the level of ICT use and the implementation of fisheries extension activities;

H0 = There is no significant relationship between the characteristics of fisheries instructors characteristics, the level of ICT use and the implementation of fisheries extension activities.

Material and Method. This research was conducted in the Regency and City of Cirebon in West Java Province, Indonesia in April-May 2019. Respondents were all fisheries government officers and assistance fisheries extension officers in Cirebon Regency and City of West Java Province.

The method used is the census method. This method is a survey research that researchers take all members of the population as respondents, thus the census uses the total sampling studied (Kriyantono 2009). The type of data used includes primary data and secondary data. Data collection tools used by researchers include three methods (Fathoni 2011), namely: a) Questionnaire, b) Interview (interview) and c) Literature Study.

Data analysis method. Data collected was tabulated and analyzed using non-parametric statistics. Analysis of the data used the form of descriptive analysis, and inferential statistical analysis. Inferential statistical analysis using the Spearman Rank Correlation test (r_s) with the Spearman Rank Analysis formula (Siegel 1997).

$$r_s = 1 - \frac{6 \sum d_i^2}{N^3 - N}$$

Where:
r_s = Spearman's rank correlation coefficient
N = Number of respondents
d_i = Difference in ranking between two variables

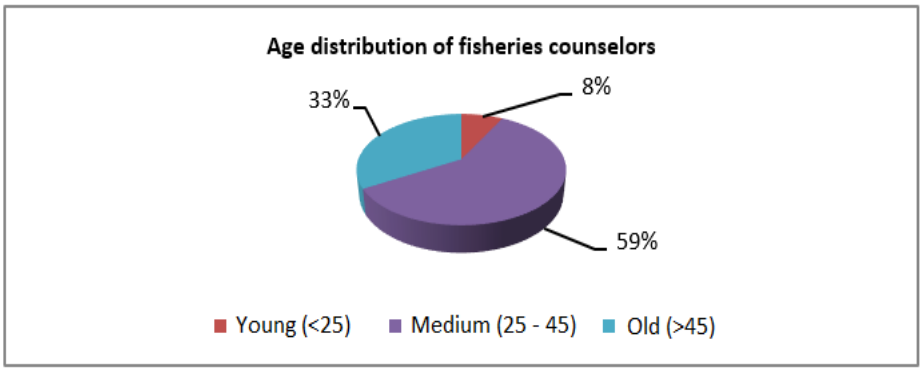
All data were analyzed with the SPSS program version 23.

Results. Cirebon Regency and City are potential fishing areas for the development of various freshwater, brackish and marine aquaculture commodities, fish processing and salt production (Central Bureau of Statistics for regencies and cities of Cirebon 2019). Seeing the very diverse potential of fisheries to be developed, the extension of fisheries extension to Information and Communication Technology (ICT) is very important. Their main duties and functions in implementing extension activities through the transfer of knowledge, knowledge and skills in the field of fisheries to the main actors of fisheries will be carried out optimally with the support of the use of ICT infrastructure, motivation and perception of extension workers, as well as environmental support and the supporting institutions. The use of ICTs with parameters of duration, frequency and types of information accessed by fisheries extension officers are closely related to how they are implemented in the extension process which includes preparation, implementation, development and support.

ICT facilities owned consist of computers/laptops, cellphones, radios and televisions, while the types of media accessed are websites, video conferences, video calls, Cyber Extension Applications, social media (WhatsApp, Facebook, Tweeter, Instagram) and e-mail. The various ICTs that are accessed to enrich the presentation of fisheries extension materials are those of marine and fisheries technology, technology and insights outside of marine and fisheries science and other social news.

In general, the results of the study illustrate the relationship between the internal characteristics of fisheries instructors (age and education) and the external characteristics of fisheries instructors (motivation, environment, perception of instructors, agency/institutional support and ICT ownership) with the use of ICTs and implementation in fisheries extension activities in Regencies and Cirebon City.

Age distribution. Age distribution of fisheries instructors revealed that out of a total of 39 people, the majority was in the middle age category between 25 and 45 years (23 individuals or 59%) and then followed by old counselors with age category of above 45 years (13 individuals or 33%) and the least are young counselors with age category of <25 years (3 individuals or 8%). Figure 2 shows that in general most of te fisheries instructors are in the medium age category, followed by the old age category, which shows that the extension process to the main fisheries actors in this area has been carried out by a generation who is ICT literate, but not necessarily in terms of adoption of using these technological devices.

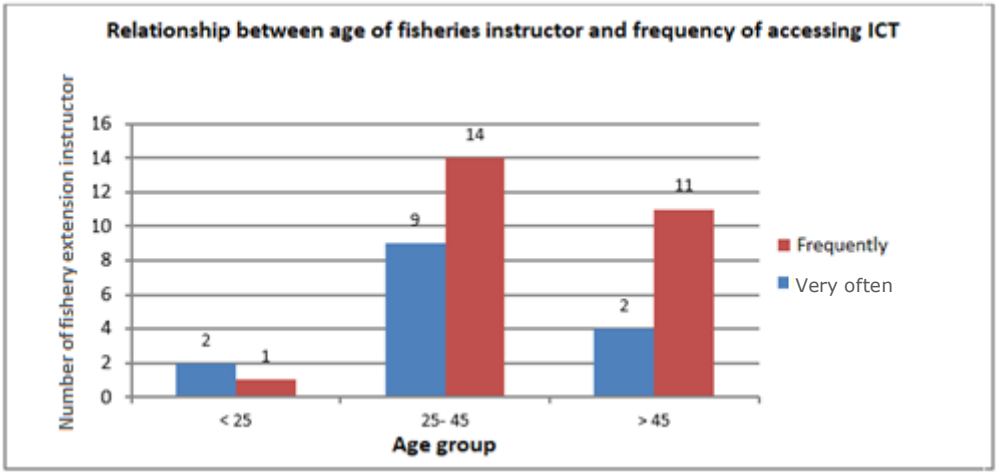


Extension workers = 39 individuals; Minimum age is 22 years; Maximum age is 50 years; The average age is 36 years.

Figure 2. Age distribution of fisheries extention instructors (counselors).

Analysis of age relationship with ICT use

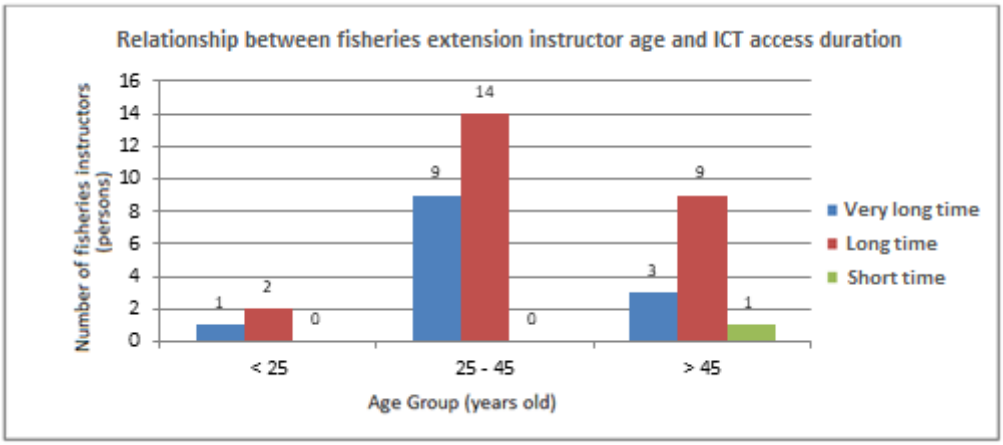
Relationship between age of fisheries instuctors and frequency of accessing ICT. The results showed that out of a total of 39 fisheries instructors, concerning the frequency of accessing ICT that is categorized frequently (10-19 times month^{-1}) and very often (>20 times month^{-1}) was very dominant in the middle age group (25-45 years) and then followed by the old age group (>45 years) and young age groups (<25 years). Figure 3 shows that the frequency of accessing ICT is dominated by medium-aged extension instuctors.



Accessing frequency is at least 10 times month^{-1}; Maximum Accessing Frequency 28 times month^{-1}. Categories: Very often (Access of >20 times month^{-1}); Frequent (Access 10-19 times month^{-1}).

Figure 3. Relationship between fisheries instructors age and ICT access frequency.

Relationship between fisheries instructors age and ICT access duration. Concerning the duration of accessing ICT, from a total of 39 fisheries instructors in the very long time accessing category were icluded 13 individuals, I the long time accessing category were 25 individuals included and in the short time accessing category was found only 1 person. This means that fisheries instuctors who are in the middle age dominate in terms of duration length using ICT (Figure 4).

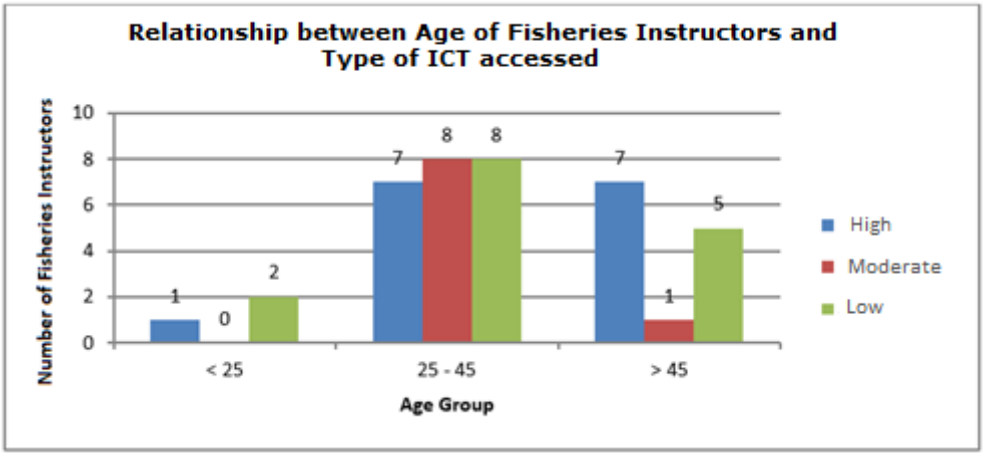


Minimum access duration 2 hours week^{-1}; Maximum access duration 7 hours week^{-1}; Long time accessing category (2-7 hours week^{-1}); Very long time accessing category (>7 hours week^{-1}).

Figure 4. Relationship between fisheries extension instructor age and ICT access duration.

Relationship between fisheries extension instructors age and type of ICT accessed. In the medium age group (25-45 years) who mastered the type of ICT applications with many categories (5 applications) were as many as 7 people, enough (2-

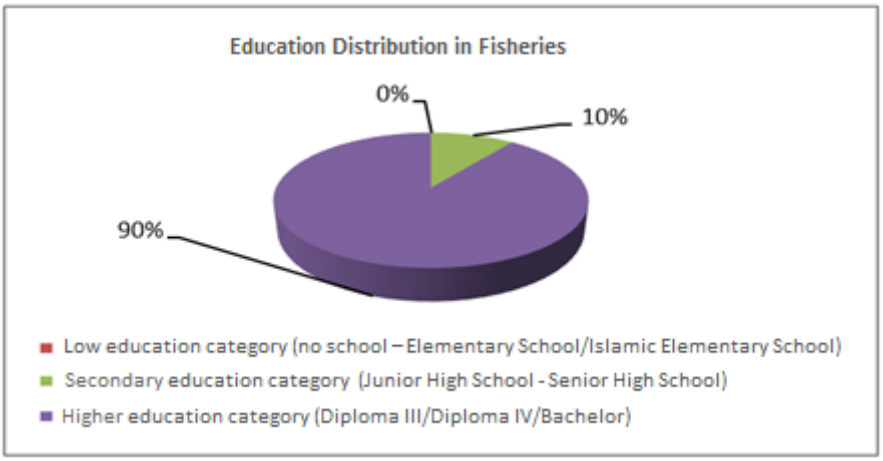
3 applications) as many as 8 people and a few (1 application) as many as 8 people. In the young age group (>25 years) access to applications is minimal, while the age group of >45 years is the majority of those who access applications (5 applications) (Figure 5).



Minimum of 1 ICTs application accessed; Maximum of 5 ICT applications accessed. High category (5 types of ICT applications); Moderate category (2-3 types of ICT applications); Low category (1 type of ICT application).

Figure 5. Relationship between fisheries instructors age and type of ICT accessed.

Education distribution. Out of a total of 39 fisheries instructors, the majority benefited of higher education (Diploma III/Diploma IV/Bachelor) of 90% (35 individuals), of secondary education (Junior High School - Senior High School) of 10% (4 individuals) and no individuals were identified in the low education category (no school – Elementary School/Islamic Elementary School) (Figure 6).

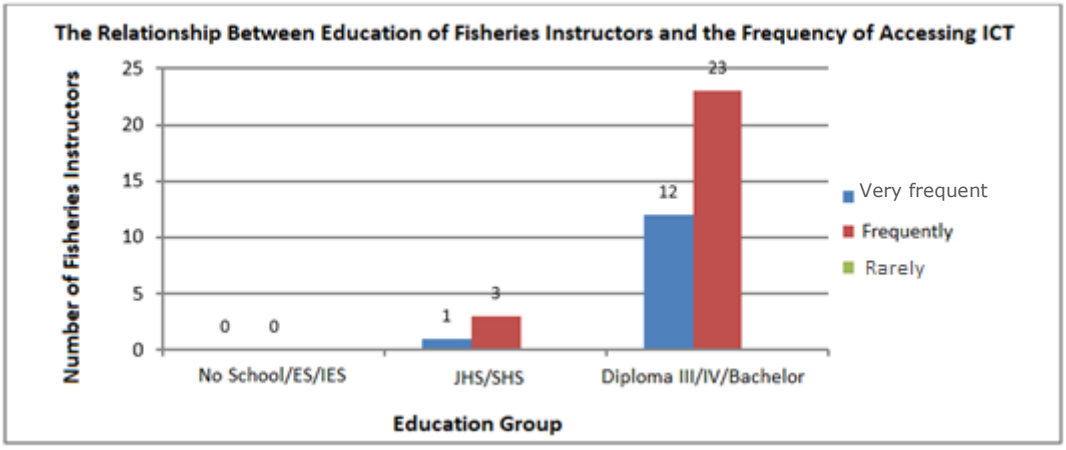


Number of respondents 39 individuals; Minimum education – secondary school; High education - diploma III/IV/ Bachelor's education; Average education - diploma/Bachelor education.

Figure 6. Education distribution in fishery.

Analysis of the relationship of education with ICT

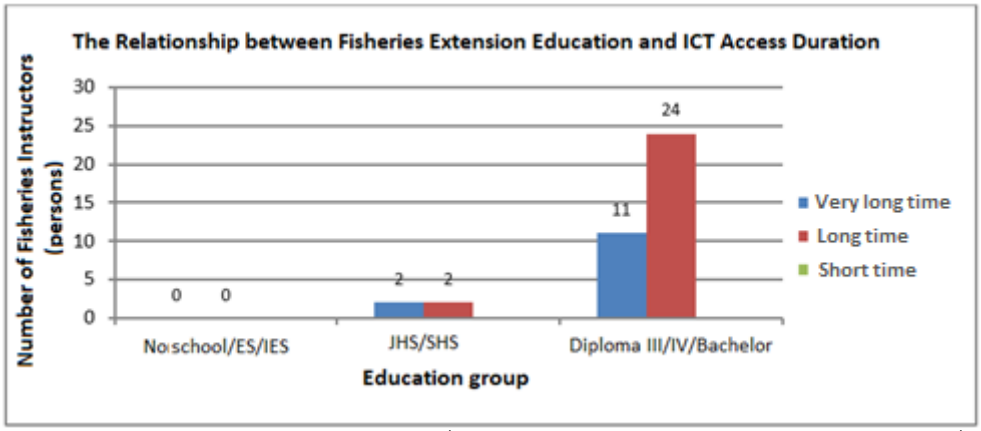
The relationship between fisheries instructors education and the frequency of accessing ICT. The number of fisheries instructors who have high education (Diploma III/Diploma IV/Bachelor) were the majority falling within the frequent category (10-19 times month^{-1}) in accessing ICTs as many as 23 people, and into the very often category (>20 times month^{-1}) were included as many as 12 people, while a small proportion in the moderate education group (Junior High School - Senior High School) were included in the very often and often category (Figure 7).



Minimum accessing frequency - 10 times month^{-1}; Maximum accessing frequency - 28 times month^{-1}; Very frequent category (Accessing >20 times month^{-1}; Frequent category (Accessing 10-19 times month^{-1}).

Figure 7. The relationship between fisheries instructors education and the frequency of accessing ICT.

The relationship between fisheries instructors education and ICT access duration. The duration of fisheries extension workers in accessing ICT at the level of tertiary education (Diploma III/Diploma IV/Bachelor) within the old category (2-7 hours week^{-1}) were 24 people, and in the very long time access category (>7 hours week^{-1}) as many as 11 people. While the remaining 4 people at the level of moderate education (Junior High School - Senior High School) were included in the long and very long acces category (Figure 8).

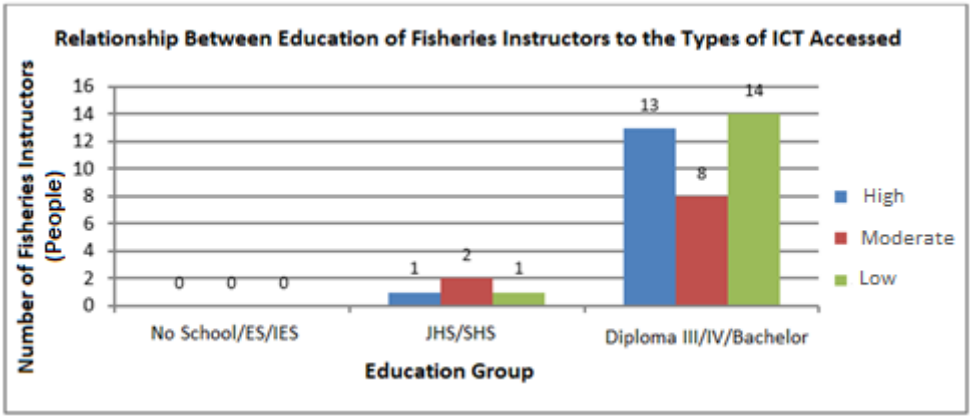


The minimum duration of access is 2 hours week^{-1}; Maximum access duration is 7 hours week^{-1}; Long time category (2-7 hours week^{-1}); Very long time category (>7 hours week^{-1}).

Figure 8. The relationship between fisheries extension education and ICT access duration.

The relationship of fisheries instructors education with accessed types of ICT. The types of ICT applications that were most accessed by fisheries instructors at the higher education level (Diploma III/Diploma IV/Bachelor) was in the low category (1 ICT application) accessed by 14 people, the sufficient category (2 ICT applications) was accessed by 8 respondents and in the high category (5 ICT applications) 13 people were included. The rest were at the level of moderate education (Junior High School - Senior High School) two persons, and the low education category was represented by one person (Figure 9).

Based on the results of the analysis shown in Figures 2 to 9, it was concluded that the age of fisheries instructors in the regencies and cities of Cirebon were mostly of medium age (25-45 years), with an average category of higher education (Diploma 4/Bachelor).



Types of ICTs accessed at least 1 application; Types of ICT accessed by a maximum of 5 applications; High category (5 types of ICT applications); Moderate category (2-3 types of ICT applications); Low category (1 type of ICT application).

Figure 9. The relationship between education of fisheries instructors and types of ICT accessed.

The age group and tertiary education of fisheries instructors and their lack of use of ICT can be seen from the frequency, duration and type of ICT that are accessed into the high category according to the facilities and infrastructure owned, so that this tendency becomes their strength in carrying out their main tasks and functions in Regency and City of Cirebon, West Java Province.

Relationship of internal characteristics of fisheries instructors with use of ICT (Spearman Rank Test results). The internal characteristics of the fisheries instructors are age and education, while the use of ICT includes the accesing frequency, duration of accesing and types of ICT accessed. Spearman rank test results concerning the relationship of internal characteristics of fisheries instructors with use of ICT are displayed in Tables 1-3.

Table 1

Relationship between the internal characteristics of fisheries extension and frequency accessing information and communication technology (ICT)

No	*Internal characteristics*	*Frequency of accessing ICT*	
		r_s	*Remarks*
1.	Age	-.361*	Significant
2.	Education	0.024	Not Significant

* Significant at the real level $\alpha = 0.05$.

The Spearman Rank analysis illustrates that the age of the respondents is significantly related to how they access ICT in the fisheries extension activities carried out (r_s = -.361), not so with education; the value of r_s = -.361, this indicates that there is a significant but not linear relationship, that the elderly (>45 years) do more, more often and even longer in accessing ICT, when compared to the majority of middle-aged fisheries instructors and young people at the same level of education.

Spearman Rank analysis shows that there is no significant relationship between age and education of fisheries instructors with the type of ICT information accessed.
So it can be concluded that from the internal characteristics of fisheries instructors who are significantly related to ICT is only the age variable with the frequency of accessing ICT.

Tabel 2

Relationship between internal characteristics of fisheries extension and duration accessing information and communication technology (ICT)

No	*Internal characteristics*	*Duration of accessing ICT*	
		r_s	*Remarks*
1.	Age	-.174	Not Significant
2.	Education	-.126	Not Significant

Spearman Rank analysis shows that there is no significant relationship between age and education of fisheries extension workers with the duration of accessing ICT.

Table 3

Relationship between the internal characteristics of fisheries instructors and types accessed information and communication technology (ICT)

No	*Internal characteristics*	*Types of ICT accessed*	
		r_s	*Remarks*
1.	Age	0.297	Not Significant
2.	Education	0.088	Not Significant

Relationship of external characteristics of fisheries instructors with the use of ICT (Spearman Rank Test results). The external characteristics of the fisheries instructor consists of motivation, environment, perception, institutional support and ownership of ICT facilities which are linked to the level of ICT utilization of fisheries extension workers including how accessing frequency, accessing duration, and types of information accessed (Tables 4-6).

Table 4

Relationship between external characteristics of fisheries instructors and frequency in accessing information and communication technology (ICT)

No	*External characteristics*	*ICT accessing frequency*	
		r_s	*Remarks*
1.	Motivation	-.164	Not Significant
2.	Environment	-.063	Not Significant
3.	Perception of fisheries instructors	-.188	Not Significant
4.	Institutional support	-.016	Not Significant
5.	Ownership of ICT facilities	0.069	Not Significant

Spearman Rank analysis shows that there is no significant relationship between the external characteristics of fisheries instructors (motivation, environment, perceptions, institutional support and ownership of ICT facilities) and the frequency with which they access (ICT) (Table 4).

Spearman Rank test analysis shows that there is a significant relationship between ownership of ICT facilities and the duration of accessing ICT (r_s = 0.322) while the external variables of other fisheries instructors are not related at all. This means that ownership of information technology equipment such as laptops, cellphones and others is the main support because without the supporting equipment it will be difficult to access technology and communication media.

Table 5

Relationship between external characteristics of fisheries instructors and duration accessing information and communication technology (ICT)

No	*External characteristics*	*ICT accessing duration*	
		r_s	*Remarks*
1.	Motivation	0.158	Not Significant
2.	Environment	0.193	Not Significant
3.	Perception of fisheries instructors	-.002	Not Significant
4.	Institutional support	0.145	Not Significant
5.	Ownership of ICT facilities	0.322*	Significant

* Significant at the real level $\alpha = 0.05$.

Table 6

Relationship between external characteristics of fisheries extension workers with types of ICT information accessed

No	*External charactheristics*	*Types of ICT information accessed*	
		r_s	*Remark*
1.	Motivation	0.434**	Significant
2.	Environment	0.133	Not significant
3.	Perception of fisheries instructors	0.333*	Significant
4.	Institutional support	0.132	Not significant
5.	Ownership of ICT facilities	0.290	Not significant

* Significant at the real level $\alpha = 0.05$.

** The correlation relationship is very strong and unidirectional at the real level $\alpha = 0.05$.

Spearman Rank test analysis shows that there are two significant variables between the external characteristics of fisheries instructors with the type of ICT that is accessed, namely the motivational variable ($r_s = 0.434$) significant and very related, it is mean that the encouragement of competency improvement, implementation of main duties and career development of fisheries extension instructors is influenced by the way they access the types of ICT in the highest category by accessing five devices such as laptops, cellphones, radio, TV, Cyber Extension, and accessing media in the form of websites, video conferences, video calls, social media and email, and then the instructor's perception ($r_s = 0.333$), significant, it is mean that the fisheries extension agents' perceptions include the many relative advantages of accessing fisheries extension materials, accessing information on extension materials, alignment with the current digital era 4.0, then their use allows them to be tried and adopted by extension targets because the process can be observed and implemented properly. Whereas the external variables of other fisheries instructors, namely environment, institutional support and ownership of ICT facilities, are not significantly related.

Recapitulation of significant relationships between characteristics of fisheries instructors and the use of fisheries instructors ICTs in the City and District of Cirebon. This recapitulation is an illustration that for fisheries extension instructors age as an internal characteristic parameter, it has a significant relationship but is not in line with the use of ICT on the frequency of access, which is because the age of extension instructors who access the majority is the elderly, not medium aged or young. Meanwhile, the external characteristics of the extension instuctors show that the motivation and perceptions of fisheries instructors have a very strong relationship with how the types of information are accessed by fisheries extension instructors, and then with the ownership of ICT tools with the duration of accessed ICT (Table 7).

Table 7
Recapitulation of significant relationships between characteristics of fisheries instructors and utilization of information and communication technology (ICT)

No	Internal and external characteristics	Utilization of ICT		
		Frequency	Duration	Type of information accessed
		r_s	r_s	r_s
1.	Age	-.361*	-.174	0.297
2.	Motivation	-.164	0.158	0.434**
3.	Perception of fisheries instructors	-.188	-.002	0.333*
4.	Ownership of ICT facilities	0.069	0.322*	0.290

* Significant at the real level α = 0.05.
** The correlation relationship is very strong and unidirectional at the real level α = 0.05.

The internal characteristics of fisheries instructors related to ICT use is the age of fisheries instructors with the frequency of accessing ICTs (r_s = -.361), while the external characteristics of fisheries instructors that are related to the use of ICTs are the motivation of instructors with the type of ICT information that is accessed (r_s = 0.434); Extension instructors with the type of ICT information accessed (r_s = 0.333); and ownership of facilities with duration of accessing ICT (r_s = 0.322).

Recapitulation of significant relationship between characteristics of fisheries instructors and the implementation of fisheries extenction activities in the City and District of Cirebon. Recapitulation of the characteristics of the fisheries instuctors that were significant with the implementation of fisheries extension activities in the field consists of three external characteristic variables, namely motivation, environment and perceptions of fisheries instructors, with the value of the spearman rank test results as shown in Table 8.

Table 8
Recapitulation of significant relationship characteristics of fisheries instructors and the implementation of fisheries extension activities

No	Characteristis of fisheries instructors	Implementation of fisheries extension activities			
		Planning	Implementation	Development	Support
		r_s	r_s	r_s	r_s
1.	Motivation	0.234	0.256	0.359*	0.276
2.	Environment	0.359*	0.349*	0.282	0.209
3.	Perception of fisheries instructors	0.384*	0.537**	0.223	0.299

* Significant at the real level α = 0.05.
** The correlation relationship is very strong and unidirectional at the real level α = 0.05.

The results of the recapitulation of a significant and unidirectional relationship between the characteristics of fisheries extension instructors and the implementation of the fisheries extension activities including planning, implementation, development and support show the results of the analysis that only external characteristics have a significant relationship, namely at the stage of extension planning, extension implementation, extension development and extension support. These external characteristics are significant motivation (rs = 0.359) with the implementation of fisheries extension development activities. The environment is significantly related to the implementation of fisheries extension planning activities (rs = 0.359) and the implementation of fisheries extension activities (rs = 0.349). Then the perception of the

extension instructors has a significant relationship with the implementation of fisheries extension planning activities (rs = 0.384); and with the implementation of fisheries extension activities (rs = 0.537).

Conclusions

1. Fisheries instructors in the regencies and cities of Cirebon are mostly of medium age (25-45 years), with an average category of higher education (Diploma 4/ Bachelor). Their vulnerability in using ICT is seen from the frequency, duration and type of ICT that are accessed into the high category according to the facilities and infrastructure they have, so that this tendency becomes the power of extension agents in carrying out their main tasks and functions.
2. Internal and external characteristics of fisheries instructors who are significantly related to ICT use are: 1) Age with frequency of accessing ICT; 2) Motivation and perception of fisheries instructors with the type of information accessed and ownership of infrastructure with the duration of accessing ICT.
3. There are no internal characteristics variables of fisheries instructors that are significantly related to the implementation of fisheries extension activities, but the external characteristics of fisheries instructors are: 1) Motivation is significantly related to the implementation of fisheries extension development at the planning, implementation, development and support stages; 2) The environment and perceptions of fisheries instructors are significantly related to the implementation of extension planning activities and implementation of extension services.
4. ICT variables which include how the frequency, duration, and types of ICT that are accessed by fisheries instructors namely the frequency of accessing ICT, the duration and type of information accessed by the extension agents, were not related to the implementation of extension activities which included the implementation of planning, implementation, development and support of extension, however, it was the most important supporting devices in carrying out their fisheries extension activities in digital 4.0 era.
5. The results of the analysis of this study conclude that in general there is a significant relationship between the characteristics of fisheries instructors and the use of ICT with the implementation of fisheries extension activities.

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