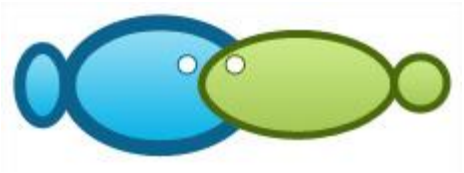

The ideal model of capture-fisheries content for fisheries cyber-extension media in Indragiri Hilir, Riau

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Abstract. The Indonesian government has long provided the Marine and Fisheries Cyber-Extension (MFCE) website as an extension medium to increase fishermen's knowledge and skills. However, in the capture fisheries center in Indragiri Hilir, Riau Province, only 20% of fishermen use the website. It is suspected that the website content model presented is less appropriate and effective. This study aims to build an ideal capture fisheries extension model by formulating the type and nature of extension materials, the format and size of media elements for presenting extension materials, as well as the frequency of updates to extension materials. This research uses a survey method with a quantitative approach, involving 95 fishermen as respondents. Data was collected through a closed questionnaire containing several statements measured on a 5-point Likert scale. Data analysis used two methods: descriptive analysis and factor analysis, with the help of SPSS software. Our research results found that the ideal content model for capturing fisheries cyber extension should do the following: (1) discuss business documents, company financing, and capital assistance; (2) solve problems faced by fishermen; (3) be packaged in poster or graphic format; (4) be large (as wide as the screen gadget); and (5) be updated on the website at least four times a month. These findings provide the theoretical implication that the generalization of Communication Planning Theory provides empirical support for its suitability in analyzing capture fisheries cyber-extension content planning, making it attractive and providing benefits for fishermen in Riau, Indonesia. These findings also provide evidence that capturing-fisheries extension content must be planned based on aspirations from below (bottom-up).
Key Words: cyber media, extension materials, factor analysis, fishermen knowledge, traditional fisheries.

Introduction. The capture fisheries sector is a potential source of income for the Indonesian economy. The sector contributes 34.275 trillion USD, or 2.5% per year, to the country's gross domestic product (Sari & Khoirudin 2023). For this reason, the government always develops fishermen resources through cyber-extension programs to increase their knowledge, attitudes, skills, and income (Indonesian Ministry of Marine Affairs and Fisheries 2022). Capture fisheries cyber-extension is non-formal education about fishing carried out through internet-based media (Hendri et al 2018). This program is operated through the MFCE (Marine and Fisheries Cyber-Extension) website, which was built in 2007. Fishermen in Indragiri Hilir (Inhil) Regency, Riau Province, Indonesia, are one of the website targets (Hendri et al 2019). Inhil Regency is one of the potential centers of marine fish production in Riau because it has fishing grounds up to the South China Sea. Marine fish production reaches 48500 metric tons per year (Bathara et al 2021). The problem that arises is that of the 5663 fishermen in Indragiri Hilir, only 1133 people (20%) use the internet and access capture fisheries cyber-extension media through the MFCE website (Hendri et al 2021a). This may be because the capture fisheries cyber-extension content presented on the website is not in accordance with the wishes and needs of fishermen.

There are at least five factors that influence the attractiveness of extension content on the website, namely the extension material type and nature, the material presentation media elements size and format, and the frequency with which the material

is updated. The extension materials types include fishing boats, fishing gear, fishing grounds, fisheries business documents, fish handling on boats, fish marketing, fish dismantling from boats, enterprise finance, and capital assistance. Materials about fishing boats and fishing gear include the type, size, and price (Limbong 2020; Salmarika et al 2022), and fishing grounds include the schooling location, sea depth, weather, currents, waves, wind, and safe distance from other boats. Furthermore, materials about business documents include procedures for obtaining a sailing permit, a fish catch certificate, a maritime work agreement, and sailing safety procedures (Teturan & Megawati 2021). Fish handling includes loading fish onto boats, handling fish on boats (sorting, washing, freezing, packaging, and storing), and unloading fish from boats (Tani et al 2020). Meanwhile, materials about enterprise finance cover financing and its impact on fish exports (Jaabi & Esemu 2014), and fish marketing includes an effective fish marketing system for consumers (Moento et al 2020). Fish dismantling covers the methods and costs of unloading fish from boats (Nugroho et al 2019). The topics of capital assistance include how to obtain and manage business capital (Nurlaili et al 2019). The nature of capture fisheries extension material consists of problem solving and recommendations (Mardikanto 2009).

The media format elements consist of text, images, sound, video (audiovisual), and animation (Pavithra et al 2018). Text-formatted media are measured by the word number; graphic-formatted media are measured in pixels or the width of the gadget screen; and the media duration in audio, video, and animation formats is measured in minutes (Hendri et al 2021b). The text-formatted media sizes consist of short categories (<700 words), medium (700–1700 words), and long (>1700 words) categories (Miladi 2018). Graphic-formatted media sizes consist of small categories (half the gadget screen), medium (two–thirds of the gadget screen); and large (as wide as the gadget screen) (Jasterweb 2019). Meanwhile, the video/audio/animation format media size categories consist of short (<4.5 minutes), medium (4.5–9 minutes), and long (>9 minutes) durations (Bahrul 2019). Likewise, the frequency of updates to cyber-extension materials also influences their appeal to audiences. Extension materials are small (or short), usually updated more frequently, and vice versa. If content updates take too long, it can reduce audience interest in the material presented in cybermedia (Shiqa 2016; Qwords 2020). Updates to cyber-extension materials are carried out 1-4 times a month. The more frequently it is updated, the better the impact on fishermen is (Paltycox 2020).

Based on these reasons, we consider it necessary to build a model of appropriate capture fisheries cyber-extension content beneficial for fishermen in Indragiri Hilir. Specifically, this research aims to analyze: (1) types of capture fisheries cyber-extension materials that are liked and useful for fishermen; (2) nature of capture fisheries cyber-extension materials that are liked and useful for fishermen; (3) media for presenting capture fisheries extension materials that are liked and useful for fishermen; (4) size of media elements for presenting capture fisheries extension materials that are liked and useful for fishermen; and (5) frequency of updating capture fisheries extension materials that are liked and useful for fishermen. Figure 1 illustrates the framework model of this research.

This study is based on Communication Planning Theory (Berger 2008), which emphasizes that effective communication messages require careful planning. Important aspects of communication planning are determining the communicator's goals, identifying the recipient of the message, explaining the message details to be conveyed, determining the media to be used, choosing the message delivery method, and evaluating the effectiveness of the plan (Knowlton & Berger 1997). The theory also aims to explain message processing in mass media, including internet-based cyber media (Putri & Oktaviani 2022). Capture fisheries cyber-extension content must refer to this theory. Moreover, in cyber-extension, instructors do not have to meet face-to-face with fishermen; they simply use internet-based media, which is more real-time and accurate (Purwiyati et al 2020).

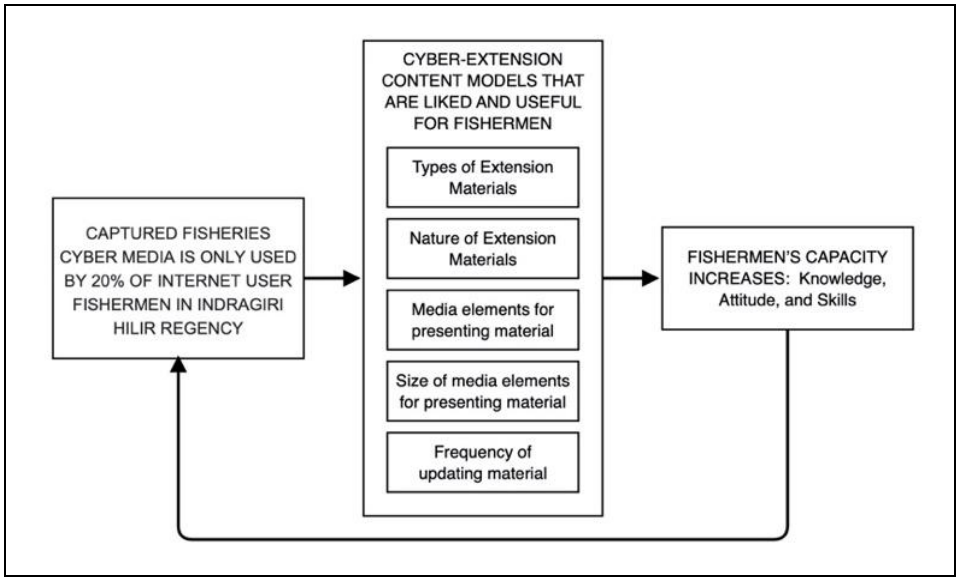

Figure 1. The conceptual framework model.

Material and Method

Description of the study location. This research was conducted in November–December 2023 in Indragiri Hilir Regency, Riau Province, involving five capture fisheries centers: Mandah, Kuala Indragiri, Concong, Tanah Merah/Enok, and Sungai Batang/Reteh (Figure 2). The location was chosen purposefully (Sugiyono 2019). This area is mostly located on the east coast of Sumatra Island, which faces the waters of the South China Sea, with some small islands (Bathara et al 2023). The area's fishermen consist of three tribes: Malay, Banjar, and Bugis (Yulinda et al 2023).

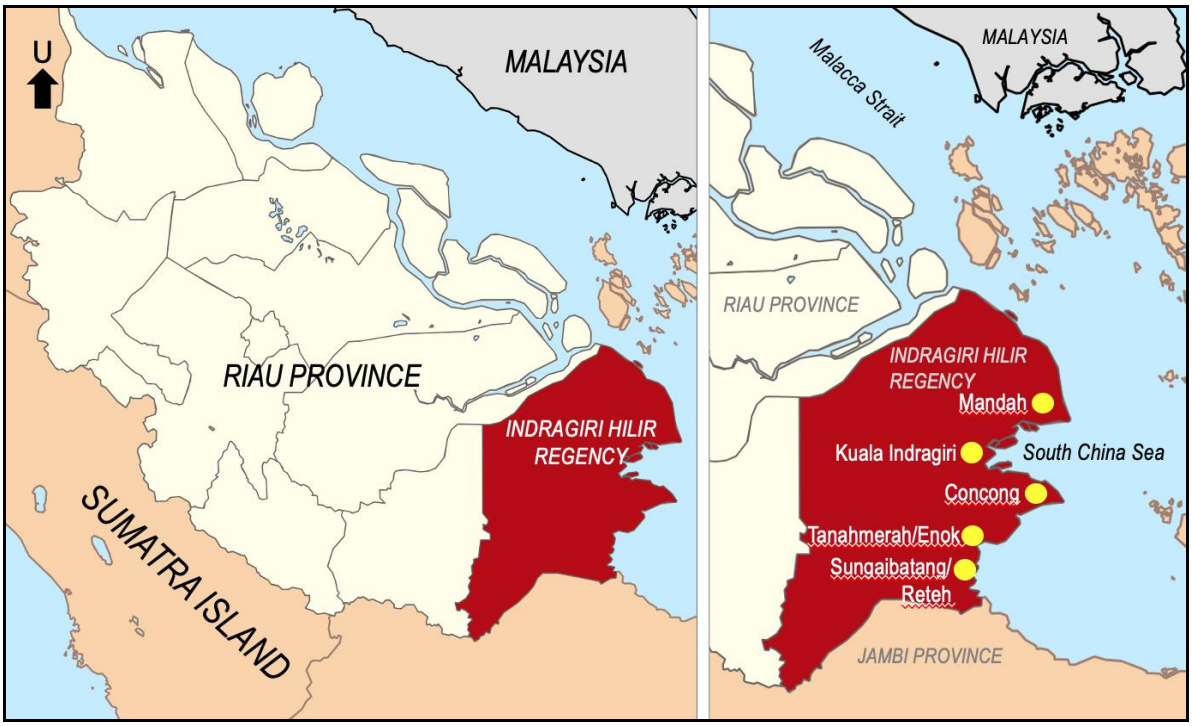

Figure 2. The location of capture fisheries center in Indragiri Hilir Regency, Riau, Indonesia.

Population and respondents. The research employed a quantitative approach (Sugiyono 2019). The population consisted of 1133 fishermen using social media in Indragiri Hilir. A total of 95 fishermen were determined as respondents using the Sample Size Calculator technique, with the formula (1):

$$\text{Sample size} = \frac{\frac{z^2 \times p\,(1 - p)}{e^2}}{1 + \frac{z^2 \times p\,(1 - p)}{e^2 N}}$$

Where: N - population size; e - margin of error; z - z-score, which is a measure that determines how far the data is from the average value in standard deviation units. The z-score value of this study was set at 95% (Survey Monkey 2022).

The selection of respondents used a simple random sampling technique (Akbar 2020). This number is considered adequate because the population is more than 100 fishermen and has homogeneous characteristics (Sugiyono 2019). They were selected purposefully and proportionally among the five fishing centres, as shown in Table 1.

Table 1

Population and respondents

Fishing centres	*Population (people)*	*Respondents (people)*	*Proportion (%)*
Kuala Indragiri	334	28	29
Tanahmerah/Enok	269	23	24
Concong	221	19	20
Mandah	164	14	14
Sungaibatang/Reteh	145	12	13
Number	*1133*	*95*	*100*

Data collection. Data collection was carried out by distributing closed questionnaires to respondents. The questionnaire contains statements related to the variables studied (type and nature of extension materials and media elements for presenting extension materials), which are measured on a 5-point Likert scale: 1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; and 5 = strongly agree.

Statistical analysis. The data were analyzed using two statistical methods: descriptive analysis and factor analysis. Descriptive analysis is used to analyze the demographic profile of fishermen, the media elements size presenting extension content, and the frequency of updates to extension content. Meanwhile, factor analysis is used to analyze the type and nature of extension materials and the media element format for presenting the material. Both of these analyses use Statistical Product and Service Solutions (SPSS) software version 25.0 (Sugiyono 2019). Descriptive analysis is used to analyze data by describing or illustrating the data that has been collected, as it is, without the intention of making general conclusions or generalizations. Meanwhile, factor analysis is a statistical analysis tool used to reduce the factors that influence a variable into just a few sets of indicators, without losing meaningful information. The purpose of this analysis is to filter which variable/indicators are superior from several variables/indicators selected by the researcher, so that it can be used to differentiate priority variables/indicators based on existing rankings. There are four stages of testing in factor analysis, respectively: KMO (Kaiser-Meyer-Olkin) and Bartlett's test of sphericity, anti-image matrices, total variance explained, and rotated component matrix. KMO and Bartlett's test are useful for determining the suitability of a variable/indicator for further processing. This is done by looking at the KMO-MSA (measure of sampling adequacy) value. If the KMO-MSA value is $\geq$0.50, then the factor analysis technique can be continued. Furthermore, anti-image matrices are useful for determining which variables/indicators are suitable for use in factor analysis. A variable/indicator is suitable for use if its MSA value is $\geq$0.50; if the

value is <0.05, then it must be removed from the test, and then re-analysis is carried out on the remaining variables/indicators. The Total Variance Explained test is needed to see the value of the variable/indicator being analyzed. This is done with the Extraction Sums of Squared Loadings test to see the number of factors formed. Factors are considered to form when the Initial Eigen values total is >1. Finally, the Rotated Component Matrix is useful for ensuring which variable/indicator falls into which factor group. This is determined by looking at the largest correlation value between variables and factors/components (Akbar 2020). Table 2 shows the factor analysis stages and the criteria that must be met.

Table 2

Factor analysis stages and criteria

Stages	*Criteria*
KMO and Bartlett's Test of Sphericity	KMO-MSA value must be ≥0.50
Anti-Image Matrices	MSA value must be ≥0.50
Total Variance Explained	Initial Eigen values total must be >1
Rotated Component Matrix	

Note: KMO - Kaiser-Meyer-Olkin; MSA - measure of sampling adequacy.

Results

Demographic profile of fishermen. The analysis results show that the majority of fishermen in Indragiri Hilir are aged 20 to 60 years (70%), have a junior high school education (55%), and have 4–8 family members, as shown in Table 3.

Table 3

Fishermen's demographic profile in Indragiri Hilir Regency (n=95)

Respondent characteristics		*Percentage*
Age	<20 years	20
	20–60 years	70
	>60 years	10
Education level	Elementary school	30
	Junior high school	55
	Senior high school	15
Family members	<4 persons	25
	4–8 persons	65
	>8 persons	10
Fisherman status	Owner	60
	Worker	40
Family members	<4 persons	25
	4–8 persons	65
	>8 persons	10
Business investment value	<2350 USD	10
	2350–4350 USD	80
	>4350 USD	10
Monthly income	<USD 200	7
	200–250 USD	85
	>250 USD	8
Daily social media use	<6 hours	15
	6–8 hours	80
	>8 hours	5
Daily use of capture fisheries cyber-extension media	<0.5 hours	5
	0.5–1 hours	85
	>0.5 hours	10

The majority of fishermen are business owners (60%), with a business investment value ranging from 2350 to 4350 USD (80%), and have monthly incomes of 200 to 250 USD per month (85%). Additionally, they use social media platforms (such as WhatsApp, YouTube, and websites) for 6 to 8 hours per day (80%), but only 0.5 hours are allocated to visit the capture fisheries cyber-extension website.

The ideal model for capture fisheries cyber-extension. The results of KMO and Bartlett's tests for the type of extension material, nature of extension material, and media element format used for presenting the extension material are presented in Table 4.

Table 4

Output of KMO and Barlett's test of sphericity

		Types of extension materials	*Nature of extension materials*	*Format of media element*
KMO-MSA		0.614	0.500	0.525
Bartlett's Test of Sphericity	Approx. Chi-square	372.913	1.366	6.435
	df	45	1	3
	Sig.	0.000	0.243	0.092

Note: df - degree of freedom; Sig. - significance.

This table shows that the KMO-MSA value for the type of material is 0.614, the nature of material is 0.5, and the format of media element is 0.525. The KMO-MSA values for those three variables are ≥0.5. Thus, the analysis can be continued to the next stage. The test results of the anti-image matrices, total variance explained, and rotated component matrix for the three variables, are summarized in Table 5.

Table 5

Factor analysis results for the material type, material nature, and format of the extension material presenting element media

Variable	*Factor analysis stage*					
	Anti-image matrices		*Total variance explained*		*Rotated component matrix*	
	Indicator	*MSA Value*	*Component*	*Initial Eigenvalue*	*Indicator*	*Value*
Type of materials	Business documents	0.616	1	2.940	Business documents	0.790
	Fishing gear	0.672	2	2.391	Enterprise finance	0.824
	Fishing boat	0.715	3	1.359	Capital assistance	0.875
	Fishing ground	0.631				
	Fish handling	0.590				
	Fish dismantling	0.574				
	Capital assistance	0.589				
	Fish marketing	0.640				
	Enterprise finance	0.531				
Nature of materials	Problem-solving	0.500	1	1.121	Problem-solving	0.749
	Recommendation	0.500				
Format of media element	Graphic	0.541	1	1.288	Text	0.763
	Text	0.517				
	Video	0.527				

In Table 5, the anti-image matrices test results indicate that the MSA value for 10 types of extension materials studied is >0.5, with the smallest MSA value being "enterprise finance" (0.531). Hence, all types of materials meet the requirements for further analysis. The results of the total variance explained test reveal three components with initial eigenvalues >1: component 1 (2.940), component 2 (2.391), and component 3 (1.359). The rotated component matrix test shows the highest value in component 1 (business documents), component 2 (enterprise finance), and component 3 (capital

assistance). Thus, it can be concluded that the most ideal types of capture fisheries cyber-extension materials, according to the wishes of fishermen in Indragiri Hilir, are business documents, business finance, and capital assistance.

The anti-image matrices test results indicate that the MSA value for the two natures of extension materials studied—problem solving and recommendation—is 0.5. Hence, both natures of materials meet the requirements for further analysis. The results of the total variance explained test reveal that one component whose initial eigenvalues are >1 is component 1 (1.121). The results of the component matrix test show that the highest value of component 1 is problem-solving. Thus, it can be concluded that the most ideal nature of capture fisheries cyber-extension materials, according to the wishes of fishermen in Indragiri Hilir, is problem-solving.

The anti-image matrices test results indicate that the MSA value for three formats of media elements used for presenting the extension material—text, graphic, and video—is >0.4, with the smallest MSA value being "video" format (0.527). Hence, all format of media meet the requirements for further analysis. The results of the total variance explained test reveal a single component with initial eigenvalues >1: component 1 (1.288). The rotated component matrix test shows the highest value in component 1, which is graphic format. Thus, it can be concluded that the most ideal format of media elements for presenting the capture fisheries cyber-extension material, according to the wishes of fishermen in Indragiri Hilir, is graphic.

The descriptive analysis results for the size of graphic format media elements used to present extension materials, as well as the frequency of updating capture fisheries extension materials, are summarized in Table 6.

Table 6

Graphic format media size and extension material update frequency

Variable	*Indicator*	*Number of respondents (n=95)*	
		People	*%*
The graphic format media element size	Small (half the gadget screen)	10	10.5
	Medium (two-thirds of the gadget screen)	5	5.3
	Large (as wide as the gadget screen)	80	84.2
Frequency of updating cyber-extension materials	Once a month	3	3.5
	Twice a month	4	4.5
	Three times a month	6	6.7
	Four times a month	81	85.3

The analysis results for the size of graphic format media elements show that the majority of fishermen (84.2%) want large-size media (as wide as the gadget screen). It can be concluded that the ideal graphic format media element size for capture-fisheries cyber-extension, according to the wishes of fishermen in Indragiri Hilir, is large-size media (as wide as the gadget screen). Meanwhile, the frequency of updating cyber extension materials that most fishermen want is four times a month (85.3%). It can be concluded that the ideal frequency of updating cyber-extension materials, according to the wishes of those fishermen, is four times a month.

Based on the overall analysis, the ideal model for capture fisheries cyber-extension content that is useful for fishermen in Indragiri Hilir is to present material about fisheries business documents, business finance, and capital assistance. Extension materials must be able to solve the problems of fishermen, presented in graphic format media elements in large sizes, as wide as a gadget screen, and updated four times a month (Figure 3).

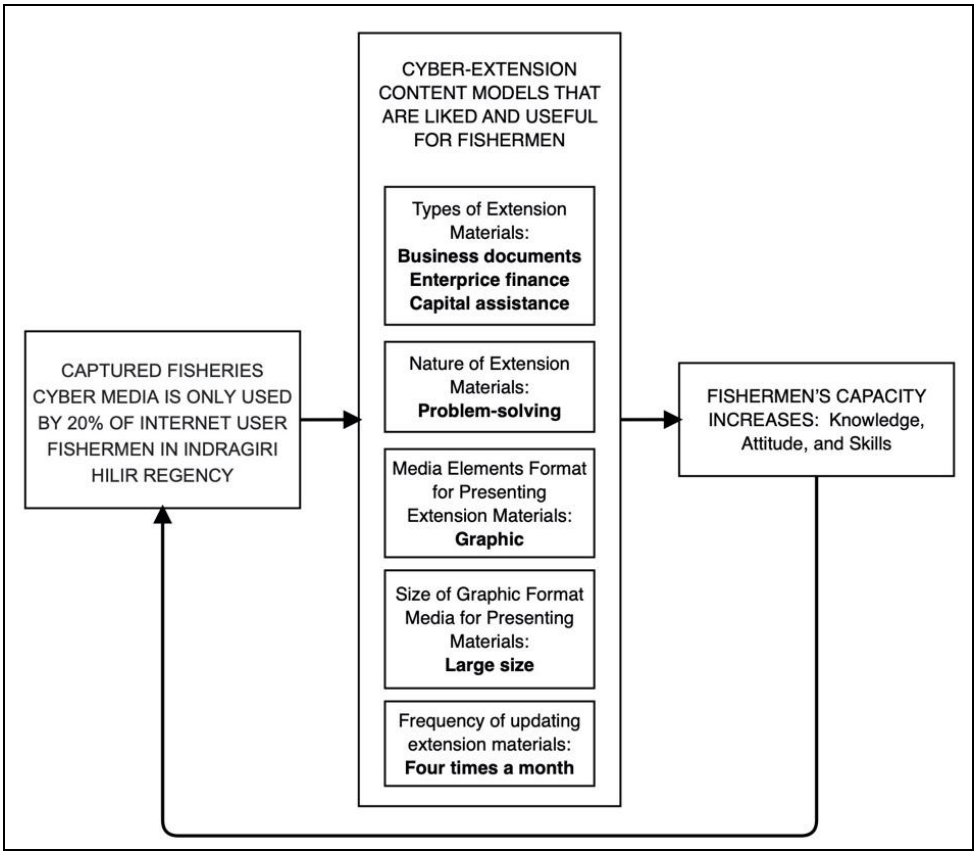

Figure 3. The ideal model for capture fisheries cyber-extension content for fishermen

Discussion. The research results show that the majority of fishermen in Indragiri Hilir are aged 20 to 60 years, have a junior high school education, and have the status of business owners. This means that fishermen in the regency are of productive age and have low education, but they act as controllers of the business. According to Indonesiabaik (2023), the age range of 15–64 years is classified as productive age. Low education causes a person's knowledge, skills, and competitive ability to be limited (Yanti & Murtala 2019). According to Tuna et al (2019), the education level of fishermen affects the development of their businesses. The fisherman owner (skipper) is the fishing boat owner and actively uses it for fishing business. Therefore, they have more freedom to manage the duties and responsibilities of the fishermen who work on their boats (Muja et al 2023). In addition, the majority of fishermen have household members of 4–8 people. The nationally average number is four people (Putranto et al 2023). The greater the number of household members is, the lower is their consumption level. This will affect the welfare of fishermen households (Hanum 2018). According to Ihlamdi et al (2020), the number of the household affects the development of a fisherman's businesses. Most fishermen in Indragiri Hilir have a business investment value of 2350 to 4350 USD. For traditional fishermen, this value is quite large and can be used for future business development. Meanwhile, the fishermen earn an average of 200 to 250 USD per month. According to Sinaga et al (2022), the amount is almost the same as the average income of traditional Indonesian fishermen, namely 193 to 322 USD per month. Most fishermen use social media (WhatsApp, YouTube, and websites) for 6 to 8 hours per day, but only use 0.5 hours to visit the capture fisheries cyber-extension website. According to Hendri et al (2021a), the duration is too short compared to the time allocated by fish farmers in Riau to visit the extension website.

The ideal capture fisheries extension material type presented in cyber-extension media for Indragiri Hilir fishermen is comprised of business documents, enterprise finance, and capital assistance. The finding is justifiable because the available evidence indicates that the most important information for fishermen currently pertains to

business documents, enterprise finance, and capital assistance. Fishermen need information about the business documents because they have no other job apart from fishing. Thus, they must know all aspects related to the smooth running of their fishing business. According to the Maritime Affairs and Fisheries Minister of Republic of Indonesia (2013), fishermen who own boats and fishing businesses must obtain administrative documents from the port authority. These documents include sailing approval, proof of boat arrival and departure reports, and a fish catch certificate. To obtain these documents, fishermen must fulfill the technical requirements for their fishing vessels, equipment, and aids. Managing these administrative and technical requirements requires adequate knowledge and skills (Teturan & Megawati 2021). This poses a challenge for fishermen in Indragiri Hilir, as the results of a descriptive analysis indicate that the majority of them have a low level of formal education, with 55% having completed junior high school and 30% having completed elementary school. Individuals with limited education may experience challenges comprehending complex issues, analyzing problems, and generating ideas (Putra & Kartika 2019).

Similarly, when it comes to information regarding business finances, it is crucial for fishermen, as the majority of them are still poor. According to Sinaga et al (2022), most fishermen earn only 200–250 USD per month, which is below the national average income of 322 USD per month. This reinforces the finding that these fishermen require financial support. Husuna et al (2017) suggest that providing capital assistance to low-income fishermen can motivate them to develop their businesses. Therefore, it is hoped that the extension material provided through cybermedia can overcome the problems faced by these fishermen. The nature of the capture fisheries extension materials that fishermen want is problem-solving. This is natural because they are often faced with many problems in running their business, both technical problems in catching fish and in marketing fish. According to Riadi (2020), good extension materials are those that can help solve problems faced by fishermen. The ideal and desired format by fishermen for fisheries extension materials in Indragiri Hilir is graphics. This happens because they face obstacles in accessing more interesting video format content. The reason is the limited infrastructure facilities and internet signal available. Apart from that, fishermen have limitations in purchasing internet data packages due to their low income. As a result, fishermen are only able to access small content formats, such as graphics. This is in line with the opinions of Cavallin (2000) and Hendri et al (2018) that fishermen are more likely to choose 'ordinary quality content but easy to access' compared to 'good quality content but difficult to access.' The ideal size of graphic media elements that fishermen like is large (as wide as the gadget screen). This is in line with the opinions of Haryadi (2017) and Jasterweb (2019), who found that website users like large graphic sizes on their gadgets because they look clearer and will not strain the eyes. Finally, fishermen want the ideal frequency of updating fisheries extension material in cyberspace to be four times a month. In line with Surya (2019) and Vaughan (2014), updating website content can stimulate users to access the website because they want to find new things. Therefore, the more frequently the content is updated, the more often they will use the website. The extension content must be updated at least four times a month.

Conclusions. This research concludes that the ideal model for cyber-extension content of capture fisheries for fishermen in Indragiri Hilir is the following: it should present materials of business documents, business finance, and capital assistance; it should be problem-solving; it should be presented in a graphic format that is large (as wide as the gadget screen); and it should be updated four times a month.

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Conflict of Interest. The authors declare that there is no conflict of interest.

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