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Dear,
Dr. Ioan Valentin Petrescu-Mag
Editor-in-Chief of AACL Bioflux Journal

We send you a manuscript/article entitled "The impact of agriculture cyber extension on fish farmers' attitude and behavior in Riau, Indonesia", and
hoping that the manuscript can meet the standard to be accepted and published in the AACL Bioflux Journal.

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Warm regards,
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Thank you,

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Ridar Hendri

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The impact of aquaculture cyber extension on fish farmers' attitudes and behavior in Riau, Indonesia

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Abstract. The purpose of this survey is to see how the aquaculture cyber extension materials on the MFCE (Marine and Fisheries Cyber Extension) website affect the attitudes and behavior of freshwater fish farmers in Riau Province, Indonesia. Using Isaac and Michael's table, a total of 259 fish farmers who used the MFCE website were chosen as samples. The data information was gathered via a closed questionnaire that was purposive-proportionally distributed to respondents in ten districts. The data were analyzed using Paired Sample T-Test with SPSS 25 software. The research findings revealed that the MFCE website's aquaculture cyber extension content was able to change the attitudes of fish producers in Riau Province. With the help of SPSS 25 software, the data were analyzed using the Paired sample T-Test. The findings revealed that the MFCE website's cyber aquaculture extension content was able to change the attitudes of fish producers in Riau Province. This is possible because the extension material are engaging, simple to comprehend, and tailored to their specific needs. The extension materials, on the other hand, have no impact on changes in their behavior when it comes to conducting a freshwater aquaculture business. This might arise due to non-technical issues that fish farmers confront, such as a lack of capital business.

Keywords: aquaculture, attitude, behavior, fish farmer, cyber extension, *MFCE* website.

Introduction. Aquaculture is an important sector to support the Indonesian economic because contributes USD4,154,186,154 a year (Ministry of Marine Affairs and Fisheries Republic of Indonesia, 2018). Aquaculture is a human economic activity that utilizes and converts natural resources into commodities of value to society, such as fish, shrimp, shellfish, and other aquatic environmental organisms (Kautsky et al., 2000). Freshwater aquaculture are carried out in rivers, lakes, reservoirs, and swamps (Lesa, 2020).

Therefore, the government continues to develop this sector, among others through fisheries extension programs. The extension is non-formal education (Sadono, 2010) or education for adults, which involves someone conveying information to help audiences make the right decisions (Ban & Hawkins, 1996) so that aspects of their life change to be better than the existing conditions (Riadi, 2020). The extension purpose is to change the knowledge, attitudes, and behavior of the audience for the better (Oakley & Garforth, 1985; Ibrahim *et al*., 2003; and Amanah, 2007).

To achieve maximum results, since 2017 the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia (KKP-RI) has implemented an internet-based extension system (cyber extension). They built the *Marine and Fisheries Cyber Extension* (MFCE) website to disseminate extension materials to extension workers and fish farmers in the regions (Pusat Penyuluhan Kelautan dan Perikanan KKP-RI, 2018). The MFCE website display is shown in Figure 1.

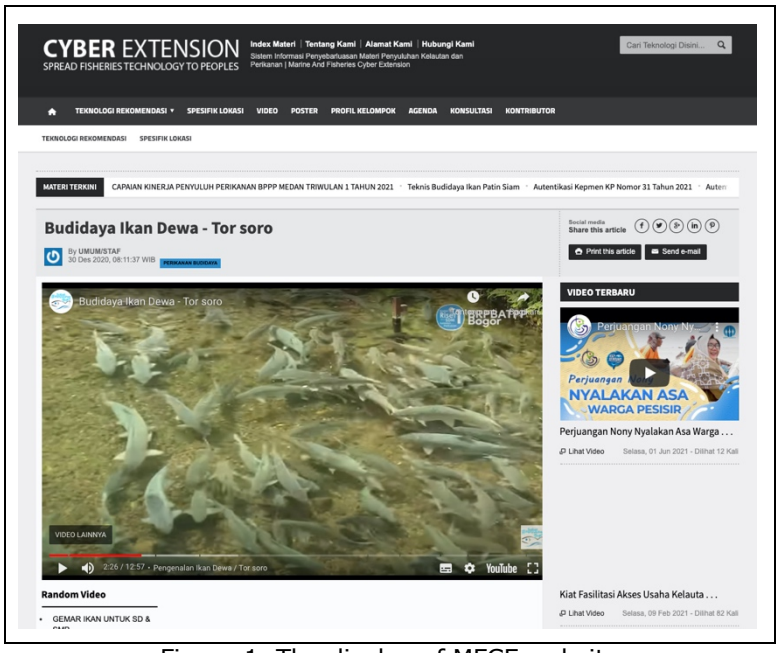

Figure 1. The display of MFCE website

Riau Province is one of the centers of freshwater aquaculture in Indonesia. Fish farmers in Riau are the target of MFCE cyber media (Hendri *et al*., 2018). The aquaculture in Riau is carried out in ponds, reservoirs, rivers, and swamps. This business involves 28,962 fish farmers who can produce 97.910 tons of fish a year (Dinas Perikanan dan Kelautan Provinsi Riau, 2019).

The aquaculture cyber extension material on the MFCE website is expected to improve the attitudes and behavior of fish farmers in Riau Province. Attitudes are defined as psychological constructs, mental and emotional entities that are attached to or characterize a person (Perloff, 2016). A person's predisposition to act, think, and feel his best while dealing with ideas, situations, or objects is sometimes referred to as attitude. People, locations, ideas, and situations in groups can all be objects (Rakhmat, 2012).

While behavior is a series of actions made by individuals, organisms, systems, or artificial entities in relation to themselves or their environment (Hemakumara & Rainis, 2018). Behavior is a response to various internal or external stimuli, conscious or subconscious, overt or covert, and voluntary or involuntary (Minton & Khale, 2014). There are five stages of audience acceptance of an extension or innovation material: knowing, being interested (wanting to learn more), assessing (evaluating and contemplating), trying, and putting the innovations presented into practice (Riadi, 2020). Attitude refers to one's level of interest and judgment, whereas behavior refers to one's willingness to test and execute new ideas. But so far the not know the extension material impact on the fish farmers' attitudes and behavior in Riau. For that, this research needs to be done.

Material and Method

Description of the study sites. This study was conducted from August - October 2020 in the Province of Riau, Indonesia, using a quantitative descriptive approach. Descriptive research is collecting measurable data to be able to describe the situation precisely (DeFranzo, 2020; and Robson & McCartan, 2016). While the quantitative approach is the process of finding knowledge using data in the form of numbers as a tool to analyze information about what you want to know (Kasiram, 2010).

The unit of analysis is fish farmers who use the MFCE website in Riau. The population consists of 5,792 fish farmers (Hendri et al., 2018). While the respondent is 259 fish

farmers, determined based on Isaac and Michael's table (Sugiyono, 2019). They are spread across 10 districts: Pekanbaru, Kampar, Rokan Hulu, Rokan Hilir, Bengkalis, Pelalawan, Kuantan Singingi, Indragiri Hulu, and Indragiri Hilir, as shown in Figure 2. Respondents were selected purposive proportional (Cresweel, 2015). Data collection is done by distributing questionnaires with open-ended questions to respondents (Bandhari, 2020).

Figure 2. Research site map

Statistic analysis. Validity and reliability tests were carried out using SPSS 25 software to ensure all data were valid and reliable. The validity test was carried out by looking at the Pearson Correlation coefficient (r). If the value of r-statistics > r-table, then all questionnaire items are considered valid (Sugiyono, 2019). Meanwhile, the reliability test was carried out by looking at the value of the Cronbach's Alpha coefficient. According to Hinton *et al.* (2014), if the coefficient value is 0.50 – 0.70, then all items in the questionnaire are considered moderately reliable.

Furthermore, the Kolmogorov-Smirnov test (KS test) was carried out to analyze the normality of data attitudes and behavior of fish farmers before and after using the MFCE website. If the value of KS-statistical > KS-table, then the data is considered to be normally distributed (Ghasemi & Zahediasl, 2012), so that the next analysis, Paired-Sample T-Test, can be carried out. According to Akbar (2020), Paired-Sample T-Test can only be done if the research data is normally distributed. This analysis is used to see the impact of extension materials on the attitudes and behavior of fish farmers can be seen from differences in levels before and after using the MFCE website.

Paired Sample T-Test method with SPSS Statistics 25 software was performed to analyze the difference. According to Creswell (2009), if the significance value (Sig.) < probability 0.05, it can be said that there is a relationship between variables (fish farmers' attitudes or behavior) before and after using the MFCE website. Otherwise, if the value of Sig. > 0.05 probability, there is no relationship between variables before and before using the website.

Two hypotheses were proposed in this study:
H1 = There is an average difference between attitudes before and after using the website. This means freshwater aquaculture cyber extension materials are presented on the MFCE website can improve the attitude of fish farmers in Riau Province.
H2 = There is an average difference between behavior before and after using the website. This means freshwater aquaculture cyber extension materials are presented on the MFCE website can improve the behavior of fish farmers in Riau Province.

If the value of Sig. (2-tailed) < 0.05, then the hypothesis is accepted. But, if the value of Sig. (2-tailed) > 0.05, then the hypothesis is rejected (Sugiyono, 2019).

Results and Discussion

The impact of cyber extension materials on the attitude of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' attitudes before and after using the MFCE website ranged from 0.127 to 0.440. It can be seen that all values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the attitude in the questionnaire are valid.

The reliability test results showed that Cronbach's Alpha coefficient value was 0.793 > 0.50. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' attitude before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about attitudes are normally distributed.

Thus the next analysis, Paired Sample T-Test, can be performed. The Paired Samples Test output table shows that the value of Sig. (2-tailed) is 0.000 < 0.05 (Figure 3), then H1 is accepted. So it can be concluded that there is an average difference between the attitudes of fish farmers before and after using the MFCE website. In other words, there is an impact of aquaculture extension materials presented on the MFCE website in improving the fish farmers attitude in Riau Province to a better direction.

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	AttBeforeMFCE – AttAfterMFCE	3,57196	10,23844	,63619	2,31918	4,82474	5,615	258	,000

Figure 3. Paired Samples Test Output on the attitude of fish farmers

These results are in line with the research of Ahmed et al. (2018) which states that aquaculture extension has succeeded in improve the fish farmers' attitude in Bangladesh. The extension was able to improve the attitude of most of them (61.11%) to a moderate level. Meijer et al. (2015) also revealed that innovative extension materials on agro-industry (including aquaculture) affect attitudes of small-scale fish farmers in sub-Saharan Africa. In line with this, Pramitasari et al. (2015) discovered that extension of local wisdom improved the fishermen's attitude toward fish conservation in the Mae Klong River in Songkram, Thailand.

The increasing attitude of fish farmers in Riau proves that they already know the content and benefits of the extension materials presented on the MFCE website, so they want to try it. This may occur because the cyber extension materials available on the MFCE website are thought to be fascinating, simple to comprehend, and relevant to their current needs.

The impact of cyber extension materials on the behaviour of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' behavior before and after using the MFCE website ranged from 0.126 to 0.492. It can be seen that all values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the behavior in the questionnaire are valid.

The reliability test results showed that Cronbach's Alpha coefficient value was 0.597 > 0.50. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' behavior before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about behavior are normally distributed.

Thus the next analysis, Paired Sample T-Test, can be performed. The Paired Samples Test output table shows that the value of Sig. (2-tailed) is 0.351 < 0.05 (Figure 4), then H2 is rejected. So it can be concluded that there is no average difference between the fish farmers' behavior before and after using the MFCE website. In other words, the aquaculture extension materials presented on the MFCE website have no impact on improving the fish farmers' behavior in Riau Province.

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	BehvBeforeMFCE - BehvAfterMFCE	-,34430	5,93418	,36873	-1,07041	,38181	-,934	258	,351

Figure 4. Paired Samples Test Output on the behavior of fish farmers

These findings suggest that, while there is a willingness to try to implement all of the extension resources on the MFCE website, they do not do so right away. This is most likely due to non-technical challenges they still encounter. According to Hakim & Eriyanti (2019), capital was one of the non-technical problems that hampered the fish farming industry, according to Hakim & Eriyanti (2019).

Conclusions. The findings of this study show that the MFCE website's cyber extension materials improve the attitudes of freshwater fish farmers in Riau Province, but have no impact on their aquaculture activity behavior. This occurs because, while the extension materials technically meet the demands of fish farmers, they have been unable to implement them in the field due to non-technical issues such as capital.

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Ridar Hendri
[Kutipan teks disembunyikan]

Submission letter AACL Bioflux MFCE .pdf
98K

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 15 Juni 2021 pukul 10.53
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Dear,
Dr. Crisna Petrescu
Editor of Bioflux SRL

Thank you for accepting our article for publication in the Bioflux Journal.
We have sent a publication fee payment of USD 250 (full for Bioflux, no deductions because we have paid all fees in the bank).
I hereby attach proof of the publication fee transfer. We hope there are no problems. Thank you.

Best regards,

Rider Hendri

Pada tanggal Jum, 11 Jun 2021 pukul 15.15 Bioflux Journals <biofluxeditor1@gmail.com> menulis:

Bioflux (publishing house)
54 Ceahlau Street,
Cluj-Napoca 400488,
Romania, European Union

Certificate

This certificate shows that the manuscript entitled **"The impact of Aquaculture cyber extension on fish farmers' attitude and behavior in Riau, Indonesia"**, authored by Ridar Hendri, Haslinda Sutan Ahmad Nawi, Azmuddin Ibrahim, submitted to our journal Aquaculture, Aquarium, Conservation & Legislation - International Journal of the Bioflux Society (AACL Bioflux), has been preliminary accepted for publication.

Thank you for your participation!

Cordially yours,

Editor,
Crina Petrescu

Senior Researcher
Ioan Valentin Petrescu-Mag, PhD
editor-in-chief

SOCIETATEA COMERCIALĂ BIOFLUX S.R.L. CLUJ-NAPOCA, ROMÂNIA

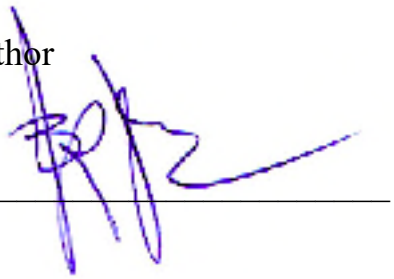
Submission Letter

Article title:

Hereby I would like to submit the manuscript entitled "**The impact of aquaculture cyber extension on fish farmers' attitudes and behavior in Riau, Indonesia**" to Aquaculture, Aquarium, Conservation & Legislation - International Journal of the Bioflux Society.

This manuscript was not submitted or published to any other journal. The authors declare that the manuscript is an original paper and contain no plagiarized text. All authors declare that they are not currently affiliated or sponsored by any organization with a direct economic interest in subject of the article. My co-authors have all contributed to this manuscript and approve this submission.

Corresponding author

Ridar Hendri, 

Author 1, Author 2, Author 3

Ridar Hendri, Haslinda Sutan Ahmad Nawi, Azmuddin Ibrahim

Date
June 12, 2021

Your Future Starts Here

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

Ms status

19 pesan

Bioflux Journals <biofluxeditor1@gmail.com> 21 Juni 2021 pukul 14.39
Kepada: ridar.hendri@lecturer.unri.ac.id

Dear Dr. Ridar Hendri,

We have received your payment and we thank you for it.

The status of your manuscript is "Under review". Your manuscript was sent to be reviewed by two independent reviewers. As soon as we receive their reports, we will send them to you. Please be aware that the review process may take some time. If you have any questions, do not hesitate to contact me.

Kind regards,
Crina Petrescu

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 21 Juni 2021 pukul 16.30
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Dear
Dr. Crina Petrescu

Thank you for your response.
I plan to upgrade the fee payment system from USD250 to USD300 because I need a fast publishing journal.
Is this possible?
Thank you

Kind regards,
Ridar Hendri

[Kutipan teks disembunyikan]

Bioflux Journals <biofluxeditor1@gmail.com> 22 Juni 2021 pukul 02.20
Kepada: Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

Dear Dr. Ridar Hendri,

Thank you for your email.
I understand you need the paper to be published fast and please be assured that we always do our best to speed the process.

Before answering your question about upgrading the payment, I need some additional information from you. Please let me know how soon you need your paper to be published.

Kind regards,
Crina Petrescu

[Kutipan teks disembunyikan]

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 22 Juni 2021 pukul 07.57
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Dear Dr. Crina Petrescu

Thank you for your response. I hope to be published in August 2021 at the latest.
However, if not possible, I follow the policy of the Bioflux journal's publication schedule only.

Warm Regards,
Ridar Hendri

[Kutipan teks disembunyikan]

Bioflux Journals <biofluxeditor1@gmail.com> 22 Juni 2021 pukul 22.04
Kepada: Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

Dear dr. Ridar Hendri,

If you pay the difference of 50 $ you will also have to pay the transfer tax again and I believe this is not convenient for you. So, this time, please do not pay any supplementary fee. We will do our best to send you reviewers feedback as soon as possible.
I will keep you informed about manuscript status.

Kind regards,
Crina Petrescu
[Kutipan teks disembunyikan]

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 22 Juni 2021 pukul 22.33
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Dear Dr. Crina Petrescu

Thank you for your kindness and Bioflux Management.
This made a very deep impression on me.

Kind regards,
Ridar Hendri
[Kutipan teks disembunyikan]

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 4 Juli 2021 pukul 20.36
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Dear Dr. Crina Petrescu

Hello Miss. Hope you stay healthy. Amen.
May I know the progress of my article process to be published in Bioflux Journal? Thank you.

Kind regards,
Ridar Hendri
[Kutipan teks disembunyikan]

Bioflux Journals <biofluxeditor1@gmail.com> 5 Juli 2021 pukul 13.09
Kepada: Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

Dear Mr. Ridar Hendri,

Thank you for your email.
Your manuscript was sent to reviewers. We are waiting for their feedback. When we receive their reports, we send them to you so you can revise the manuscript.

Kind regards,
Crina Petrescu,
Editor, Bioflux Journlas
[Kutipan teks disembunyikan]

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 5 Juli 2021 pukul 13.49
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>
Bcc: ridar.hendri@lecturer.unri.ac.id

Thank you for your response.

Dikirim dari iPhone saya

Pada 5 Jul 2021, pukul 13.09, Bioflux Journals <biofluxeditor1@gmail.com> menulis:

[Kutipan teks disembunyikan]

Bioflux Journals <biofluxeditor1@gmail.com> 8 Juli 2021 pukul 21.22
Kepada: Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

Dear dr. Ridar Hendri,

I am happy to tell you that we have received the feedback for your manuscript from four reviewers. I attach here four folders, zipped. Each contains the comments of one reviewer. Please read all documents in each folder and their comments. Please answer to the comments in the form that I attach to this email and also write a revised version of your manuscript in which you incorporate the revisions requested by the four reviewers. If you choose not to follow some of the recommendations/ comments, please motivate your choice.

In conclusion, please send me two documents:
1. The revised version of the manuscript.
2. The document "Answers to reviewers" which contains all your answers.

Could you, please, let me know how much time (days or weeks) you need to revise the manuscript?

Kind regards,
Crina Petrescu,
Editor - Bioflux Journals

[Kutipan teks disembunyikan]

2 lampiran

_For Author.zip
757K

Authors Answers to Reviewers.docx
14K

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 9 Juli 2021 pukul 00.37
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Dear Ms Crina Petrescu,
Editor - Bioflux Journals

Thank you, my article has been reviewed by 4 reviewers. I've seen all their comments. It took me about three days to answer or complete as requested by the reviewer. However, there are reviewer comments that are not quite right, because what was asked was written in the article. I'll let you know, if the three days still less.

Ridar Hendri
[Kutipan teks disembunyikan]

Bioflux Journals <biofluxeditor1@gmail.com> 9 Juli 2021 pukul 02.22
Kepada: Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

Dear Dr. Ridar Hendri,

Please take the time that you need to make the revisions.
For the comments that refer to aspects that are already included in the paper, please write this fact in the column dedicated to the answer and cite the paragraph where you write about that aspect.

Also, I would appreciate it very much if you could use Zotero as reference manager for the revised version and use the APA style, 7th edition. Have you used it so far? If yes, great! If not, please know that it is extremely useful. I am sure that if you start using it, you will continue because it saves a lot of time and it is very efficient in relation to the organization of the references. It is a free program. You can download it from here: https://www.zotero.org/download/
There are many video tutorials that show you how to use it. However, if you need, I can help you.
After you instal Zotero on your computer, you can download the APA style 7th edition (American Psychological Association) from here: https://www.zotero.org/styles?format=author-date.

The use of Zotero as reference manager is not compulsory and it does not affect in any way the decision on your manuscript, but I would appreciate it very much.

Kind regards,
Crina Petrescu
[Kutipan teks disembunyikan]

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 9 Juli 2021 pukul 04.27
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Dear Ms Crina Petrescu

Thank you for your valuable response. I will try to learn the Zotero software. So far I use Mendeley software, APA style version 7.

Kind regards,
Ridar Hendri

[Kutipan teks disembunyikan]

Bioflux Journals <biofluxeditor1@gmail.com> 10 Juli 2021 pukul 22.08
Kepada: Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

Dear Mr. Ridar Hendri,

Thank you for your availability to use Zotero. I am happy that you already use Mendeley, it means that you are familiar with the advantages of a reference manager program and you understand the reason that supports my request.
I would also use Mendeley to help authors who use it, but I cannot have both Zotero and Mendeley installed on the same computer because this messes up the libraries.

Kind regards,
Crina Petrescu
[Kutipan teks disembunyikan]

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 10 Juli 2021 pukul 22.22
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Dear Ms. Crina Petrescu
Editor of Bioflux

Thank you for your impressive response. So far I use Mendeley with APA style version 7. I've read on the internet, the comparison of Mendeley and Zotero. Each has advantages and disadvantages. So, if allowed, I will use Mendeley because it has been familiar with my work and computers in the past two years. I am currently improving the article as requested by the reviewers. Thank you

Regards,
Ridar Hendri
[Kutipan teks disembunyikan]

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 13 Juli 2021 pukul 17.02
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Dear Ms. Crina Petrescu
Editor of Bioflux Journal

I have corrected and completely remodeled the manuscript (40%), following the requests of the four reviewers. I've also answered one by one reviewer's comments (attached comment column). I've also attached a manuscript that I've edited/corrected. I hope that I have met the requirements set by Bioflux.
Thank you.

Regards,
Ridar Hendri

[Kutipan teks disembunyikan]

2 lampiran

RH Impact of MFCE Cyber Extension on Attitude and Behavior revision1.doc
567K

Authors Answers to Reviewers.docx
27K

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 15 Juli 2021 pukul 12.02
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Subject: My responses to reviewers' comments

Dear Ms. Crena Petrescu

I pray you are always healthy and successful. A few days ago, I emailed: (1) manuscript improvements, according to reviewers' suggestions; and (2) a column list of my answers to the comments of four reviewers.
I hope you have read it, but if not, I resend it to you (see attachments). For citations and reference lists, I still use Mendeley (APA Style 7). Hopefully, there will be no problems with the publishing process in the journal Bioflux. Thank you.

Warm regards,
Ridar Hendri

[Kutipan teks disembunyikan]

2 lampiran

RH Impact of MFCE Cyber Extension on Attitude and Behavior revision2.doc
570K

Authors Answers to Reviewers.docx
27K

Bioflux Journals <biofluxeditor1@gmail.com> 17 Juli 2021 pukul 02.15
Kepada: Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

Dear Dr. Ridar Hendri,

Thank you for your email.
I have just downloaded the two documents. I will read them and then I will write to you back (in approximately one week).

Kind regards,
Crina Petrescu

[Kutipan teks disembunyikan]

Bioflux Journals <biofluxeditor1@gmail.com> 22 Juli 2021 pukul 17.26
Kepada: Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

Dear dr. Ridar Hendri,

I am editing your manuscript. Thank you for using a reference manager. It helps me a lot. I attach here the ms, please replace the titles, journal namens etc that are not in English with their English translation between "[]", as in the following examples:

> Kyne P. M., Courtney A. J., Bennet M. B., 2008 Aspects of reproduction and diet of the Australian endemic skate *Dipturus polyommata* (Ogilby) (Elasmobranchii: Rajidae), by-catch of a commercial prawn trawl fishery. J Fish Biol 72:61-77. doi: 10.1111/j.1095-8649.2007.01655.x

Berg L. S., 1949 [Freshwater fishes of the USSR and adjacent countries]. Izd. AN SSSR, Moscow-Leningrad [in Russian].
Goryczko K., 2000 [The rainbow trout *Oncorhynchus mykiss*]. In: [The freshwater fishes of Poland]. Brylińska M. (ed.), pp. 428-430. PWN, Warsaw [in Polish].

Is this Cresweel or Creswell?

Cresweel, J. W., 2015 Penelitian Kualitatif Dan Desain Riset. International Journal of Physiology 3:674.

I did not find the references highlighted in yellow in the main text. Please add them.

Please do not change the format of the references. We still have to use the original style of the journal for the current number (and not APA). If I will have other questions while I work on your manuscript I will write again.

Please mark with green highlight all changes that you make on the manuscript.

Best regards,
Crina Petrescu

[Kutipan teks disembunyikan]

RH Impact Edited.doc
555K

Authors Answers to Reviewers

X Please copy Reviewer's comments, one by one, in the column in the right and write your answer in the left column.
√ *Please copy Reviewer's comments, one by one, in the column in the **left** and write your answer in the **right** column.*

Answers to Reviewer 1

Reviewer's comment	**Authors' answer**
1. **No**. The title does not reflect the content of the manuscript. There is absolutely no explanation about the aspects that become parameters to determine the differences in attitudes and behavior of fish farmers before and after learning the extension material. The contents of the manuscript only provide information that there is a change in attitude and behavior, while there is no explanation regarding the attitude and behavior in what field and on what aspects of aquaculture protocols experienced by fish farmers.	I think there is no need to change this title, because it already reflects all the material described in the contents of the manuscript. Moreover, the other three reviewers considered that this title was very representative. However, I have completely corrected the contents of the manuscript (40%) according to the suggestions given by the reviewer
2. Yes. The abstract synthesizes well the content of the article	It is clear. Thank you very much
3. No. 5 of the keywords are in the title.	I have fixed it according to the rules. I've replaced it with four new keywords, according to the suggestions given
4. No. There is no comparison with the results of other previous studies. There is absolutely no background related to the conditions and status of aquaculture practices and fish-farmers behavior and attitude regarding the aquaculture practices at the research site. Also no information regarding the aspects that become parameters to determine the differences in attitudes and behavior in aquaculture practices.	I have completely corrected the manuscript. What the reviewers expected has been answered in the manuscript. There is already a background related to the condition and status of aquaculture practices as well as the behavior and attitudes of fish farmers towards aquaculture practices of the research site. There is also information about aspects that become parameters to determine differences in attitudes and behavior in aquaculture practices.
5. No. Only 1 reference, but from other country. No overview related to the study area particularly in the aquaculture practice aspects at the introduction, result and discussion section.	I have added some relevant references
6. Yes. However, in terms of the description in the method, results dan discussion section, it is more suitable this manuscript for the field of statistic, because the description is more dominant in statistical procedures.	The statistical discussion in the description of the method has been simplified, the description of the research results and discussion has been added to several paragraphs and references from Bioflux journal
7. – – –	
8. – – –	
9. Yes. However, the conclusion does not reflect what is in the title.	I have completed the research conclusions with solid sentences
10. No. There are at least 14 references quoted in the text not listed in the bibliography.	Since the first time I've used Mendeley in the literature writing system. Indeed, there is still one literature that escapes Mendeley's system. But I have corrected it, and have even added some more literature from the journal Bioflux.
11. – – –	
12. – – –	

Answers to Reviewer 2

Reviewer's comment	Authors' answer
B). The vocabulary used is academic, without incoherencies or grammar mistakes but still need to add objectives, data analysis and discussion.	
1. **Yes**, the title is clear and reflects the object of study but needs to be more specific about the Website or MFCE	It is clear. Thank you very much
2. **Yes**, the abstract synthesizes well the content of the article	It is clear. Thank you very much
3. **Yes**, there are 4-6 key words (they key words have to be different from the words from the paper's title)	I have fixed it according to the rules. I've replaced it with four new keywords, according to the suggestions given
4. **Yes,** but it is not complete compared to the previous article, both as to the purpose and the method	I have completely corrected the manuscript. What the reviewers expected has been answered in the manuscript. There is already a background related to the condition and status of aquaculture practices as well as the behavior and attitudes of fish farmers towards aquaculture practices of the research site. There is also information about aspects that become parameters to determine differences in attitudes and behavior in aquaculture practices.
5. **Yes**, but it is not complete compared to the previous article, both as to the purpose and the method	I have added some relevant references
6. **Yes**, but a. it does not explain the method on selecting respondents (random, criteria) b. does not state how many fish farmers exist in every district c. more analysis on data is needed d. discussion is limited to data analysis, thus it is not detailed enough.	I have corrected the manusscript: a. I have explained the method of selecting respondents (proportional purposive) b. I already mentioned how many fish farmers there are in each district c. I've analyzed more data d. I have discussed the data analysis results in detail
7. Yes. The source of the database is reliable (official databases, representative samples, etc)	It is clear. Thank you very much
8. Yes. The scientific contribution of the paper is original	It is clear. Thank you very much
9. Yes, The conclusions summarize clearly. But phrase structures need to be revised to be more understood	I have completed the research conclusions with solid sentences
10. Yes. Recent and well chosen (suitable) bibliography. There is a clear match between the bibliographic references from the end of the article and the ones quoted in the text	It is clear. Thank you very much
11. Yes. The vocabulary used is academic, without incoherencies or grammar mistakes	It is clear. Thank you very much
12. Yes. The paper is edited according to journal format. **But** revision is required on Bibliography; please refer to Bloflux format	The bibliography has been written using Bioflux format (Mendeley APA version 7)

Answers to Reviewer 3

Reviewer's comment	Authors' answer

B). In general, this study only describes the results of statistical tests on changes in attitudes and behavior. The discussion of statistical results is still not sufficient to explain the results of the study. Authors can add to the discussion about attitudes and behavior Please add more comprehensive discussions.	
1. Yes. The title is clear and reflects the object of study	It is clear. Thank you very much
2. Yes. The abstract synthesizes well the content of the article	It is clear. Thank you very much
3. **No**. There are not 4-6 key words (they key words have to be different from the words from the paper's title)	I have fixed it according to the rules. I've replaced it with four new keywords, according to the suggestions given
4. Yes. The introduction presents the relevance of the article for the given field and quotes the main results obtained by other authors concerning the subject. The introduction also has to contain the aim of the study.	It is clear. Thank you very much
5. Yes. The article contains a good overview on the previous studies from the same domain	It is clear. Thank you very much
6. No. The methodology in use is not coherently presented and there is a fair justification of it being preferred instead of other existent methodologies	The statistical discussion in the description of the method has been simplified, the description of the research results and discussion has been added to several paragraphs and references from Bioflux journal
7. Yes. The source of the database is reliable (official databases, representative samples, etc)	It is clear. Thank you very much
8. Yes. The scientific contribution of the paper is original	It is clear. Thank you very much
9. Yes. The conclusions summarize clearly the results and the consequences	It is clear. Thank you very much
10. Yes. Recent and well chosen (suitable) bibliography. There is a clear match between the bibliographic references from the end of the article and the ones quoted in the text	It is clear. Thank you very much
11. Yes. The vocabulary used is academic, without incoherencies or grammar mistakes	It is clear. Thank you very much
12. No. The paper is not edited according to journal format	The bibliography has been written using Bioflux format (Mendeley APA version 7)

Answers to Reviewer 4

Reviewer's comment	**Authors' answer**
B). Good manuscript and needs to be published to provide an overview of the impact of aquaculture cyber extension. However, there are several things that need to be adjusted, such as updated and original image information and also the appearance of the existing results and discussions.	
1. **Yes.** The title is clear and reflects the object of study	It is clear. Thank you very much
2. Yes. The abstract synthesizes well the content of the article	It is clear. Thank you very much
3. Yes, it has 6 key words. Please make them in alphabetical order.	I have fixed it according to the rules. I've replaced it with four new keywords, according to the suggestions given
4. Yes, its relevance. The introduction presents the relevance of the article for the given field and quotes the main results obtained by other authors	It is clear. Thank you very much

	concerning the subject. The introduction also has to contain the aim of the study.	
5.	**Yes**. The article contains a good overview on the previous studies from the same domain	It is clear. Thank you very much
6.	**No**, the research site map not specific.	I have corrected the map of the research location optimally. The map cannot be made to specific, given the vast area of research data collection
7.	**No**, results not inform clearly. It would be better to make it in the form of a table.	I think there is no need to explain in the table, because the results of the T-test have shown the effect of the independent variable on the dependent variable. In addition, these results have been explained at length in the description of the discussion.
8.	**Yes**, but add references from Bioflux Journal are highly recommended	It is clear. Thank you, but
9.	**Yes**. The conclusions summarize clearly the results and the consequences	It is clear. Thank you very much
10.	**Yes**. Recent and well chosen (suitable) bibliography. There is a clear match between the bibliographic references from the end of the article and the ones quoted in the text	It is clear. Thank you very much
11.	**Yes.** The vocabulary used is academic, without incoherencies or grammar mistakes	It is clear. Thank you very much
12.	**Yes**. The paper is edited according to journal format	It is clear. Thank you very much

The impact of aquaculture cyber extension on fish farmers' attitudes and behavior in Riau, Indonesia

[1] Ridar Hendri, [2] Haslinda Sutan Ahmad Nawi, [3] Azmuddin Ibrahim

[1] Department of Fisheries Socio-Economic, Faculty of Fisheries and Marine, University of Riau, Pekanbaru, Indonesia; [2] Department of Information Technology, Faculty of Communication, Visual Art, and Computing, Universiti Selangor, Bestari Jaya, Malaysia; [3] Department of Communication, Faculty of Communication, Visual Art, and Computing, Universiti Selangor, Bestari Jaya, Malaysia. Corresponding author: ridar.hendri@lecturer.unri.ac.id

Abstract. The purpose of this survey is to see how the aquaculture cyber extension materials on the MFCE (Marine and Fisheries Cyber Extension) website affect the attitudes and behavior of freshwater fish farmers in Riau Province, Indonesia. Using Isaac and Michael's table, a total of 259 fish farmers who used the MFCE website were chosen as samples. The data and information were gathered via a closed questionnaire that was purposive proportionally distributed to respondents in ten districts. With the help of SPSS 25 software, the data were analyzed using the Paired Sample T-Test. The findings concluded that the MFCE website's cyber aquaculture extension content was able to change the attitudes of fish producers in Riau Province. This is possible because the extension materials are engaging, simple to comprehend, and tailored to their specific needs. The extension materials, on the other hand, have no impact on changes in their behavior regarding how a freshwater aquaculture business is managed. This may arise because the material presented is not in accordance with the needs of fish farmers, especially fish species, water quality management, feed management, and fish marketing.
Key words: freshwater aquaculture, media impact, MFCE website, non-formal education.

Introduction. Aquaculture is an important sector to support the Indonesian economic because contributes USD4,154,186,154 a year (Ministry of Marine Affairs and Fisheries Republic of Indonesia 2018). Aquaculture is a human economic activity that utilizes and converts natural resources into commodities of value to society, such as fish, shrimp, shellfish, and other aquatic environmental organisms (Kautsky et al 2000). Freshwater aquaculture are carried out in rivers, lakes, reservoirs, and swamps (Lesa 2020).

Therefore, the government continues to develop this sector, among others through fisheries extension programs. The extension is non-formal education (Sadono 2010) or education for adults, which involves someone conveying information to help audiences make the right decisions (Ban & Hawkins 1999) so that aspects of their life change to be better than the existing conditions (Riadi 2020). The extension purpose is to change the knowledge, attitudes, and behavior of the audience for the better (Oakley & Garforth 1985; Ibrahim et al 2003; Amanah 2007).

To achieve the maximum results, since 2017, the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia (KKP-RI) has implemented an internet-based extension system (cyber extension). They built the *Marine and Fisheries Cyber Extension* (MFCE) website to disseminate extension materials to extension workers and fish farmers in the regions (Marine and Fishery Extension KKP-RI 2018). The MFCE website display is shown in Figure 1.

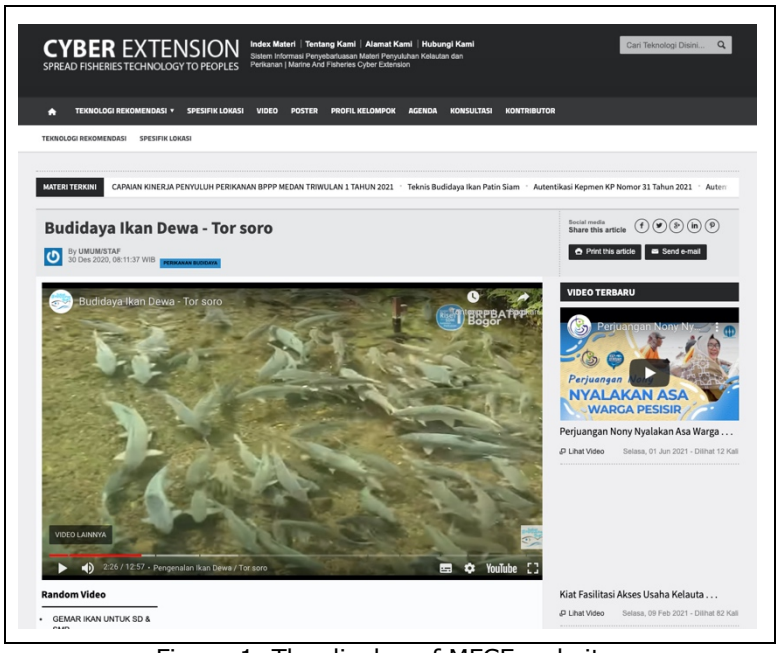


Figure 1. The display of MFCE website.

Riau Province is one of the centers of freshwater aquaculture in Indonesia. Fish farmers in Riau are the target of MFCE cyber media (Hendri et al 2018). Almost all areas in Riau develop freshwater aquaculture. Aquaculture was developed in 10 of the 12 regencies/cities, namely, Kampar, Pekanbaru, Rokan Hulu, Pelalawan, Kuantan Singingi, Indragiri Hulu, Indragiri Hilir, Rokan Hilir, and Bengkalis. It is not developed in Dumai, and Meranti Islands. The aquaculture in Riau is carried out in ponds, reservoirs, rivers, and swamps. This business involves 28,962 fish farmers who can produce 97.910 tons of fish a year (Dinas Perikanan dan Kelautan Provinsi Riau 2019). A total of 5,792 fish farmers used the MFCE website to find information about good freshwater aquaculture techniques (Hendri et al 2018).

The aquaculture cyber extension material on the MFCE website is expected to improve the attitudes and behavior of fish farmers in Riau Province. Attitudes are defined as psychological constructs, mental and emotional entities that are attached to or characterize a person (Perloff 2016). A person's predisposition to act, think, and feel his best while dealing with ideas, situations, or objects is sometimes referred to as attitude. People, locations, ideas, and situations in groups can all be objects (Rakhmat 2012).

While behavior is a series of actions made by individuals, organisms, systems, or artificial entities in relation to themselves or their environment (Hemakumara & Rainis 2018). Behavior is a response to various internal or external stimuli, conscious or subconscious, overt or covert, and voluntary or involuntary (Minton & Khale 2014). There are five stages of audience acceptance of an extension or innovation material: knowing, being interested (wanting to learn more), assessing (evaluating and contemplating), trying, and putting the innovations presented into practice (Riadi 2020). Attitude refers to one's level of interest and judgment, whereas behavior refers to one's willingness to test and execute new ideas. However, so far, the extension material impact on the fish farmers' attitudes and behavior in Riau is not known. Research like the present one need to be done to fill in this gap.

The main material of an aquaculture extension presented on the MFCE website is the seven principles of aquaculture management (*Sapta Usaha Budidaya Perikanan*). The material consists of pond preparation, water supply, handling fish seed stocking, water quality management, feed management, fish pest control, and harvest/post-harvest activities/and fish marketing (Agustina 2018; Zaelani 2018). Thus, aquaculture extension aims to change the attitudes and behaviour of fish farmers regarding the application of the seven principles of aquaculture management towards a better direction than before.

Several studies have shown that aquaculture extension materials have a significant impact on public attitudes. Sugiharto et al (2019) prove that extension materials have a

significant effect on improving the attitudes of members of the freshwater fish farmer group in Samarinda, Indonesia. Mustaqim & Nuraini (2019) also stated that Fishery extension materials improved the attitude of fishery business actors by 75.6% in developing their businesses for the better.

The extension material impact on fish farmer's behaviour. Several studies have stated that the extension materials given to fish farmers can change their behaviour, namely, carrying out aquaculture activities according to the guidelines for extension materials. According to Andiski et al (2017), freshwater aquaculture extension has a significant impact on the behaviour of the "Sejiwa" fish farmer group member in Pasaman, West Sumatra, Indonesia. Rosiah et al (2018) also explained that freshwater aquaculture extension materials had a significant effect on the behaviour of fish farmers in aquaculture. Once they know the extension materials provided, they begin to apply them to their business.

However, the impact of the cyber extension materials presented on the MFCE website on the attitudes and behaviour of fish farmers in Riau is unknown. For that, this research needs to be done.

Material and Method

Description of the study sites. This study was conducted from August - October 2020 in the Province of Riau, Indonesia, using a quantitative descriptive approach. Descriptive research is collecting measurable data to be able to describe the situation precisely (DeFranzo 2020; Robson & McCartan 2016). While the quantitative approach is the process of finding knowledge using data in the form of numbers as a tool to analyze information about what you want to know (Kasiram 2010).

The unit of analysis is fish farmers who use the MFCE website in Riau. The population consists of 5,792 fish farmers (Hendri et al 2018). While the respondent sample size is 259 fish farmers, determined based on Isaac and Michael's table (Sugiyono 2019). They are spread across 10 cities/regencies: Pekanbaru (16 respondents), Kampar (78), Rokan Hulu (35), Rokan Hilir (13), Bengkalis (5), Pelalawan (40), Kuantan Singingi (15), Indragiri Hulu (25), Siak (25), and Indragiri Hilir (7 respondents), as shown in Figure 2. Respondents were selected purposive proportional (Creswell 2009). Data collection was done by distributing questionnaires with open-ended questions to respondents (Bandhari 2020).

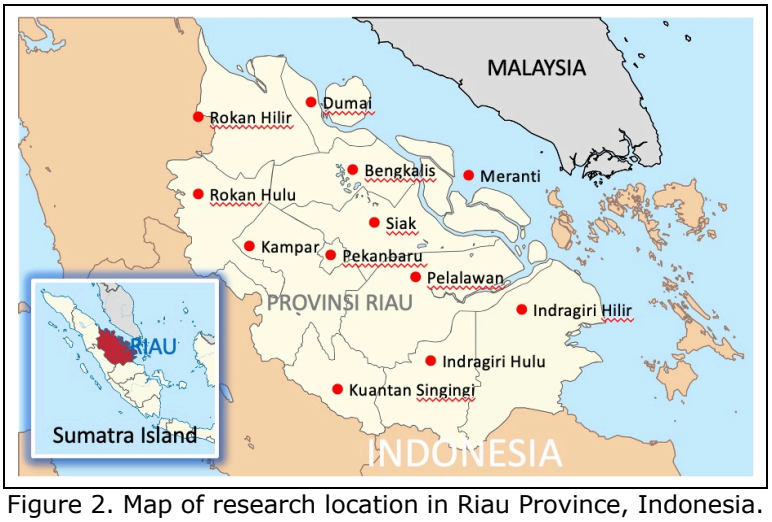


Figure 2. Map of research location in Riau Province, Indonesia.

Statistical analysis. Instrument validity and reliability tests were carried out using SPSS 25 software to ensure all data were valid and reliable. The validity test was carried out by looking at the Pearson Correlation coefficient (r). If the value of r-statistics > r-table, then all questionnaire items are considered valid (Sugiyono 2019). Meanwhile, the

reliability test was carried out by looking at the value of the Cronbach's Alpha coefficient. According to Hinton et al (2014), if the coefficient value is 0.50 – 0.70, then all items in the questionnaire are considered moderately reliable.

Furthermore, the Kolmogorov-Smirnov test (KS test) was carried out to analyze the normality of data regarding attitudes and behavior of fish farmers before and after using the MFCE website. If the value of KS-statistical > KS-table, then the data is considered to be normally distributed (Ghasemi & Zahediasl 2012), so that the next analysis, Paired-Sample T-Test, can be carried out. According to Akbar (2020), Paired-Sample T-Test can only be done if the research data is normally distributed. This analysis is used to see the impact of extension materials on the attitudes and behavior of fish farmers can be seen from differences in levels before and after using the MFCE website.

Paired Sample T-Test method with SPSS Statistics 25 software was performed to analyze the difference. According to Creswell (2009), if the significance value (Sig.) < probability 0.05, it can be said that there is a relationship between variables (fish farmers' attitudes or behavior) before and after using the MFCE website. Otherwise, if the value of Sig. > 0.05 probability, there is no relationship between variables before and before using the website.

Two hypotheses were proposed in this study:

H1 = There is an average difference between attitudes before and after using the website. This means freshwater aquaculture cyber extension materials are presented on the MFCE website can improve the attitude of fish farmers in Riau Province.

H2 = There is an average difference between behavior before and after using the website. This means freshwater aquaculture cyber extension materials are presented on the MFCE website can improve the behavior of fish farmers in Riau Province.

If the value of Sig. (2-tailed) < 0.05, then the hypothesis is accepted. If the value of Sig. (2-tailed) > 0.05, then the hypothesis is rejected (Sugiyono 2019).

Results and Discussion

The impact of cyber extension materials on the attitude of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' attitudes before and after using the MFCE website ranged from 0.127 to 0.440. It can be seen that all values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the attitude in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.793 > 0.50. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' attitude before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about attitudes are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.000 < 0.05 (Table 1), then H1 is accepted. It can be concluded that there is an average difference between the attitudes of fish farmers before and after using the MFCE website. In other words, there is an impact of aquaculture extension materials presented on the MFCE website in improving the fish farmers attitude in Riau Province to a better direction.

Table 1

Paired samples T-Test output for attitude of fish farmers

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	AttBeforeMFCE – AttAfterMFCE*	3.57196	10.23844	0.63619	2.31918	4.82474	5.615	258	0.000

*.....

These results are in line with the research of Ahmed et al (2018) which states that aquaculture extension has succeeded to improve the fish farmers' attitude in Bangladesh. The extension was able to improve the attitude of most of them (61.11%) to a moderate level. Meijer et al (2015) also revealed that innovative extension materials about agro-industry (including aquaculture) affect the attitudes of small-scale fish farmers in sub-Saharan Africa. In line with this, Pramitasari et al (2015) discovered that extension of local wisdom improved the fishermen's attitude toward fish conservation in the Mae Klong River in Songkram, Thailand.

The increasing attitude of fish farmers in Riau proves that they already know the content and benefits of the extension materials presented on the MFCE website, so they want to try it. This may occur because the cyber extension materials available on the MFCE website are considered interesting and easy to understand.

According to Surya (2019), agricultural extension materials (including fisheries) on websites can impact on the user attitudes, if the material presented is interesting and easily understandable. According to the fish farmers, the extension materials on the MFCE website are quite easy, because they only consist of three content formats, namely, text, images/graphics, and video. Extension content in text format is understood easily if popular language is used, is not too long, and is not wordy (Hendri & Yulinda 2019).

The ideal text formatted content consists of 700 – 1,700 words (Miladi 2018; Sall 2013). Image/graphic content will be interesting if it is displayed in a large size, which is the size of a gadget screen (Minimatters 2020). Meanwhile, video content must have sharp images, clean sound, and a short duration. The ideal duration is 4-10 minutes (Bahrul 2019). However, fish farmers will practice the extension materials if useful for their business development (Hermawan et al 2017).

The impact of cyber extension materials on the behaviour of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' behavior before and after using the MFCE website ranged from 0.126 to 0.492. It can be seen that all values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the behavior in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.597 > 0.50. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' behavior before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about behavior are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.351 < 0.05 (Table 2), then H2 is rejected. It can be concluded that there is no average difference between the fish farmers' behavior before and after using the MFCE website. In other words, the aquaculture extension materials presented on the MFCE website have no impact on improving the fish farmers' behavior in Riau Province.

Table 2

Paired samples T-Test output for the behavior of fish farmers

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	BehvBeforeMFCE – BehvAfterMFCE*	-0.34430	5.93418	0.36873	-1.07041	0.38181	-0.934	258	0.351

*.....

These findings suggest that, while there is a willingness to try to implement all extension resources on the MFCE website, they do not do so right away. This may be due to the material presented on the website, which is not following the needs of fish farmers in Riau. According to Ardiyanti (2016) and Hakim & Eriyanti (2019), fish farmers will only practice the extension material if it suits their business needs. I, fish farmers will only practice the extension material if it suits their business needs. It is not yet known what the extension material content presented on the MFCE website should be, according to fish farmers' needs. However, several researchers stated that there are two types of fishery extension materials needed by fish farmers, namely, types of fish, and aquaculture management.

The freshwater fish species that are widely cultivated in Riau are catfish (*Pangasius* spp.), golden fish (*Cyprinus carpio* Linnaeus, 1758), Mozambique tilapia (*Oreochromis mossambicus* (Peters, 1852)), catfish (*Clarias batrachus,* (Linnaeus, 1758)), parrot fish (*Oreochromis niloticus*), and giant gourami (*Osphronemus goramy* Lacepède, 1801). There are three of the seven aspects of aquaculture management that are needed by fish farmers in Riau, namely, water quality management, feed management, and fish marketing (Fauzi et al 2016). Water quality is a strategic issue in the freshwater aquaculture business in Riau, because the four major rivers in Riau (namely, Kampar, Siak, and Indragiri), are important sources of water for aquaculture (Siagian & Simarmata 2018). However, the Siak river has started to be polluted due to industrial waste along the river (Budijono et al 2021).

Conclusions. The findings of this study show that the MFCE website's cyber extension materials improve the attitudes of freshwater fish farmers in Riau Province, but have no impact on their aquaculture activity behavior. This is thought to have occurred because the extension materials presented were not following the needs of fish farmers, especially materials related to fish species, water quality management, feed management, and fish marketing.

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[Kutipan teks disembunyikan]

Bioflux Journals <biofluxeditor1@gmail.com> 31 Juli 2021 pukul 02.19
Kepada: Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

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Please find attached the acceptance letter. Because you said you need the paper to be published fast, the editor in chief is making the final verification of the manuscript tomorrow. This means that if all is well, your paper will be published online very soon (this week-end).

Kind regards,
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Acceptance letter.pdf
154K

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 31 Juli 2021 pukul 05.48
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>
Bcc: ridar.hendri@lecturer.unri.ac.id

Dear Dr Crina Petrescu
Editor of AACL Bioflux Journal

THANK YOU very much. I am very happy to cooperation with you, with Bioflux. Wish you always success. greetings to everyone here. amen..

Best Regards,
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Dikirim dari iPhone saya
[Kutipan teks disembunyikan]

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Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 31 Juli 2021 pukul 18.27
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

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Bioflux Journals <biofluxeditor1@gmail.com> 31 Juli 2021 pukul 22.20
Kepada: Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

Dear Dr. Ridar Hendri,

Please do not worry about the email from Mr. Valentin Petrescu-Mag. The document was a template. The article was published online 10 minutes ago.

Thank you for your kind words. It was a pleasure to work with you. I hope you will publish again in AACl or other Bioflux journals soon.

Your article is now published online. Please find it it here:
http://www.bioflux.com.ro/home/volume-14-4-2021/
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>>>> Please check the authors' names, affiliations, Universities names in Acknowledgement, etc.
>>>> If you want to modify something, let me know.
>>>>
>>>> I will send it to the editor in chief for publication.
>>>> He will publish it online on June 30 (+/- 2 days).
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154K

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 31 Juli 2021 pukul 05.48
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>
Bcc: ridar.hendri@lecturer.unri.ac.id

Dear Dr Crina Petrescu
Editor of AACL Bioflux Journal

THANK YOU very much. I am very happy to cooperation with you, with Bioflux. Wish you always success. greetings to everyone here. amen..

Best Regards,
Ridar Hendri

Dikirim dari iPhone saya
[Kutipan teks disembunyikan]

> [Kutipan teks disembunyikan]
> <Acceptance letter.pdf>

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 31 Juli 2021 pukul 18.27
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Dear Dr Crina Petrescu
Editor, Bioflux Journal

Two hours ago I received an email from Assc. Prof. Mag Ioan Valentin. I was asked to correct and complete the last bit of information in my manuscript. I fixed it and sent back to him. In the draft sent, it appears that this manuscript will be published in October. Not August as we expected. This worries me a little.
Thank you very much.
[Kutipan teks disembunyikan]

Bioflux Journals <biofluxeditor1@gmail.com> 31 Juli 2021 pukul 22.20
Kepada: Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

Dear Dr. Ridar Hendri,

Please do not worry about the email from Mr. Valentin Petrescu-Mag. The document was a template. The article was published online 10 minutes ago.

Thank you for your kind words. It was a pleasure to work with you. I hope you will publish again in AACl or other Bioflux journals soon.

Your article is now published online. Please find it it here:
http://www.bioflux.com.ro/home/volume-14-4-2021/
and
http://www.bioflux.com.ro/docs/2021.1965-1973.pdf

I wish you all the best!

Kind regards,
Crina Petrescu

[Kutipan teks disembunyikan]

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 31 Juli 2021 pukul 22.29
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Thanks. Hahaha.
[Kutipan teks disembunyikan]

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 2 Agustus 2021 pukul 07.14
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Dear Dr Crina Petrescu

Thank you for publishing my article. Indeed, after I reread it, I still found a few spelling mistakes and one sentence was written twice. Something that can't be fixed anymore because it's already published. Here I attach the script after I edited it. Thank you.

Warm regards
Ridar Hendri

[Kutipan teks disembunyikan]

RH Impact Edited last rev.doc
580K

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 2 Agustus 2021 pukul 07.25
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

This email only just for information, as an experience for writing my next article in Bioflux.
[Kutipan teks disembunyikan]

Bioflux Journals <biofluxeditor1@gmail.com> 2 Agustus 2021 pukul 16.28
Kepada: Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

Dear Dr. Ridar Hendri,

I will contact the editor in chief. I cannot promise you to change the published version (because I do not know if it is possible), but we will try. If it is possible, we will do it this evening.

Please read carefully once again your manuscript and introduce in it ALL changes that you need. Then, send it to me during the next 5 hours (6 pm Romania time). I attach here the final version, the one that was published. Please make all your corrections on THE ATTACHED VERSION using track changes function, because we already corrected other spelling mistakes that we found in the previous version.

Kind regards,
Crina Petrescu
[Kutipan teks disembunyikan]

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Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 2 Agustus 2021 pukul 16.31
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Ok, I will do it.
[Kutipan teks disembunyikan]

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 2 Agustus 2021 pukul 18.13
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Dear Dr Crina Petrescu

Thank you for your hospitality. I've corrected the manuscript you just submitted. Hopefully improvements can be made. However, if it is not possible, no problem.

Warm regards,
Ridar Hendri

[Kutipan teks disembunyikan]

2021.1965-1973.doc
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Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 2 Agustus 2021 pukul 20.24
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

This is file final. Thank you very much..
[Kutipan teks disembunyikan]

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Bioflux Journals <biofluxeditor1@gmail.com> 3 Agustus 2021 pukul 01.57
Kepada: Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

Dear Dr Ridar Hendri,

I received your file and I will work on it tomorrow.

The formulation "....Department of Fisheries Socio Economic" is a bit unusual (in the Acknowledgement section). Are you sure this is the correct translation that you officially use?

Kind regards,

[Kutipan teks disembunyikan]

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 3 Agustus 2021 pukul 05.34
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Dear Dr Crina Petrescu

You are right. I have seen the term used by many similar departments in other universities in the world. They used the Department of Fisheries Socioeconomics. I have changed it and adapted it accordingly in the attached manuscript. We use the attached manuscript because it is considered complete. Thank you very much.

Kind regards,
Ridar Hendri
[Kutipan teks disembunyikan]

2021.1965-1973 new1.doc
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Bioflux Journals <biofluxeditor1@gmail.com> 3 Agustus 2021 pukul 16.57
Kepada: Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

Dear dr. Ridar Hendri,

I noticed that there are 9 mentioned here
"Aquaculture was developed in 10 of the 12 regencies/cities, namely, Kampar, Pekanbaru, Rokan Hulu, Pelalawan, Kuantan Singingi, Indragiri Hulu, Indragiri Hilir, Rokan Hilir, and Bengkalis."
Please add one more.

Please read carefully the "***Statistical analysis***" section, I corrected much there.
Also, read this: "***The impact of cyber extension materials on the behaviour of fish farmers***". I modified the following: "The reliability test results showed that Cronbach's Alpha coefficient value was 0.597, which is poor, but still acceptable. This suggests that different questions should be used in the future."

I need to add the following information:
farmers' attitude related to what?
farmers' behavior related to what?

Also, send me the questions that you used to measure the attitude and the behavior, so I can put them in an annex.

The paragraf with latin names is not corrected yet. I'll write about it later.

Best regards,
Crina Petrescu

[Kutipan teks disembunyikan]

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The impact of aquaculture cyber extension on fish farmers' attitudes and behavior in Riau, Indonesia

[1] Ridar Hendri, [2] Haslinda Sutan Ahmad Nawi, [3] Azmuddin Ibrahim

[1] Department of Fisheries Socio Economic, Faculty of Fisheries and Marine, University of Riau, 20293 Pekanbaru, Indonesia; [2] Department of Computing, Faculty of Communication, Visual Art, and Computing, Universiti Selangor, 45600 Bestari Jaya, Malaysia; [3] Department of Communication, Faculty of Communication, Visual Art, and Computing, Universiti Selangor, 45600 Bestari Jaya, Malaysia.
Corresponding author: ridar.hendri@lecturer.unri.ac.id

Abstract. The purpose of this survey is to see how the aquaculture cyber extension materials on the MFCE (Marine and Fisheries Cyber Extension) website affect the attitudes and behavior of freshwater fish farmers in Riau Province, Indonesia. Using Isaac and Michael's table, a total of 259 fish farmers who used the MFCE website were chosen as samples. The data and information were gathered via a closed questionnaire that was purposive proportionally distributed to respondents in ten districts. With the help of SPSS 25 software, the data were analyzed using the Paired Sample T-Test. The findings concluded that the MFCE website's cyber aquaculture extension content was able to change the attitudes of fish producers in Riau Province. This is possible because the extension materials are engaging, simple to comprehend, and tailored to their specific needs. The extension materials, on the other hand, have no impact on changes in their behavior regarding how a freshwater aquaculture business is managed. This may arise because the material presented is not in accordance with the needs of fish farmers, especially fish species, water quality management, feed management, and fish marketing.
Key words: freshwater aquaculture, media impact, MFCE website, non-formal education.

Introduction. Aquaculture is an important sector to support the Indonesian economic because contributes USD 4,154,186,154 a year (Ministry of Marine Affairs and Fisheries Republic of Indonesia 2018). Aquaculture is a human economic activity that utilizes and converts natural resources into commodities of value to society, such as fish, shrimp, shellfish, and other aquatic environmental organisms (Kautsky et al 2000). Freshwater aquaculture are carried out in rivers, lakes, reservoirs, and swamps (Lesa 2020).

Therefore, the government continues to develop this sector, among others through fisheries extension programs. The extension is non-formal education (Sadono 2010) or education for adults, which involves someone conveying information to help audiences make the right decisions (Ban & Hawkins 1999) so that aspects of their life change to be better than the existing conditions (Riadi 2020). The extension purpose is to change the knowledge, attitudes, and behavior of the audience for the better (Oakley & Garforth 1985; Ibrahim et al 2003; Amanah 2007).

To achieve the maximum results, since 2017, the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia (KKP-RI) has implemented an internet-based extension system (cyber extension). They built the *Marine and Fisheries Cyber Extension* (MFCE) website to disseminate extension materials to extension workers and fish farmers in the regions (Marine and Fishery Extension KKP-RI 2018). The MFCE website display is shown in Figure 1.

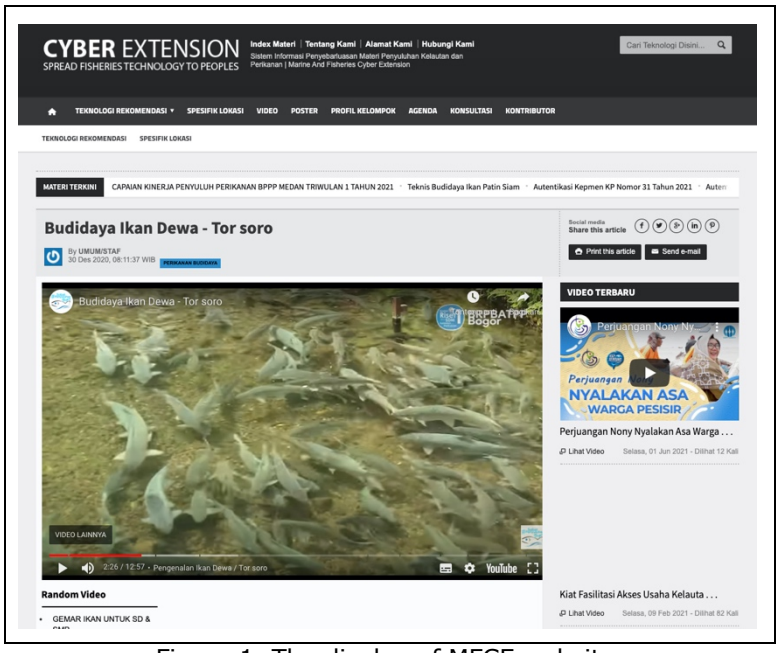

Figure 1. The display of MFCE website.

Riau Province is one of the centers of freshwater aquaculture in Indonesia. Fish farmers in Riau are the target of MFCE cyber media (Hendri et al 2018). Almost all areas in Riau develop freshwater aquaculture. Aquaculture was developed in 10 of the 12 regencies/cities, namely, Kampar, Pekanbaru, Rokan Hulu, Pelalawan, Kuantan Singingi, Indragiri Hulu, Indragiri Hilir, Rokan Hilir, and Bengkalis. It is not developed in Dumai, and Meranti Islands. The aquaculture in Riau is carried out in ponds, reservoirs, rivers, and swamps. This business involves 28,962 fish farmers who can produce 97.910 tons of fish a year (Dinas Perikanan dan Kelautan Provinsi Riau 2019). A total of 5,792 fish farmers used the MFCE website to find information about good freshwater aquaculture techniques (Hendri et al 2018).

The aquaculture cyber extension material on the MFCE website is expected to improve the attitudes and behavior of fish farmers in Riau Province. Attitudes are defined as psychological constructs, mental and emotional entities that are attached to or characterize a person (Perloff 2016). A person's predisposition to act, think, and feel his best while dealing with ideas, situations, or objects is sometimes referred to as attitude. People, locations, ideas, and situations in groups can all be objects (Rakhmat 2012).

While behavior is a series of actions made by individuals, organisms, systems, or artificial entities in relation to themselves or their environment (Hemakumara & Rainis 2018). Behavior is a response to various internal or external stimuli, conscious or subconscious, overt or covert, and voluntary or involuntary (Minton & Khale 2014). There are five stages of audience acceptance of an extension or innovation material: knowing, being interested (wanting to learn more), assessing (evaluating and contemplating), trying, and putting the innovations presented into practice (Riadi 2020). Attitude refers to one's level of interest and judgment, whereas behavior refers to one's willingness to test and execute new ideas. However, so far, the extension material impact on the fish farmers' attitudes and behavior in Riau is not known. Research like the present one need to be done to fill in this gap.

The main material of an aquaculture extension presented on the MFCE website is the seven principles of aquaculture management (*Sapta Usaha Budidaya Perikanan*). The material consists of pond preparation, water supply, handling fish seed stocking, water quality management, feed management, fish pest control, and harvest/post-harvest activities/and fish marketing (Agustina 2018; Zaelani 2018). Thus, aquaculture extension aims to change the attitudes and behaviour of fish farmers regarding the application of the seven principles of aquaculture management towards a better direction than before.

Several studies have shown that aquaculture extension materials have a significant impact on public attitudes. Sugiharto et al (2019) prove that extension materials have a

significant effect on improving the attitudes of members of the freshwater fish farmer group in Samarinda, Indonesia. Mustaqim & Nuraini (2019) also stated that Fishery extension materials improved the attitude of fishery business actors by 75.6% in developing their businesses for the better.

The extension material impact on fish farmer's behaviour. Several studies have stated that the extension materials given to fish farmers can change their behaviour, namely, carrying out aquaculture activities according to the guidelines for extension materials. According to Andiski et al (2017), freshwater aquaculture extension has a significant impact on the behaviour of the "Sejiwa" fish farmer group member in Pasaman, West Sumatra, Indonesia. Rosiah et al (2018) also explained that freshwater aquaculture extension materials had a significant effect on the behaviour of fish farmers in aquaculture. Once they know the extension materials provided, they begin to apply them to their business.

However, the impact of the cyber extension materials presented on the MFCE website on the attitudes and behaviour of fish farmers in Riau is unknown. For that, this research needs to be done.

Material and Method

Description of the study sites. This study was conducted from August - October 2020 in the Province of Riau, Indonesia, using a quantitative descriptive approach. Descriptive research is collecting measurable data to be able to describe the situation precisely (DeFranzo 2020; Robson & McCartan 2016). While the quantitative approach is the process of finding knowledge using data in the form of numbers as a tool to analyze information about what you want to know (Kasiram 2010).

The unit of analysis is fish farmers who use the MFCE website in Riau. The population consists of 5,792 fish farmers (Hendri et al 2018). While the respondent sample size is 259 fish farmers, determined based on Isaac and Michael's table (Sugiyono 2019). They are spread across 10 cities/regencies: Pekanbaru (16 respondents), Kampar (78), Rokan Hulu (35), Rokan Hilir (13), Bengkalis (5), Pelalawan (40), Kuantan Singingi (15), Indragiri Hulu (25), Siak (25), and Indragiri Hilir (7 respondents), as shown in Figure 2. Respondents were selected purposive proportional (Creswell 2009). Data collection was done by distributing questionnaires with open-ended questions to respondents (Bandhari 2020).

Figure 2. Map of research location in Riau Province, Indonesia.

Statistical analysis. Instrument validity and reliability tests were carried out using SPSS 25 software to ensure all data were valid and reliable. The validity test was carried out by looking at the Pearson Correlation coefficient (r). If the value of r-statistics > r-table, then all questionnaire items are considered valid (Sugiyono 2019). Meanwhile, the

reliability test was carried out by looking at the value of the Cronbach's Alpha coefficient. According to Hinton et al (2014), if the coefficient value is 0.50 – 0.70, then all items in the questionnaire are considered moderately reliable.

Furthermore, the Kolmogorov-Smirnov test (KS test) was carried out to analyze the normality of data regarding attitudes and behavior of fish farmers before and after using the MFCE website. If the value of KS-statistical > KS-table, then the data is considered to be normally distributed (Ghasemi & Zahediasl 2012), so that the next analysis, Paired-Sample T-Test, can be carried out. According to Akbar (2020), Paired-Sample T-Test can only be done if the research data is normally distributed. This analysis is used to see the impact of extension materials on the attitudes and behavior of fish farmers can be seen from differences in levels before and after using the MFCE website.

Paired Sample T-Test method with SPSS Statistics 25 software was performed to analyze the difference. According to Creswell (2009), if the significance value (Sig.) < probability 0.05, it can be said that there is a relationship between variables (fish farmers' attitudes or behavior) before and after using the MFCE website. Otherwise, if the value of Sig. > 0.05 probability, there is no relationship between variables before and before using the website.

Two hypotheses were proposed in this study:

H1 = There is an average difference between attitudes before and after using the website. This means freshwater aquaculture cyber extension materials are presented on the MFCE website can improve the attitude of fish farmers in Riau Province.

H2 = There is an average difference between behavior before and after using the website. This means freshwater aquaculture cyber extension materials are presented on the MFCE website can improve the behavior of fish farmers in Riau Province.

If the value of Sig. (2-tailed) < 0.05, then the hypothesis is accepted. If the value of Sig. (2-tailed) > 0.05, then the hypothesis is rejected (Sugiyono 2019).

Results and Discussion

The impact of cyber extension materials on the attitude of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' attitudes before and after using the MFCE website ranged from 0.127 to 0.440. It can be seen that all values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the attitude in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.793 > 0.50. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' attitude before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about attitudes are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.000 < 0.05 (Table 1), then H1 is accepted. It can be concluded that there is an average difference between the attitudes of fish farmers before and after using the MFCE website. In other words, there is an impact of aquaculture extension materials presented on the MFCE website in improving the fish farmers attitude in Riau Province to a better direction.

Table 1

Paired samples T-Test output for attitude of fish farmers

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	AttBeforeMFCE – AttAfterMFCE*	3.57196	10.23844	0.63619	2.31918	4.82474	5.615	258	0.000

*AttBeforeMFCE = Attitude level of fish farmers before using the MFCE website; AttAfterMFCE = Attitude level of fish farmers after using the MFCE website.

These results are in line with the research of Ahmed et al (2018) which states that aquaculture extension has succeeded to improve the fish farmers' attitude in Bangladesh. The extension was able to improve the attitude of most of them (61.11%) to a moderate level. Meijer et al (2015) also revealed that innovative extension materials about agro-industry (including aquaculture) affect the attitudes of small-scale fish farmers in sub-Saharan Africa. In line with this, Pramitasari et al (2015) discovered that extension of local wisdom improved the fishermen's attitude toward fish conservation in the Mae Klong River in Songkram, Thailand.

The increasing attitude of fish farmers in Riau proves that they already know the content and benefits of the extension materials presented on the MFCE website, so they want to try it. This may occur because the cyber extension materials available on the MFCE website are considered interesting and easy to understand.

According to Surya (2019), agricultural extension materials (including fisheries) on websites can impact on the user attitudes, if the material presented is interesting and easily understandable. According to the fish farmers, the extension materials on the MFCE website are quite easy, because they only consist of three content formats, namely, text, images/graphics, and video. Extension content in text format is understood easily if popular language is used, is not too long, and is not wordy (Hendri & Yulinda 2019).

The ideal text formatted content consists of 700 – 1,700 words (Miladi 2018; Sall 2013). Image/graphic content will be interesting if it is displayed in a large size, which is the size of a gadget screen (Minimatters 2020). Meanwhile, video content must have sharp images, clean sound, and a short duration. The ideal duration is 4-10 minutes (Bahrul 2019). However, fish farmers will practice the extension materials if useful for their business development (Hermawan et al 2017).

The impact of cyber extension materials on the behaviour of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' behavior before and after using the MFCE website ranged from 0.126 to 0.492. It can be seen that all values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the behavior in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.597 > 0.50. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' behavior before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about behavior are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.351 < 0.05 (Table 2), then H2 is rejected. It can be concluded that there is no average difference between the fish farmers' behavior before and after using the MFCE website. In other words, the aquaculture extension materials presented on the MFCE website have no impact on improving the fish farmers' behavior in Riau Province.

Table 2

Paired samples T-Test output for the behavior of fish farmers

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	BehvBeforeMFCE – BehvAfterMFCE*	-0.34430	5.93418	0.36873	-1.07041	0.38181	-0.934	258	0.351

*BehvBeforeMFCE = Behavior level of fish farmers before using the MFCE website; BehvAfterMFCE = Behavior level of fish farmers after using the MFCE website.

These findings suggest that, while there is a willingness to try to implement all extension resources on the MFCE website, they do not do so right away. This may be due to the material presented on the website, which is not following the needs of fish farmers in Riau. According to Ardiyanti (2016) and Hakim & Eriyanti (2019), fish farmers will only practice the extension material if it suits their business needs. I, fish farmers will only practice the extension material if it suits their business needs. It is not yet known what the extension material content presented on the MFCE website should be, according to fish farmers' needs. However, several researchers stated that there are two types of fishery extension materials needed by fish farmers, namely, types of fish, and aquaculture management.

The freshwater fish species that are widely cultivated in Riau are catfish (*Pangasius* spp.), carp (*Cyprinus carpio* Linnaeus, 1758), Mozambique tilapia (*Oreochromis mossambicus* (Peters, 1852)), catfish (*Clarias batrachus* (Linnaeus, 1758)), nile tilapia (*Oreochromis niloticus* (Linnaeus, 1758)), and giant gourami (*Osphronemus goramy* Lacepède, 1801). There are three of the seven aspects of aquaculture management that are needed by fish farmers in Riau, namely, water quality management, feed management, and fish marketing (Fauzi et al 2016). Water quality is a strategic issue in the freshwater aquaculture business in Riau, because the four major rivers in Riau (namely, Kampar, Siak, Rokan and Indragiri), are important sources of water for aquaculture (Siagian & Simarmata 2018). However, the Siak river has started to be polluted due to industrial waste along the river (Budijono et al 2021).

Conclusions. The findings of this study show that the MFCE website's cyber extension materials improve the attitudes of freshwater fish farmers in Riau Province, but have no impact on their aquaculture activity behavior. This is thought to have occurred because the extension materials presented were not following the needs of fish farmers, especially materials related to fish species, water quality management, feed management, and fish marketing.

Acknowledgements. We appreciate the help of the Faculty of Fisheries and Marine, University of Riau, and University Selangor for this study. Special thanks to Department of Fisheries Socio Economic.

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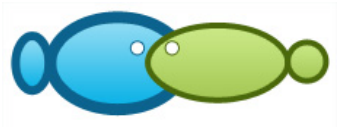

The impact of aquaculture cyber extension on fish farmers' attitudes and behavior in Riau, Indonesia

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Abstract. The purpose of this survey is to see how the aquaculture cyber extension materials on the MFCE (Marine and Fisheries Cyber Extension) website affect the attitudes and behavior of freshwater fish farmers in Riau Province, Indonesia. Using Isaac and Michael's table, a total of 259 fish farmers who used the MFCE website were chosen as samples. The data and information were gathered via a closed questionnaire that was purposive proportionally distributed to respondents in ten districts. With the help of SPSS 25 software, the data were analyzed using the Paired Sample T-Test. The findings concluded that the MFCE website's cyber aquaculture extension content was able to change the attitudes of fish producers in Riau Province. This is possible because the extension materials are engaging, simple to comprehend, and tailored to their specific needs. The extension materials, on the other hand, have no impact on changes in their behavior regarding how a freshwater aquaculture business is managed. This may arise because the material presented is not in accordance with the needs of fish farmers, especially fish species, water quality management, feed management, and fish marketing.
Key words: freshwater aquaculture, media impact, MFCE website, non-formal education.

Introduction. Aquaculture is an important sector to support the Indonesian economic because contributing USD 4,15 billion a year (Ministry of Marine Affairs and Fisheries Republic of Indonesia 2018). Aquaculture is a human economic activity that utilizes and converts natural resources into commodities of value to society, such as fish, shrimp, shellfish, and other aquatic environmental organisms (Kautsky et al 2000). Freshwater aquaculture are carried out in rivers, lakes, reservoirs, and swamps (Lesa 2020).

Therefore, the government continues to develop this sector, among others through fisheries extension programs. The extension is non-formal education (Sadono 2010) or education for adults, which involves someone conveying information to help audiences make the right decisions (Ban & Hawkins 1999) so that aspects of their life change to be better than the existing conditions (Riadi 2020). The extension purpose is to change the knowledge, attitudes, and behavior of the audience for the better (Oakley & Garforth 1985; Ibrahim et al 2003; Amanah 2007).

To achieve the maximum results, since 2017, the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia (KKP-RI) has implemented an internet-based extension system (cyber extension). They built the *Marine and Fisheries Cyber Extension* (MFCE) website to disseminate extension materials to extension workers and fish farmers in the regions (Marine and Fishery Extension KKP-RI 2018). The MFCE website display is shown in Figure 1.

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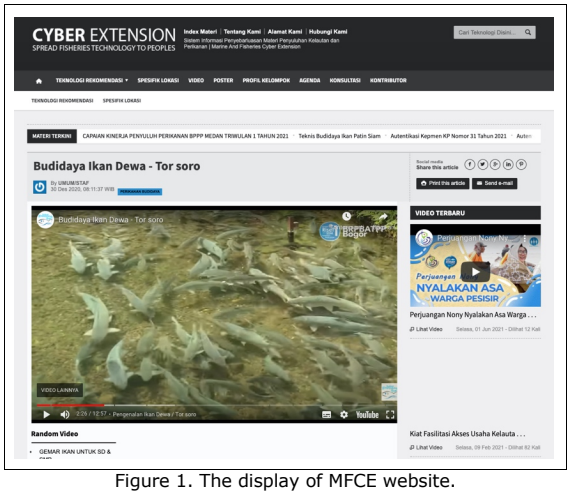

Figure 1. The display of MFCE website.

Riau Province is one of the centers of freshwater aquaculture in Indonesia. Fish farmers in Riau are the target of MFCE cyber media (Hendri et al 2018). Almost all areas in Riau develop freshwater aquaculture. Aquaculture was developed in 10 of the 12 regencies/cities, namely, Kampar, Pekanbaru, Rokan Hulu, Pelalawan, Kuantan Singingi, Indragiri Hulu, Indragiri Hilir, Rokan Hilir, and Bengkalis. It is not developed in Dumai, and Meranti Islands. The aquaculture in Riau is carried out in ponds, reservoirs, rivers, and swamps. This business involves 28,962 fish farmers who can produce 97.910 tons of fish a year (Dinas Perikanan dan Kelautan Provinsi Riau 2019). A total of 5,792 fish farmers used the MFCE website to find information about good freshwater aquaculture techniques (Hendri et al 2018).

The aquaculture cyber extension material on the MFCE website is expected to improve the attitudes and behavior of fish farmers in Riau Province. Attitudes are defined as psychological constructs, mental and emotional entities that are attached to or characterize a person (Perloff 2016). A person's predisposition to act, think, and feel his best while dealing with ideas, situations, or objects is sometimes referred to as attitude. People, locations, ideas, and situations in groups can all be objects (Rakhmat 2012).

While behavior is a series of actions made by individuals, organisms, systems, or artificial entities in relation to themselves or their environment (Hemakumara & Rainis 2018). Behavior is a response to various internal or external stimuli, conscious or subconscious, overt or covert, and voluntary or involuntary (Minton & Khale 2014). There are five stages of audience acceptance of an extension or innovation material: knowing, being interested (wanting to learn more), assessing (evaluating and contemplating), trying, and putting the innovations presented into practice (Riadi 2020). Attitude refers to one's level of interest and judgment, whereas behavior refers to one's willingness to test and execute new ideas. However, so far, the extension material impact on the fish farmers' attitudes and behavior in Riau is not known. Research like the present one need to be done to fill in this gap.

The main material of an aquaculture extension presented on the MFCE website is the seven principles of aquaculture management (*Sapta Usaha Budidaya Perikanan*) adopted the ministry. The material consists of pond preparation, water supply, handling fish seed stocking, water quality management, feed management, fish pest control, and harvest/post-harvest activities/and fish marketing (Agustina 2018; Zaelani 2018). Thus, aquaculture extension aims to change the attitudes and behaviour of fish farmers regarding the application of the seven principles of aquaculture management towards a better direction than before.

Several studies have shown that aquaculture extension materials have a significant impact on public attitudes. Sugiharto et al (2019) prove that extension materials have a significant effect on improving the attitudes of members of the freshwater fish farmer group in Samarinda, Indonesia. Mustaqim & Nuraini (2019) also stated that Fishery extension materials improved the attitude of fishery business actors by 75.6% in developing their businesses for the better.

Several studies shown the extension material impact on fish farmer's behaviour. Studies have shown that the extension materials given to fish farmers can change their behaviour, namely, carrying out aquaculture activities according to the guidelines for extension materials. According to Andiski et al (2017), freshwater aquaculture extension has a significant impact on the behaviour of the "Sejiwa" fish farmer group member in Pasaman, West Sumatra, Indonesia. Rosiah et al (2018) also explained that freshwater aquaculture extension materials had a significant effect on the behaviour of fish farmers in aquaculture. Once they know the extension materials provided, they begin to apply them to their business.

However, the impact of the cyber extension materials presented on the MFCE website on the attitudes and behaviour of fish farmers in Riau is unknown. For that, this research needs to be done.

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Material and Method

Description of the study sites. This study was conducted from August - October 2020 in the Province of Riau, Indonesia, using a quantitative descriptive approach. Descriptive research is collecting measurable data to be able to describe situation precisely (DeFranzo 2020; Robson & McCartan 2016). While the quantitative approach is the process of finding knowledge using data in the form of numbers as a tool to analyze information about what you want to know (Kasiram 2010).

The unit of analysis is fish farmers who use the MFCE website in Riau. The population consists of 5,792 fish farmers (Hendri et al 2018). While the respondent sample size is 259 fish farmers, determined based on Isaac and Michael's table (Sugiyono 2019). They comprise spread across 10 cities/regencies: Pekanbaru (16 respondents), Kampar (78), Rokan Hulu (35), Rokan Hilir (13), Bengkalis (5), Pelalawan (40), Kuantan Singingi (15), Indragiri Hulu (25), Siak (25), and Indragiri Hilir (7 respondents), as shown in Figure 2. Respondents were selected purposive proportional (Creswell 2009). Data collection was done by distributing questionnaires with open-ended questions to respondents (Bandhari 2020).

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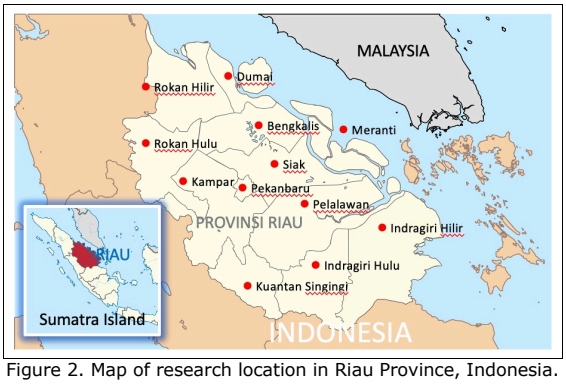

Figure 2. Map of research location in Riau Province, Indonesia.

Statistical analysis. Instrument validity and reliability tests were carried out using SPSS 25 software to ensure all data were valid and reliable. The validity test was carried

out by looking at the Pearson Correlation coefficient (r). If the value of r-statistics > r-table, then all questionnaire items are considered valid (Sugiyono 2019). Meanwhile, the reliability test was carried out by looking at the value of the Cronbach's Alpha coefficient. According to Hinton et al (2014), if the coefficient value is 0.50 – 0.70, then all items in the questionnaire are considered moderately reliable.

Furthermore, the Kolmogorov-Smirnov test (KS test) was carried out to analyze the normality of data regarding attitudes and behavior of fish farmers before and after using the MFCE website. If the value of KS-statistical > KS-table, then the data is considered to be normally distributed (Ghasemi & Zahediasl 2012), so that the next analysis, Paired-Sample T-Test, can be carried out. According to Akbar (2020), Paired-Sample T-Test can only be done if the research data is normally distributed. This analysis is used to see the impact of extension materials on the attitudes and behavior of fish farmers can be seen from differences in levels before and after using the MFCE website.

Paired Sample T-Test method with SPSS Statistics 25 software was performed to analyze the difference. According to Creswell (2009), if the significance value (Sig.) < probability 0.05, it can be said that there is a relationship between variables (fish farmers' attitudes or behavior) before and after using the MFCE website. Otherwise, if the value of Sig. > 0.05 probability, there is no relationship between variables before and after using the website.

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Two hypotheses were proposed in this study:

H1 = There is an average difference between attitudes before and after using the website. This means freshwater aquaculture cyber extension materials are presented on the MFCE website can improve the attitude of fish farmers in Riau Province.

H2 = There is an average difference between behavior before and after using the website. This means freshwater aquaculture cyber extension materials are presented on the MFCE website can improve the behavior of fish farmers in Riau Province.

If the value of Sig. (2-tailed) < 0.05, then the hypothesis is accepted. If the value of Sig. (2-tailed) > 0.05, then the hypothesis is rejected (Sugiyono 2019).

Results and Discussion

The impact of cyber extension materials on the attitude of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' attitudes before and after using the MFCE website ranged from 0.127 to 0.440. It can be seen that all values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the attitude in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.793 > 0.50. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' attitude before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about attitudes are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.000 < 0.05 (Table 1), then H1 is accepted. It can be concluded that there is an average difference between the attitudes of fish farmers before and after using the MFCE website. In other words, there is an impact of aquaculture extension materials presented on the MFCE website in improving the fish farmers' attitude in Riau Province to a better direction.

Table 1

Paired samples T-Test output for attitude of fish farmers

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	AttBeforeMFCE – AttAfterMFCE*	3.57196	10.23844	0.63619	2.31918	4.82474	5.615	258	0.000

*AttBeforeMFCE = Attitude level of fish farmers before using the MFCE website; AttAfterMFCE = Attitude level of fish farmers after using the MFCE website.

These results are in line with the research of Ahmed et al (2018) which states that aquaculture extension has succeeded to improve the fish farmers' attitude in Bangladesh. The extension was able to improve the attitude of most of them (61.11%) to a moderate level. Meijer et al (2015) also revealed that innovative extension materials about agro-industry (including aquaculture) affect the attitudes of small-scale fish farmers in sub-Saharan Africa. In line with this, Pramitasari et al (2015) discovered that extension of local wisdom improved the fishermen's attitude toward fish conservation in the Mae Klong River in Songkram, Thailand.

The increased attitude of fish farmers in Riau proves that they already know the content and benefits of the extension materials presented on the MFCE website, so they want to try it. This may occur because the cyber extension materials available on the MFCE website are considered interesting and easy to understand.

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According to Surya (2019), agricultural extension materials (including fisheries) on websites can have impact on the user attitudes, if the material presented is interesting and easily understandable. According to the fish farmers, the extension materials on the MFCE website are quite easy, because they only consist of three content formats, namely, text, images/graphics, and video. Extension content in text format is understood easily if popular language is used, is not too long, and is not wordy (Hendri & Yulinda 2019).

The ideal text formatted content consists of 700 – 1,700 words (Miladi 2018; Sall 2013). Image/graphic content will be interesting if it is displayed in a large size, which is the size of a gadget screen (Minimatters 2020). Meanwhile, video content must have sharp images, clean sound, and a short duration. The ideal duration is 4-10 minutes (Bahrul 2019). However, fish farmers will practice the extension materials if useful for their business development (Hermawan et al 2017).

The impact of cyber extension materials on the behaviour of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' behavior before and after using the MFCE website ranged from 0.126 to 0.492. It can be seen that all values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the behavior in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.597 > 0.50. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' behavior before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about behavior are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.351 < 0.05 (Table 2), then H2 is rejected. It can be concluded that there is no average difference between the fish farmers' behavior before and after using the MFCE website. In other words, the

aquaculture extension materials presented on the MFCE website have no impact on improving the fish farmers' behavior in Riau Province.

Table 2

Paired samples T-Test output for the behavior of fish farmers

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	BehvBeforeMFCE – BehvAfterMFCE*	-0.34430	5.93418	0.36873	-1.07041	0.38181	-0.934	258	0.351

*BehvBeforeMFCE = Behavior level of fish farmers before using the MFCE website; BehvAfterMFCE = Behavior level of fish farmers after using the MFCE website.

These findings suggest that, while there is a willingness to try to implement all extension resources on the MFCE website, they do not do so right away. This may be due to the material presented on the website, which is not following the needs of fish farmers in Riau. According to Ardiyanti (2016) and Hakim & Eriyanti (2019), fish farmers will only practice the extension material if it suits their business needs. I, fish farmers will only practice the extension material if it suits their business needs. It is not yet known what the extension material content presented on the MFCE website should be, according to fish farmers' needs. However, several researchers stated that there are two types of fishery extension materials needed by fish farmers, namely, types of fish, and aquaculture management.

The freshwater fish species that are widely cultivated in Riau are catfish (*Pangasius* spp.), carp (***Cyprinus carpio*** (Linnaeus, 1758)), Mozambique tilapia (***Oreochromis mossambicus*** (Peters, 1852)), catfish (***Clarias batrachus*** (Linnaeus, 1758)), nile tilapia (***Oreochromis niloticus*** (Linnaeus, 1758)), and giant gourami (***Osphronemus goramy*** (Lacepède, 1801)). There are three of the seven aspects of aquaculture management that are needed by fish farmers in Riau, namely, water quality management, feed management, and fish marketing (Fauzi et al 2016). Water quality is a strategic issue in the freshwater aquaculture business in Riau, because the four major rivers in Riau (namely, Kampar, Siak, Rokan and Indragiri), are important sources of water for aquaculture (Siagian & Simarmata 2018). However, the Siak river has started to be polluted due to industrial waste along the river (Budijono et al 2021).

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Conclusions. The findings of this study show that the MFCE website's cyber extension materials improve the attitudes of freshwater fish farmers in Riau Province, but have no impact on their aquaculture activity behavior. This is thought to have occurred because the extension materials presented were not following the needs of fish farmers, especially materials related to fish species, water quality management, feed management, and fish marketing.

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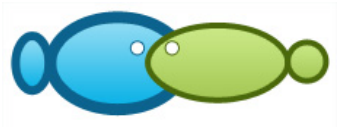

The impact of aquaculture cyber extension on fish farmers' attitudes and behavior in Riau, Indonesia

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Abstract. The purpose of this survey is to see how the aquaculture cyber extension materials on the MFCE (Marine and Fisheries Cyber Extension) website affect the attitudes and behavior of freshwater fish farmers in Riau Province, Indonesia. Using Isaac and Michael's table, a total of 259 fish farmers who used the MFCE website were chosen as samples. The data and information were gathered via a closed questionnaire that was purposive proportionally distributed to respondents in ten districts. With the help of SPSS 25 software, the data were analyzed using the Paired Sample T-Test. The findings concluded that the MFCE website's cyber aquaculture extension content was able to change the attitudes of fish producers in Riau Province. This is possible because the extension materials are engaging, simple to comprehend, and tailored to their specific needs. The extension materials, on the other hand, have no impact on changes in their behavior regarding how a freshwater aquaculture business is managed. This may arise because the material presented is not in accordance with the needs of fish farmers, especially fish species, water quality management, feed management, and fish marketing.
Key words: freshwater aquaculture, media impact, MFCE website, non-formal education.

Introduction. Aquaculture is an important sector to support the Indonesian economic because contributing USD 4,15 billion a year (Ministry of Marine Affairs and Fisheries Republic of Indonesia 2018). Aquaculture is a human economic activity that utilizes and converts natural resources into commodities of value to society, such as fish, shrimp, shellfish, and other aquatic environmental organisms (Kautsky et al 2000). Freshwater aquaculture are carried out in rivers, lakes, reservoirs, and swamps (Lesa 2020).

Therefore, the government continues to develop this sector, among others through fisheries extension programs. The extension is non-formal education (Sadono 2010) or education for adults, which involves someone conveying information to help audiences make the right decisions (Ban & Hawkins 1999) so that aspects of their life change to be better than the existing conditions (Riadi 2020). The extension purpose is to change the knowledge, attitudes, and behavior of the audience for the better (Oakley & Garforth 1985; Ibrahim et al 2003; Amanah 2007).

To achieve the maximum results, since 2017, the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia (KKP-RI) has implemented an internet-based extension system (cyber extension). They built the *Marine and Fisheries Cyber Extension* (MFCE) website to disseminate extension materials to extension workers and fish farmers in the regions (Marine and Fishery Extension KKP-RI 2018). The MFCE website display is shown in Figure 1.

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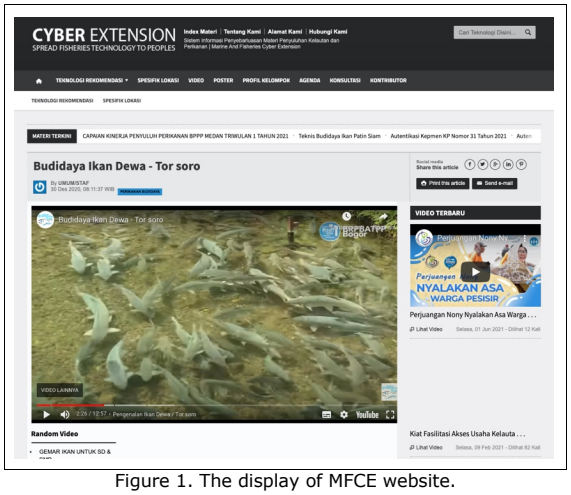

Figure 1. The display of MFCE website.

Riau Province is one of the centers of freshwater aquaculture in Indonesia. Fish farmers in Riau are the target of MFCE cyber media (Hendri et al 2018). Almost all areas in Riau develop freshwater aquaculture. Aquaculture was developed in 10 of the 12 regencies/cities, namely, Kampar, Pekanbaru, Rokan Hulu, Pelalawan, Kuantan Singingi, Indragiri Hulu, Indragiri Hilir, Rokan Hilir, and Bengkalis. It is not developed in Dumai, and Meranti Islands. The aquaculture in Riau is carried out in ponds, reservoirs, rivers, and swamps. This business involves 28,962 fish farmers who can produce 97.910 tons of fish a year (Dinas Perikanan dan Kelautan Provinsi Riau 2019). A total of 5,792 fish farmers used the MFCE website to find information about good freshwater aquaculture techniques (Hendri et al 2018).

The aquaculture cyber extension material on the MFCE website is expected to improve the attitudes and behavior of fish farmers in Riau Province. Attitudes are defined as psychological constructs, mental and emotional entities that are attached to or characterize a person (Perloff 2016). A person's predisposition to act, think, and feel his best while dealing with ideas, situations, or objects is sometimes referred to as attitude. People, locations, ideas, and situations in groups can all be objects (Rakhmat 2012).

While behavior is a series of actions made by individuals, organisms, systems, or artificial entities in relation to themselves or their environment (Hemakumara & Rainis 2018). Behavior is a response to various internal or external stimuli, conscious or subconscious, overt or covert, and voluntary or involuntary (Minton & Khale 2014). There are five stages of audience acceptance of an extension or innovation material: knowing, being interested (wanting to learn more), assessing (evaluating and contemplating), trying, and putting the innovations presented into practice (Riadi 2020). Attitude refers to one's level of interest and judgment, whereas behavior refers to one's willingness to test and execute new ideas. However, so far, the extension material impact on the fish farmers' attitudes and behavior in Riau is not known. Research like the present one need to be done to fill in this gap.

The main material of an aquaculture extension presented on the MFCE website is the seven principles of aquaculture management (*Sapta Usaha Budidaya Perikanan*) adopted the ministry. The material consists of pond preparation, water supply, handling fish seed stocking, water quality management, feed management, fish pest control, and harvest/post-harvest activities/and fish marketing (Agustina 2018; Zaelani 2018). Thus, aquaculture extension aims to change the attitudes and behaviour of fish farmers regarding the application of the seven principles of aquaculture management towards a better direction than before.

Several studies have shown that aquaculture extension materials have a significant impact on public attitudes. Sugiharto et al (2019) prove that extension materials have a significant effect on improving the attitudes of members of the freshwater fish farmer group in Samarinda, Indonesia. Mustaqim & Nuraini (2019) also stated that Fishery extension materials improved the attitude of fishery business actors by 75.6% in developing their businesses for the better.

Several studies shown the extension material impact on fish farmer's behaviour. Studies have shown that the extension materials given to fish farmers can change their behaviour, namely, carrying out aquaculture activities according to the guidelines for extension materials. According to Andiski et al (2017), freshwater aquaculture extension has a significant impact on the behaviour of the "Sejiwa" fish farmer group member in Pasaman, West Sumatra, Indonesia. Rosiah et al (2018) also explained that freshwater aquaculture extension materials had a significant effect on the behaviour of fish farmers in aquaculture. Once they know the extension materials provided, they begin to apply them to their business.

However, the impact of the cyber extension materials presented on the MFCE website on the attitudes and behaviour of fish farmers in Riau is unknown. For that, this research needs to be done.

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Material and Method

Description of the study sites. This study was conducted from August - October 2020 in the Province of Riau, Indonesia, using a quantitative descriptive approach. Descriptive research is collecting measurable data to be able to describe situation precisely (DeFranzo 2020; Robson & McCartan 2016). While the quantitative approach is the process of finding knowledge using data in the form of numbers as a tool to analyze information about what you want to know (Kasiram 2010).

The unit of analysis is fish farmers who use the MFCE website in Riau. The population consists of 5,792 fish farmers (Hendri et al 2018). While the respondent sample size is 259 fish farmers, determined based on Isaac and Michael's table (Sugiyono 2019). They comprise spread across 10 cities/regencies: Pekanbaru (16 respondents), Kampar (78), Rokan Hulu (35), Rokan Hilir (13), Bengkalis (5), Pelalawan (40), Kuantan Singingi (15), Indragiri Hulu (25), Siak (25), and Indragiri Hilir (7 respondents), as shown in Figure 2. Respondents were selected purposive proportional (Creswell 2009). Data collection was done by distributing questionnaires with open-ended questions to respondents (Bandhari 2020).

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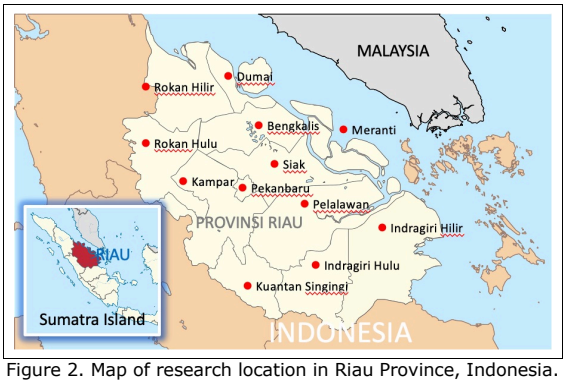

Figure 2. Map of research location in Riau Province, Indonesia.

Statistical analysis. Instrument validity and reliability tests were carried out using SPSS 25 software to ensure all data were valid and reliable. The validity test was carried

out by looking at the Pearson Correlation coefficient (r). If the value of r-statistics > r-table, then all questionnaire items are considered valid (Sugiyono 2019). Meanwhile, the reliability test was carried out by looking at the value of the Cronbach's Alpha coefficient. According to Hinton et al (2014), if the coefficient value is 0.50 – 0.70, then all items in the questionnaire are considered moderately reliable.

Furthermore, the Kolmogorov-Smirnov test (KS test) was carried out to analyze the normality of data regarding attitudes and behavior of fish farmers before and after using the MFCE website. If the value of KS-statistical > KS-table, then the data is considered to be normally distributed (Ghasemi & Zahediasl 2012), so that the next analysis, Paired-Sample T-Test, can be carried out. According to Akbar (2020), Paired-Sample T-Test can only be done if the research data is normally distributed. This analysis is used to see the impact of extension materials on the attitudes and behavior of fish farmers can be seen from differences in levels before and after using the MFCE website.

Paired Sample T-Test method with SPSS Statistics 25 software was performed to analyze the difference. According to Creswell (2009), if the significance value (Sig.) < probability 0.05, it can be said that there is a relationship between variables (fish farmers' attitudes or behavior) before and after using the MFCE website. Otherwise, if the value of Sig. > 0.05 probability, there is no relationship between variables before and after using the website.

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Two hypotheses were proposed in this study:

H1 = There is an average difference between attitudes before and after using the website. This means freshwater aquaculture cyber extension materials are presented on the MFCE website can improve the attitude of fish farmers in Riau Province.

H2 = There is an average difference between behavior before and after using the website. This means freshwater aquaculture cyber extension materials are presented on the MFCE website can improve the behavior of fish farmers in Riau Province.

If the value of Sig. (2-tailed) < 0.05, then the hypothesis is accepted. If the value of Sig. (2-tailed) > 0.05, then the hypothesis is rejected (Sugiyono 2019).

Results and Discussion

The impact of cyber extension materials on the attitude of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' attitudes before and after using the MFCE website ranged from 0.127 to 0.440. It can be seen that all values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the attitude in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.793 > 0.50. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' attitude before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about attitudes are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.000 < 0.05 (Table 1), then H1 is accepted. It can be concluded that there is an average difference between the attitudes of fish farmers before and after using the MFCE website. In other words, there is an impact of aquaculture extension materials presented on the MFCE website in improving the fish farmers' attitude in Riau Province to a better direction.

Table 1

Paired samples T-Test output for attitude of fish farmers

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	AttBeforeMFCE – AttAfterMFCE*	3.57196	10.23844	0.63619	2.31918	4.82474	5.615	258	0.000

*AttBeforeMFCE = Attitude level of fish farmers before using the MFCE website; AttAfterMFCE = Attitude level of fish farmers after using the MFCE website.

These results are in line with the research of Ahmed et al (2018) which states that aquaculture extension has succeeded to improve the fish farmers' attitude in Bangladesh. The extension was able to improve the attitude of most of them (61.11%) to a moderate level. Meijer et al (2015) also revealed that innovative extension materials about agro-industry (including aquaculture) affect the attitudes of small-scale fish farmers in sub-Saharan Africa. In line with this, Pramitasari et al (2015) discovered that extension of local wisdom improved the fishermen's attitude toward fish conservation in the Mae Klong River in Songkram, Thailand.

The increased attitude of fish farmers in Riau proves that they already know the content and benefits of the extension materials presented on the MFCE website, so they want to try it. This may occur because the cyber extension materials available on the MFCE website are considered interesting and easy to understand.

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According to Surya (2019), agricultural extension materials (including fisheries) on websites can have impact on the user attitudes, if the material presented is interesting and easily understandable. According to the fish farmers, the extension materials on the MFCE website are quite easy, because they only consist of three content formats, namely, text, images/graphics, and video. Extension content in text format is understood easily if popular language is used, is not too long, and is not wordy (Hendri & Yulinda 2019).

The ideal text formatted content consists of 700 – 1,700 words (Miladi 2018; Sall 2013). Image/graphic content will be interesting if it is displayed in a large size, which is the size of a gadget screen (Minimatters 2020). Meanwhile, video content must have sharp images, clean sound, and a short duration. The ideal duration is 4-10 minutes (Bahrul 2019). However, fish farmers will practice the extension materials if useful for their business development (Hermawan et al 2017).

The impact of cyber extension materials on the behaviour of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' behavior before and after using the MFCE website ranged from 0.126 to 0.492. It can be seen that all values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the behavior in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.597 > 0.50. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' behavior before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about behavior are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.351 < 0.05 (Table 2), then H2 is rejected. It can be concluded that there is no average difference between the fish farmers' behavior before and after using the MFCE website. In other words, the

aquaculture extension materials presented on the MFCE website have no impact on improving the fish farmers' behavior in Riau Province.

Table 2

Paired samples T-Test output for the behavior of fish farmers

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	BehvBeforeMFCE – BehvAfterMFCE*	-0.34430	5.93418	0.36873	-1.07041	0.38181	-0.934	258	0.351

*BehvBeforeMFCE = Behavior level of fish farmers before using the MFCE website; BehvAfterMFCE = Behavior level of fish farmers after using the MFCE website.

These findings suggest that, while there is a willingness to try to implement all extension resources on the MFCE website, they do not do so right away. This may be due to the material presented on the website, which is not following the needs of fish farmers in Riau. According to Ardiyanti (2016) and Hakim & Eriyanti (2019), fish farmers will only practice the extension material if it suits their business needs. It is not yet known what the extension material content presented on the MFCE website should be, according to fish farmers' needs. However, several researchers stated that there are two types of fishery extension materials needed by fish farmers, namely, types of fish, and aquaculture management.

The freshwater fish species that are widely cultivated in Riau are catfish (*Pangasius* spp.), carp (***Cyprinus carpio*** (Linnaeus, 1758)), Mozambique tilapia (***Oreochromis mossambicus*** (Peters, 1852)), catfish (***Clarias batrachus*** (Linnaeus, 1758)), nile tilapia (***Oreochromis niloticus*** (Linnaeus, 1758)), and giant gourami (***Osphronemus goramy*** (Lacepède, 1801)). There are three of the seven aspects of aquaculture management that are needed by fish farmers in Riau, namely, water quality management, feed management, and fish marketing (Fauzi et al 2016). Water quality is a strategic issue in the freshwater aquaculture business in Riau, because the four major rivers in Riau (namely, Kampar, Siak, Rokan and Indragiri), are important sources of water for aquaculture (Siagian & Simarmata 2018). However, the Siak river has started to be polluted due to industrial waste along the river (Budijono et al 2021).

Conclusions. The findings of this study show that the MFCE website's cyber extension materials improve the attitudes of freshwater fish farmers in Riau Province, but have no impact on their aquaculture activity behavior. This is thought to have occurred because the extension materials presented were not following the needs of fish farmers, especially materials related to fish species, water quality management, feed management, and fish marketing.

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The impact of aquaculture cyber extension on fish farmers' attitudes and behavior in Riau, Indonesia

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Abstract. The purpose of this survey is to see how the aquaculture cyber extension materials on the MFCE (Marine and Fisheries Cyber Extension) website affect the attitudes and behavior of freshwater fish farmers in Riau Province, Indonesia. Using Isaac and Michael's table, a sample of 259 fish farmers who used the MFCE website was used. The data and information were gathered via a closed questionnaire that was purposive proportionally distributed to respondents in ten districts. With the help of SPSS 25 software, the data were analyzed using the Paired Sample T-Test. The findings concluded that the MFCE website's cyber aquaculture extension content was able to change the attitudes of fish producers in Riau Province. This is possible because the extension materials are engaging, simple to comprehend, and tailored to their specific needs. Results also showed that the extension materials do not change their behavior regarding how a freshwater aquaculture business is managed. This may be happen because the material presented is not in accordance with the needs of fish farmers, especially fish species, water quality management, feed management, and fish marketing.
Key words: freshwater aquaculture, media impact, MFCE website, non-formal education.

Introduction. Aquaculture is an important sector that supports the Indonesian economy with 4,15 billion USD per year (Ministry of Marine Affairs and Fisheries Republic of Indonesia 2018). Aquaculture is a human economic activity that utilizes and converts natural resources into commodities of value to society, such as fish, shrimp, shellfish, and other aquatic environmental organisms (Kautsky et al 2000). Freshwater aquaculture activities are carried out in rivers, lakes, reservoirs, and swamps (Lesa 2020).

The government continues to develop this sector, among others, through fisheries extension programs. The extension is non-formal education (Sadono 2010) or education for adults, which involves someone conveying information to help audiences make the right decisions (Ban & Hawkins 1999) so that aspects of their life change to be better than the existing conditions (Riadi 2020). The extension purpose is to change the knowledge, attitudes, and behavior of the audience for the better (Oakley & Garforth 1985; Ibrahim et al 2003; Amanah 2007).

To achieve the maximum results, the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia (MMAF-RI) has implemented an internet-based extension system (cyber extension) since 2017. The ministry created the *Marine and Fisheries Cyber Extension* (MFCE) website to disseminate extension materials to extension workers and fish farmers in the regions (Marine and Fishery Extension KKP-RI 2018). The MFCE website display is shown in Figure 1.

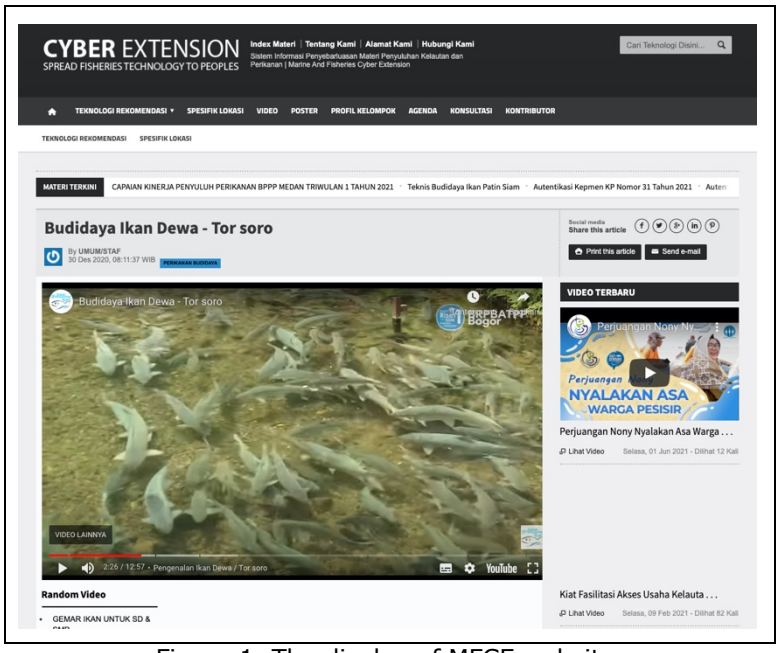

Figure 1. The display of MFCE website.

Riau Province is one of the centers of freshwater aquaculture in Indonesia. Fish farmers in Riau are the target of MFCE cyber media (Hendri et al 2018). Almost all areas in Riau develop freshwater aquaculture. Aquaculture was developed in 10 of the 12 regencies/cities, namely, Kampar, Pekanbaru, Rokan Hulu, Pelalawan, Kuantan Singingi, Indragiri Hulu, Indragiri Hilir, Rokan Hilir, and Bengkalis. It is not developed in Dumai, and Meranti Islands. The aquaculture in Riau is carried out in ponds, reservoirs, rivers, and swamps. This business involves 28,962 fish farmers who can produce 97.910 tons of fish a year (Dinas Perikanan dan Kelautan Provinsi Riau 2019). A total of 5,792 fish farmers used the MFCE website to find information about good freshwater aquaculture techniques (Hendri et al 2018).

The aquaculture cyber extension material on the MFCE website is expected to improve the attitudes and behavior of fish farmers in Riau Province. Attitudes are defined as psychological constructs, mental and emotional entities that are attached to or characterize a person (Perloff 2016). A person's predisposition to act, think, and feel his best while dealing with ideas, situations, or objects is sometimes referred to as attitude. People, locations, ideas, and situations in groups can all be objects (Rakhmat 2012).

While behavior is a series of actions made by individuals, organisms, systems, or artificial entities in relation to themselves or their environment (Hemakumara & Rainis 2018). Behavior is a response to various internal or external stimuli, conscious or subconscious, overt or covert, and voluntary or involuntary (Minton & Khale 2014). There are five stages of audience acceptance of an extension or innovation material: knowing, being interested (wanting to learn more), assessing (evaluating and contemplating), trying, and putting the innovations presented into practice (Riadi 2020). Attitude refers to one's level of interest and judgment, whereas behavior refers to one's willingness to test and execute new ideas. However, so far, the extension material impact on the fish farmers' attitudes and behavior in Riau is not known. Research like the present one need to be done to fill in this gap.

The main material of an aquaculture extension presented on the MFCE website is the seven principles of aquaculture management (*Sapta Usaha Budidaya Perikanan*) adopted by the ministry. The material consists of pond preparation, water supply, handling fish seed stocking, water quality management, feed management, fish pest control, and harvest/post-harvest activities/and fish marketing (Agustina 2018; Zaelani 2018). Thus, aquaculture extension aims to change the attitudes and behaviour of fish farmers regarding the application of the seven principles of aquaculture management towards a better direction than before.

Several studies have shown that aquaculture extension materials have a significant impact on public attitudes. Sugiharto et al (2019) proved that extension materials had a significant effect on improving the attitudes of members of the freshwater fish farmer group in Samarinda, Indonesia. Mustaqim & Nuraini (2019) also stated that Fishery extension materials improved the attitude of fishery business actors by 75.6% in developing their businesses for the better.

Several studies highlighted the impact of the extension material on fish farmer's behaviour. Studies indicated that the extension materials given to fish farmers can change their behaviour, namely, carrying out aquaculture activities according to the guidelines for extension materials. According to Andiski et al (2017), freshwater aquaculture extension had a significant impact on the behaviour of the "Sejiwa" fish farmer group member in Pasaman, West Sumatra, Indonesia. Rosiah et al (2018) also explained that freshwater aquaculture extension materials had a significant effect on the behaviour of fish farmers in aquaculture. Once they knew the extension materials provided, they begun to apply them to their business.

However, the impact of the cyber extension materials presented on the MFCE website on the attitudes and behaviour of fish farmers in Riau is unknown. For that, this research needs to be done.

Material and Method

Description of the study sites. This study was conducted from August - October 2020 in the Province of Riau, Indonesia, using a quantitative descriptive approach. Descriptive research is collecting measurable data to describe the situation as precisely as possible (DeFranzo 2020; Robson & McCartan 2016). In exchange, the quantitative approach is the process of finding knowledge using data in the form of numbers as a tool to analyze information about what you want to know (Kasiram 2010).

The unit of analysis is the fish farmer who uses the MFCE website in Riau. The population consists of 5,792 fish farmers (Hendri et al 2018). The respondent sample size is 259 fish farmers, determined based on Isaac and Michael's table (Sugiyono 2019). They are spread across 10 cities/regencies: Pekanbaru (16 respondents), Kampar (78), Rokan Hulu (35), Rokan Hilir (13), Bengkalis (5), Pelalawan (40), Kuantan Singingi (15), Indragiri Hulu (25), Siak (25), and Indragiri Hilir (7 respondents), as shown in Figure 2. Respondents were selected by a purposive proportional method (Creswell 2009). Data collection was done by distributing questionnaires with open-ended questions to respondents (Bandhari 2020).

Figure 2. Map of research location in Riau Province, Indonesia.

Statistical analysis. Instrument validity and reliability tests were carried out using SPSS 25 software to ensure all data were valid and reliable. The validity test was carried

out by looking at the Pearson Correlation coefficient (r). If the value of r-statistics > r-table, then all questionnaire items are considered valid (Sugiyono 2019). Meanwhile, the reliability test was carried out by looking at the value of the Cronbach's Alpha coefficient. According to Hinton et al (2014), if the coefficient value is between 0.50 and 0.70, then, all items in the questionnaire are considered moderately reliable.

Furthermore, the Kolmogorov-Smirnov test (KS test) was applied to analyze the normality of data regarding attitudes and behavior of fish farmers before and after using the MFCE website. If the value of KS-statistics > KS-table, then the data is considered to be normally distributed (Ghasemi & Zahediasl 2012), so that the next analysis, Paired-Sample T-Test, can be carried out. According to Akbar (2020), Paired-Sample T-Test can only be done if the research data is normally distributed. This analysis is used to see the impact of extension materials on the attitudes and behavior of fish farmers can be seen from differences in levels before and after using the MFCE website.

Paired Sample T-Test method with SPSS Statistics 25 software was performed to analyze the difference before-after. According to Creswell (2009), if the significance value (Sig.) < 0.05, it can be said that there is a statistically significant difference before and after using the MFCE website regarding fish farmers' attitudes or behavior. Otherwise, if the value of Sig. > 0.05, the difference between farmers' attitude/ behavior before and after using the website is not statistically significant.

Two hypotheses were proposed in this study:

H1 = There is an average difference between the attitudes measured before and after using the website. This means freshwater aquaculture cyber extension materials presented on the MFCE website can improve the attitude of fish farmers in Riau Province.

H2 = There is an average difference between the behavior measured before and after using the website. This means freshwater aquaculture cyber extension materials presented on the MFCE website can improve the behavior of fish farmers in Riau Province.

If the value of Sig. (2-tailed) < 0.05, then the hypothesis is accepted. If the value of Sig. (2-tailed) > 0.05, then the hypothesis is rejected (Sugiyono 2019).

Results and Discussion

The impact of cyber extension materials on the attitude of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' attitudes before and after using the MFCE website ranged from 0.127 to 0.440. Values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the attitude in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.793, which is higher that the required threshold of 0.7. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' attitude before and after using the MFCE website were 0.200, a value higher than the KS-table value of 0.05. This means that all data about attitudes are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.000 < 0.05 (Table 1), then H1 is accepted. It can be concluded that there is an average difference between the attitudes of fish farmers before and after using the MFCE website. In other words, there is an impact of aquaculture extension materials presented on the MFCE website in improving the fish farmers attitude in Riau Province to a better direction.

Table 1

Paired samples T-Test output for attitude of fish farmers

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	AttBeforeMFCE – AttAfterMFCE*	3.57196	10.23844	0.63619	2.31918	4.82474	5.615	258	0.000

*AttBeforeMFCE = Attitude level of fish farmers before using the MFCE website; AttAfterMFCE = Attitude level of fish farmers after using the MFCE website.

These results are in line with the research of Ahmed et al (2018) which states that aquaculture extension has succeeded to improve the fish farmers' attitude in Bangladesh. The extension was able to improve the attitude of most of them (61.11%) to a moderate level. Meijer et al (2015) also revealed that innovative extension materials about agro-industry (including aquaculture) affect the attitudes of small-scale fish farmers in sub-Saharan Africa. In line with this, Pramitasari et al (2015) discovered that extension of local wisdom improved the fishermen's attitude toward fish conservation in the Mae Klong River in Songkram, Thailand.

The attitude of fish farmers in Riau revealed by the study proves that they already know the content and benefits of the extension materials presented on the MFCE website, so they want to try it. This may occur because the cyber extension materials available on the MFCE website are considered interesting and easy to understand.

According to Surya (2019), agricultural extension materials (including fisheries) on websites can have an impact on the user attitudes, if the material presented is interesting and easily understandable. According to the fish farmers, the extension materials on the MFCE website are quite easy, because they only consist of three content formats, namely, text, images/graphics, and video. Extension content in text format is understood easily if popular language is used, is not too long, and is not wordy (Hendri & Yulinda 2019).

The ideal text formatted content consists of 700 – 1,700 words (Miladi 2018; Sall 2013). Image/graphic content will be interesting if it is displayed in a large size, which is the size of a gadget screen (Minimatters 2020). Meanwhile, video content must have sharp images, clean sound, and a short duration. The ideal duration is 4-10 minutes (Bahrul 2019). However, fish farmers will practice the extension materials if useful for their business development (Hermawan et al 2017).

The impact of cyber extension materials on the behaviour of fish farmers*.* The validity test results showed that the r-statistic value of the fish farmers' behavior before and after using the MFCE website ranged from 0.126 to 0.492. Values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the behavior in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.597, which is poor, but still acceptable. This suggests that different questions should be used in the future. The normality test results showed that the KS-statistical values of the fish farmers' behavior before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about behavior are normally distributed.

The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.351 < 0.05 (Table 2), then H2 is rejected. It can be concluded that there is no average

difference between the fish farmers' behavior before and after using the MFCE website. In other words, the aquaculture extension materials presented on the MFCE website have no impact on improving the fish farmers' behavior in Riau Province.

Table 2

Paired samples T-Test output for the behavior of fish farmers

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	BehvBeforeMFCE – BehvAfterMFCE*	-0.34430	5.93418	0.36873	-1.07041	0.38181	-0.934	258	0.351

*BehvBeforeMFCE = Behavior level of fish farmers before using the MFCE website; BehvAfterMFCE = Behavior level of fish farmers after using the MFCE website.

These findings suggest that, while farmers have the willingness to try to implement all extension resources on the MFCE website, they do not do so right away. This may be due to the material presented on the website, which is not following the needs of fish farmers in Riau. According to Ardiyanti (2016) and Hakim & Eriyanti (2019), fish farmers will only practice the extension material if it suits their business needs. It is not yet known what the extension material content presented on the MFCE website should be, according to fish farmers' needs. However, several researchers stated that there were two types of fishery extension materials needed by fish farmers, namely, types of fish, and aquaculture management.

The freshwater fish species that are widely cultivated in Riau are catfish (*Pangasius* spp.), carp (*Cyprinus carpio* Linnaeus, 1758), Mozambique tilapia (*Oreochromis mossambicus* (Peters, 1852)), catfish (*Clarias batrachus* (Linnaeus, 1758)), nile tilapia (*Oreochromis niloticus* (Linnaeus, 1758)), and giant gourami (*Osphronemus goramy* Lacepède, 1801). There are three of the seven aspects of aquaculture management that are needed by fish farmers in Riau, namely, water quality management, feed management, and fish marketing (Fauzi et al 2016). Water quality is a strategic issue in the freshwater aquaculture business in Riau, because the four major rivers in Riau (namely, Kampar, Siak, Rokan and Indragiri) are important sources of water for aquaculture (Siagian & Simarmata 2018). However, the Siak river has started to be polluted due to industrial waste along the river (Budijono et al 2021).

Conclusions. The findings of this study show that the MFCE website's cyber extension materials improve the attitudes of freshwater fish farmers in Riau Province, but have no impact on their aquaculture activity behavior. This is may happen because the extension materials presented were not in accordance to fish farmers' needs, especially materials related to fish species, water quality management, feed management, and fish marketing.

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The impact of aquaculture cyber extension on fish farmers' attitudes and behavior in Riau, Indonesia

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Abstract. The purpose of this survey is to see how the aquaculture cyber extension materials on the MFCE (Marine and Fisheries Cyber Extension) website affect the attitudes and behavior of freshwater fish farmers in Riau Province, Indonesia. Using Isaac and Michael's table, a total of 259 fish farmers who used the MFCE website were chosen as samples. The data and information were gathered via a closed questionnaire that was purposive proportionally distributed to respondents in ten districts. With the help of SPSS 25 software, the data were analyzed using the Paired Sample T-Test. The findings concluded that the MFCE website's cyber aquaculture extension content was able to change the attitudes of fish producers in Riau Province. This is possible because the extension materials are engaging, simple to comprehend, and tailored to their specific needs. The extension materials, on the other hand, have no impact on changes in their behavior regarding how a freshwater aquaculture business is managed. This may arise because the material presented is not in accordance with the needs of fish farmers, especially fish species, water quality management, feed management, and fish marketing.
Key words: freshwater aquaculture, media impact, MFCE website, non-formal education.

Introduction. Aquaculture is an important sector to support the Indonesian economic because contributing USD 4,15 billion a year (Ministry of Marine Affairs and Fisheries Republic of Indonesia 2018). Aquaculture is a human economic activity that utilizes and converts natural resources into commodities of value to society, such as fish, shrimp, shellfish, and other aquatic environmental organisms (Kautsky et al 2000). Freshwater aquaculture are carried out in rivers, lakes, reservoirs, and swamps (Lesa 2020).

Therefore, the government continues to develop this sector, among others through fisheries extension programs. The extension is non-formal education (Sadono 2010) or education for adults, which involves someone conveying information to help audiences make the right decisions (Ban & Hawkins 1999) so that aspects of their life change to be better than the existing conditions (Riadi 2020). The extension purpose is to change the knowledge, attitudes, and behavior of the audience for the better (Oakley & Garforth 1985; Ibrahim et al 2003; Amanah 2007).

To achieve the maximum results, since 2017, the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia (MMAF-RI) has implemented an internet-based extension system (cyber extension). They built the *Marine and Fisheries Cyber Extension* (MFCE) website to disseminate extension materials to extension workers and fish farmers in the regions (Marine and Fishery Extension KKP-RI 2018). The MFCE website display is shown in Figure 1.

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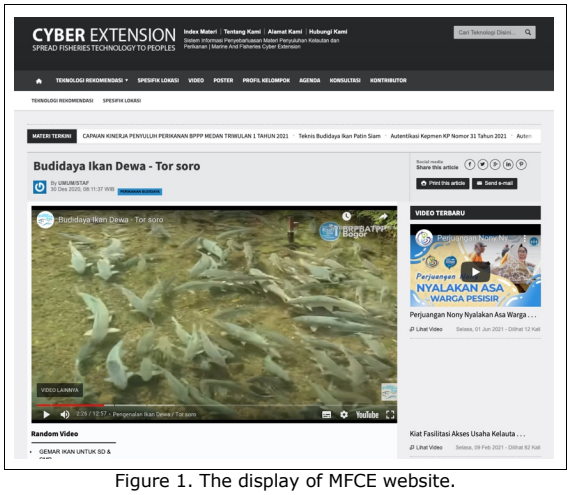

Figure 1. The display of MFCE website.

Riau Province is one of the centers of freshwater aquaculture in Indonesia. Fish farmers in Riau are the target of MFCE cyber media (Hendri et al 2018). Almost all areas in Riau develop freshwater aquaculture. Aquaculture was developed in 10 of the 12 regencies/cities, namely, Kampar, Pekanbaru, Rokan Hulu, Pelalawan, Kuantan Singingi, Indragiri Hulu, Indragiri Hilir, Rokan Hilir, and Bengkalis. It is not developed in Dumai, and Meranti Islands. The aquaculture in Riau is carried out in ponds, reservoirs, rivers, and swamps. This business involves 28,962 fish farmers who can produce 97.910 tons of fish a year (Dinas Perikanan dan Kelautan Provinsi Riau 2019). A total of 5,792 fish farmers used the MFCE website to find information about good freshwater aquaculture techniques (Hendri et al 2018).

The aquaculture cyber extension material on the MFCE website is expected to improve the attitudes and behavior of fish farmers in Riau Province. Attitudes are defined as psychological constructs, mental and emotional entities that are attached to or characterize a person (Perloff 2016). A person's predisposition to act, think, and feel his best while dealing with ideas, situations, or objects is sometimes referred to as attitude. People, locations, ideas, and situations in groups can all be objects (Rakhmat 2012).

While behavior is a series of actions made by individuals, organisms, systems, or artificial entities in relation to themselves or their environment (Hemakumara & Rainis 2018). Behavior is a response to various internal or external stimuli, conscious or subconscious, overt or covert, and voluntary or involuntary (Minton & Khale 2014). There are five stages of audience acceptance of an extension or innovation material: knowing, being interested (wanting to learn more), assessing (evaluating and contemplating), trying, and putting the innovations presented into practice (Riadi 2020). Attitude refers to one's level of interest and judgment, whereas behavior refers to one's willingness to test and execute new ideas. However, so far, the extension material impact on the fish farmers' attitudes and behavior in Riau is not known. Research like the present one need to be done to fill in this gap.

The main material of an aquaculture extension presented on the MFCE website is the seven principles of aquaculture management (*Sapta Usaha Budidaya Perikanan*) adopted the ministry. The material consists of pond preparation, water supply, handling fish seed stocking, water quality management, feed management, fish pest control, and harvest/post-harvest activities/and fish marketing (Agustina 2018; Zaelani 2018). Thus, aquaculture extension aims to change the attitudes and behaviour of fish farmers regarding the application of the seven principles of aquaculture management towards a better direction than before.

Several studies have shown that aquaculture extension materials have a significant impact on public attitudes. Sugiharto et al (2019) prove that extension materials have a significant effect on improving the attitudes of members of the freshwater fish farmer group in Samarinda, Indonesia. Mustaqim & Nuraini (2019) also stated that Fishery extension materials improved the attitude of fishery business actors by 75.6% in developing their businesses for the better.

Several studies shown the extension material impact on fish farmer's behaviour. Studies have shown that the extension materials given to fish farmers can change their behaviour, namely, carrying out aquaculture activities according to the guidelines for extension materials. According to Andiski et al (2017), freshwater aquaculture extension has a significant impact on the behaviour of the "Sejiwa" fish farmer group member in Pasaman, West Sumatra, Indonesia. Rosiah et al (2018) also explained that freshwater aquaculture extension materials had a significant effect on the behaviour of fish farmers in aquaculture. Once they know the extension materials provided, they begin to apply them to their business.

However, the impact of the cyber extension materials presented on the MFCE website on the attitudes and behaviour of fish farmers in Riau is unknown. For that, this research needs to be done.

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Material and Method

Description of the study sites. This study was conducted from August - October 2020 in the Province of Riau, Indonesia, using a quantitative descriptive approach. Descriptive research is collecting measurable data to be able to describe situation precisely (DeFranzo 2020; Robson & McCartan 2016). While the quantitative approach is the process of finding knowledge using data in the form of numbers as a tool to analyze information about what you want to know (Kasiram 2010).

The unit of analysis is fish farmers who use the MFCE website in Riau. The population consists of 5,792 fish farmers (Hendri et al 2018). While the respondent sample size is 259 fish farmers, determined based on Isaac and Michael's table (Sugiyono 2019). They comprise spread across 10 cities/regencies: Pekanbaru (16 respondents), Kampar (78), Rokan Hulu (35), Rokan Hilir (13), Bengkalis (5), Pelalawan (40), Kuantan Singingi (15), Indragiri Hulu (25), Siak (25), and Indragiri Hilir (7 respondents), as shown in Figure 2. Respondents were selected purposive proportional (Creswell 2009). Data collection was done by distributing questionnaires with open-ended questions to respondents (Bandhari 2020).

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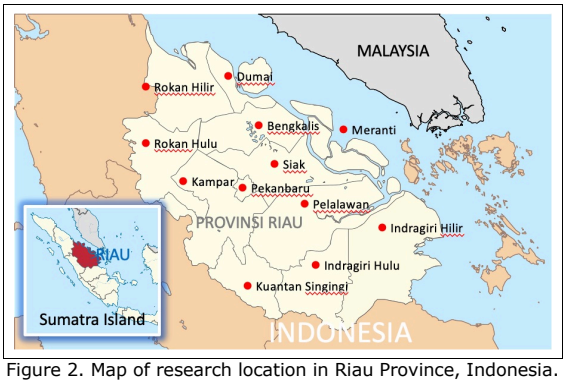

Figure 2. Map of research location in Riau Province, Indonesia.

Statistical analysis. Instrument validity and reliability tests were carried out using SPSS 25 software to ensure all data were valid and reliable. The validity test was carried

out by looking at the Pearson Correlation coefficient (r). If the value of r-statistics > r-table, then all questionnaire items are considered valid (Sugiyono 2019). Meanwhile, the reliability test was carried out by looking at the value of the Cronbach's Alpha coefficient. According to Hinton et al (2014), if the coefficient value is 0.50 – 0.70, then all items in the questionnaire are considered moderately reliable.

Furthermore, the Kolmogorov-Smirnov test (KS test) was carried out to analyze the normality of data regarding attitudes and behavior of fish farmers before and after using the MFCE website. If the value of KS-statistical > KS-table, then the data is considered to be normally distributed (Ghasemi & Zahediasl 2012), so that the next analysis, Paired-Sample T-Test, can be carried out. According to Akbar (2020), Paired-Sample T-Test can only be done if the research data is normally distributed. This analysis is used to see the impact of extension materials on the attitudes and behavior of fish farmers can be seen from differences in levels before and after using the MFCE website.

Paired Sample T-Test method with SPSS Statistics 25 software was performed to analyze the difference. According to Creswell (2009), if the significance value (Sig.) < probability 0.05, it can be said that there is a relationship between variables (fish farmers' attitudes or behavior) before and after using the MFCE website. Otherwise, if the value of Sig. > 0.05 probability, there is no relationship between variables before and after using the website.

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Two hypotheses were proposed in this study:

H1 = There is an average difference between attitudes before and after using the website. This means freshwater aquaculture cyber extension materials are presented on the MFCE website can improve the attitude of fish farmers in Riau Province.

H2 = There is an average difference between behavior before and after using the website. This means freshwater aquaculture cyber extension materials are presented on the MFCE website can improve the behavior of fish farmers in Riau Province.

If the value of Sig. (2-tailed) < 0.05, then the hypothesis is accepted. If the value of Sig. (2-tailed) > 0.05, then the hypothesis is rejected (Sugiyono 2019).

Results and Discussion

The impact of cyber extension materials on the attitude of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' attitudes before and after using the MFCE website ranged from 0.127 to 0.440. It can be seen that all values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the attitude in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.793 > 0.50. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' attitude before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about attitudes are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.000 < 0.05 (Table 1), then H1 is accepted. It can be concluded that there is an average difference between the attitudes of fish farmers before and after using the MFCE website. In other words, there is an impact of aquaculture extension materials presented on the MFCE website in improving the fish farmers' attitude in Riau Province to a better direction.

Table 1

Paired samples T-Test output for attitude of fish farmers

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	AttBeforeMFCE – AttAfterMFCE*	3.57196	10.23844	0.63619	2.31918	4.82474	5.615	258	0.000

*AttBeforeMFCE = Attitude level of fish farmers before using the MFCE website; AttAfterMFCE = Attitude level of fish farmers after using the MFCE website.

These results are in line with the research of Ahmed et al (2018) which states that aquaculture extension has succeeded to improve the fish farmers' attitude in Bangladesh. The extension was able to improve the attitude of most of them (61.11%) to a moderate level. Meijer et al (2015) also revealed that innovative extension materials about agro-industry (including aquaculture) affect the attitudes of small-scale fish farmers in sub-Saharan Africa. In line with this, Pramitasari et al (2015) discovered that extension of local wisdom improved the fishermen's attitude toward fish conservation in the Mae Klong River in Songkram, Thailand.

The increased attitude of fish farmers in Riau proves that they already know the content and benefits of the extension materials presented on the MFCE website, so they want to try it. This may occur because the cyber extension materials available on the MFCE website are considered interesting and easy to understand.

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According to Surya (2019), agricultural extension materials (including fisheries) on websites can have impact on the user attitudes, if the material presented is interesting and easily understandable. According to the fish farmers, the extension materials on the MFCE website are quite easy, because they only consist of three content formats, namely, text, images/graphics, and video. Extension content in text format is understood easily if popular language is used, is not too long, and is not wordy (Hendri & Yulinda 2019).

The ideal text formatted content consists of 700 – 1,700 words (Miladi 2018; Sall 2013). Image/graphic content will be interesting if it is displayed in a large size, which is the size of a gadget screen (Minimatters 2020). Meanwhile, video content must have sharp images, clean sound, and a short duration. The ideal duration is 4-10 minutes (Bahrul 2019). However, fish farmers will practice the extension materials if useful for their business development (Hermawan et al 2017).

The impact of cyber extension materials on the behaviour of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' behavior before and after using the MFCE website ranged from 0.126 to 0.492. It can be seen that all values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the behavior in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.597 > 0.50. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' behavior before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about behavior are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.351 < 0.05 (Table 2), then H2 is rejected. It can be concluded that there is no average difference between the fish farmers' behavior before and after using the MFCE website. In other words, the

aquaculture extension materials presented on the MFCE website have no impact on improving the fish farmers' behavior in Riau Province.

Table 2

Paired samples T-Test output for the behavior of fish farmers

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	BehvBeforeMFCE – BehvAfterMFCE*	-0.34430	5.93418	0.36873	-1.07041	0.38181	-0.934	258	0.351

*BehvBeforeMFCE = Behavior level of fish farmers before using the MFCE website; BehvAfterMFCE = Behavior level of fish farmers after using the MFCE website.

These findings suggest that, while there is a willingness to try to implement all extension resources on the MFCE website, they do not do so right away. This may be due to the material presented on the website, which is not following the needs of fish farmers in Riau. According to Ardiyanti (2016) and Hakim & Eriyanti (2019), fish farmers will only practice the extension material if it suits their business needs. It is not yet known what the extension material content presented on the MFCE website should be, according to fish farmers' needs. However, several researchers stated that there are two types of fishery extension materials needed by fish farmers, namely, types of fish, and aquaculture management.

The freshwater fish species that are widely cultivated in Riau are catfish (***Pangasius* spp.**), carp (***Cyprinus carpio*** (Linnaeus, 1758)), Mozambique tilapia (***Oreochromis mossambicus*** (Peters, 1852)), catfish (***Clarias batrachus*** (Linnaeus, 1758)), nile tilapia (***Oreochromis niloticus*** (Linnaeus, 1758)), and giant gourami (***Osphronemus goramy*** (Lacepède, 1801)). There are three of the seven aspects of aquaculture management that are needed by fish farmers in Riau, namely, water quality management, feed management, and fish marketing (Fauzi et al 2016). Water quality is a strategic issue in the freshwater aquaculture business in Riau, because the four major rivers in Riau (namely, Kampar, Siak, Rokan and Indragiri), are important sources of water for aquaculture (Siagian & Simarmata 2018). However, the Siak river has started to be polluted due to industrial waste along the river (Budijono et al 2021).

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Conclusions. The findings of this study show that the MFCE website's cyber extension materials improve the attitudes of freshwater fish farmers in Riau Province, but have no impact on their aquaculture activity behavior. This is thought to have occurred because the extension materials presented were not following the needs of fish farmers, especially materials related to fish species, water quality management, feed management, and fish marketing.

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1.Tables 1 and 2, please explain in a table footnote what is the term: **BehvBeforeMFCE – BehvAfterMFCE**
2.golden fish is different from *Cyprinus carpio* Linnaeus, 1758. Which species you refer to?
3. The same for: parrot fish (*Oreochromis niloticus*)
4. four major rivers in Riau (namely, Kampar, Siak, and Indragiri) -- Please decide if four or three rivers.
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Dear Petrescu-Mag I. V., PhD, Hab.
Editor in Chief of Bioflux Journal

Thank you very much. All points of writing that have not been perfect in my article, have been corrected according to the direction of the editor (see attachment). Hopefully there are no more obstacles to publication. Thank you for publishing in the AACL Bioflux Journal.

Best regards
Ridar Hendri

[Kutipan teks disembunyikan]

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The impact of aquaculture cyber extension on fish farmers' attitudes and behavior in Riau, Indonesia

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Abstract. The purpose of this survey is to see how the aquaculture cyber extension materials on the MFCE (Marine and Fisheries Cyber Extension) website affect the attitudes and behavior of freshwater fish farmers in Riau Province, Indonesia. Using Isaac and Michael's table, a total of 259 fish farmers who used the MFCE website were chosen as samples. The data and information were gathered via a closed questionnaire that was purposive proportionally distributed to respondents in ten districts. With the help of SPSS 25 software, the data were analyzed using the Paired Sample T-Test. The findings concluded that the MFCE website's cyber aquaculture extension content was able to change the attitudes of fish producers in Riau Province. This is possible because the extension materials are engaging, simple to comprehend, and tailored to their specific needs. The extension materials, on the other hand, have no impact on changes in their behavior regarding how a freshwater aquaculture business is managed. This may arise because the material presented is not in accordance with the needs of fish farmers, especially fish species, water quality management, feed management, and fish marketing.
Key words: freshwater aquaculture, media impact, MFCE website, non-formal education.

Introduction. Aquaculture is an important sector to support the Indonesian economic because contributes USD4,154,186,154 a year (Ministry of Marine Affairs and Fisheries Republic of Indonesia 2018). Aquaculture is a human economic activity that utilizes and converts natural resources into commodities of value to society, such as fish, shrimp, shellfish, and other aquatic environmental organisms (Kautsky et al 2000). Freshwater aquaculture are carried out in rivers, lakes, reservoirs, and swamps (Lesa 2020).

Therefore, the government continues to develop this sector, among others through fisheries extension programs. The extension is non-formal education (Sadono 2010) or education for adults, which involves someone conveying information to help audiences make the right decisions (Ban & Hawkins 1999) so that aspects of their life change to be better than the existing conditions (Riadi 2020). The extension purpose is to change the knowledge, attitudes, and behavior of the audience for the better (Oakley & Garforth 1985; Ibrahim et al 2003; Amanah 2007).

To achieve the maximum results, since 2017, the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia (KKP-RI) has implemented an internet-based extension system (cyber extension). They built the *Marine and Fisheries Cyber Extension* (MFCE) website to disseminate extension materials to extension workers and fish farmers in the regions (Marine and Fishery Extension KKP-RI 2018). The MFCE website display is shown in Figure 1.

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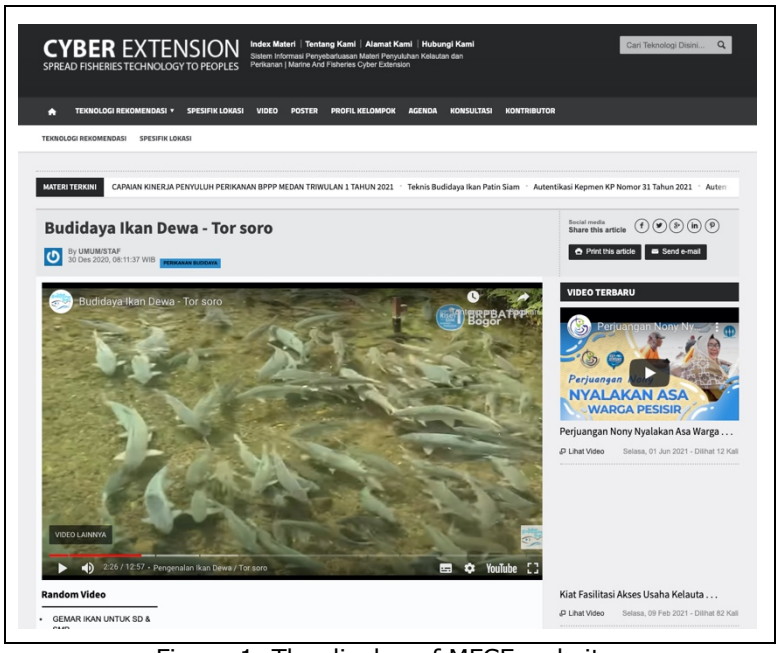

Figure 1. The display of MFCE website.

Riau Province is one of the centers of freshwater aquaculture in Indonesia. Fish farmers in Riau are the target of MFCE cyber media (Hendri et al 2018). Almost all areas in Riau develop freshwater aquaculture. Aquaculture was developed in 10 of the 12 regencies/cities, namely, Kampar, Pekanbaru, Rokan Hulu, Pelalawan, Kuantan Singingi, Indragiri Hulu, Indragiri Hilir, Rokan Hilir, and Bengkalis. It is not developed in Dumai, and Meranti Islands. The aquaculture in Riau is carried out in ponds, reservoirs, rivers, and swamps. This business involves 28,962 fish farmers who can produce 97.910 tons of fish a year (Dinas Perikanan dan Kelautan Provinsi Riau 2019). A total of 5,792 fish farmers used the MFCE website to find information about good freshwater aquaculture techniques (Hendri et al 2018).

The aquaculture cyber extension material on the MFCE website is expected to improve the attitudes and behavior of fish farmers in Riau Province. Attitudes are defined as psychological constructs, mental and emotional entities that are attached to or characterize a person (Perloff 2016). A person's predisposition to act, think, and feel his best while dealing with ideas, situations, or objects is sometimes referred to as attitude. People, locations, ideas, and situations in groups can all be objects (Rakhmat 2012).

While behavior is a series of actions made by individuals, organisms, systems, or artificial entities in relation to themselves or their environment (Hemakumara & Rainis 2018). Behavior is a response to various internal or external stimuli, conscious or subconscious, overt or covert, and voluntary or involuntary (Minton & Khale 2014). There are five stages of audience acceptance of an extension or innovation material: knowing, being interested (wanting to learn more), assessing (evaluating and contemplating), trying, and putting the innovations presented into practice (Riadi 2020). Attitude refers to one's level of interest and judgment, whereas behavior refers to one's willingness to test and execute new ideas. However, so far, the extension material impact on the fish farmers' attitudes and behavior in Riau is not known. Research like the present one need to be done to fill in this gap.

The main material of an aquaculture extension presented on the MFCE website is the seven principles of aquaculture management (*Sapta Usaha Budidaya Perikanan*). The material consists of pond preparation, water supply, handling fish seed stocking, water quality management, feed management, fish pest control, and harvest/post-harvest activities/and fish marketing (Agustina 2018; Zaelani 2018). Thus, aquaculture extension aims to change the attitudes and behaviour of fish farmers regarding the application of the seven principles of aquaculture management towards a better direction than before.

Several studies have shown that aquaculture extension materials have a significant impact on public attitudes. Sugiharto et al (2019) prove that extension materials have a

significant effect on improving the attitudes of members of the freshwater fish farmer group in Samarinda, Indonesia. Mustaqim & Nuraini (2019) also stated that Fishery extension materials improved the attitude of fishery business actors by 75.6% in developing their businesses for the better.

The extension material impact on fish farmer's behaviour. Several studies have stated that the extension materials given to fish farmers can change their behaviour, namely, carrying out aquaculture activities according to the guidelines for extension materials. According to Andiski et al (2017), freshwater aquaculture extension has a significant impact on the behaviour of the "Sejiwa" fish farmer group member in Pasaman, West Sumatra, Indonesia. Rosiah et al (2018) also explained that freshwater aquaculture extension materials had a significant effect on the behaviour of fish farmers in aquaculture. Once they know the extension materials provided, they begin to apply them to their business.

However, the impact of the cyber extension materials presented on the MFCE website on the attitudes and behaviour of fish farmers in Riau is unknown. For that, this research needs to be done.

Material and Method

Description of the study sites. This study was conducted from August - October 2020 in the Province of Riau, Indonesia, using a quantitative descriptive approach. Descriptive research is collecting measurable data to be able to describe the situation precisely (DeFranzo 2020; Robson & McCartan 2016). While the quantitative approach is the process of finding knowledge using data in the form of numbers as a tool to analyze information about what you want to know (Kasiram 2010).

The unit of analysis is fish farmers who use the MFCE website in Riau. The population consists of 5,792 fish farmers (Hendri et al 2018). While the respondent sample size is 259 fish farmers, determined based on Isaac and Michael's table (Sugiyono 2019). They are spread across 10 cities/regencies: Pekanbaru (16 respondents), Kampar (78), Rokan Hulu (35), Rokan Hilir (13), Bengkalis (5), Pelalawan (40), Kuantan Singingi (15), Indragiri Hulu (25), Siak (25), and Indragiri Hilir (7 respondents), as shown in Figure 2. Respondents were selected purposive proportional (Creswell 2009). Data collection was done by distributing questionnaires with open-ended questions to respondents (Bandhari 2020).

Figure 2. Map of research location in Riau Province, Indonesia.

Statistical analysis. Instrument validity and reliability tests were carried out using SPSS 25 software to ensure all data were valid and reliable. The validity test was carried out by looking at the Pearson Correlation coefficient (r). If the value of r-statistics > r-table, then all questionnaire items are considered valid (Sugiyono 2019). Meanwhile, the

reliability test was carried out by looking at the value of the Cronbach's Alpha coefficient. According to Hinton et al (2014), if the coefficient value is 0.50 – 0.70, then all items in the questionnaire are considered moderately reliable.

Furthermore, the Kolmogorov-Smirnov test (KS test) was carried out to analyze the normality of data regarding attitudes and behavior of fish farmers before and after using the MFCE website. If the value of KS-statistical > KS-table, then the data is considered to be normally distributed (Ghasemi & Zahediasl 2012), so that the next analysis, Paired-Sample T-Test, can be carried out. According to Akbar (2020), Paired-Sample T-Test can only be done if the research data is normally distributed. This analysis is used to see the impact of extension materials on the attitudes and behavior of fish farmers can be seen from differences in levels before and after using the MFCE website.

Paired Sample T-Test method with SPSS Statistics 25 software was performed to analyze the difference. According to Creswell (2009), if the significance value (Sig.) < probability 0.05, it can be said that there is a relationship between variables (fish farmers' attitudes or behavior) before and after using the MFCE website. Otherwise, if the value of Sig. > 0.05 probability, there is no relationship between variables before and before using the website.

Two hypotheses were proposed in this study:

H1 = There is an average difference between attitudes before and after using the website. This means freshwater aquaculture cyber extension materials are presented on the MFCE website can improve the attitude of fish farmers in Riau Province.

H2 = There is an average difference between behavior before and after using the website. This means freshwater aquaculture cyber extension materials are presented on the MFCE website can improve the behavior of fish farmers in Riau Province.

If the value of Sig. (2-tailed) < 0.05, then the hypothesis is accepted. If the value of Sig. (2-tailed) > 0.05, then the hypothesis is rejected (Sugiyono 2019).

Results and Discussion

The impact of cyber extension materials on the attitude of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' attitudes before and after using the MFCE website ranged from 0.127 to 0.440. It can be seen that all values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the attitude in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.793 > 0.50. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' attitude before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about attitudes are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.000 < 0.05 (Table 1), then H1 is accepted. It can be concluded that there is an average difference between the attitudes of fish farmers before and after using the MFCE website. In other words, there is an impact of aquaculture extension materials presented on the MFCE website in improving the fish farmers attitude in Riau Province to a better direction.

Table 1

Paired samples T-Test output for attitude of fish farmers

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	AttBeforeMFCE – AttAfterMFCE*	3.57196	10.23844	0.63619	2.31918	4.82474	5.615	258	0.000

*.....

These results are in line with the research of Ahmed et al (2018) which states that aquaculture extension has succeeded to improve the fish farmers' attitude in Bangladesh. The extension was able to improve the attitude of most of them (61.11%) to a moderate level. Meijer et al (2015) also revealed that innovative extension materials about agro-industry (including aquaculture) affect the attitudes of small-scale fish farmers in sub-Saharan Africa. In line with this, Pramitasari et al (2015) discovered that extension of local wisdom improved the fishermen's attitude toward fish conservation in the Mae Klong River in Songkram, Thailand.

The increasing attitude of fish farmers in Riau proves that they already know the content and benefits of the extension materials presented on the MFCE website, so they want to try it. This may occur because the cyber extension materials available on the MFCE website are considered interesting and easy to understand.

According to Surya (2019), agricultural extension materials (including fisheries) on websites can impact on the user attitudes, if the material presented is interesting and easily understandable. According to the fish farmers, the extension materials on the MFCE website are quite easy, because they only consist of three content formats, namely, text, images/graphics, and video. Extension content in text format is understood easily if popular language is used, is not too long, and is not wordy (Hendri & Yulinda 2019).

The ideal text formatted content consists of 700 – 1,700 words (Miladi 2018; Sall 2013). Image/graphic content will be interesting if it is displayed in a large size, which is the size of a gadget screen (Minimatters 2020). Meanwhile, video content must have sharp images, clean sound, and a short duration. The ideal duration is 4-10 minutes (Bahrul 2019). However, fish farmers will practice the extension materials if useful for their business development (Hermawan et al 2017).

The impact of cyber extension materials on the behaviour of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' behavior before and after using the MFCE website ranged from 0.126 to 0.492. It can be seen that all values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the behavior in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.597 > 0.50. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' behavior before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about behavior are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.351 < 0.05 (Table 2), then H2 is rejected. It can be concluded that there is no average difference between the fish farmers' behavior before and after using the MFCE website. In other words, the aquaculture extension materials presented on the MFCE website have no impact on improving the fish farmers' behavior in Riau Province.

Table 2

Paired samples T-Test output for the behavior of fish farmers

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	BehvBeforeMFCE – BehvAfterMFCE*	-0.34430	5.93418	0.36873	-1.07041	0.38181	-0.934	258	0.351

*.....

These findings suggest that, while there is a willingness to try to implement all extension resources on the MFCE website, they do not do so right away. This may be due to the material presented on the website, which is not following the needs of fish farmers in Riau. According to Ardiyanti (2016) and Hakim & Eriyanti (2019), fish farmers will only practice the extension material if it suits their business needs. I, fish farmers will only practice the extension material if it suits their business needs. It is not yet known what the extension material content presented on the MFCE website should be, according to fish farmers' needs. However, several researchers stated that there are two types of fishery extension materials needed by fish farmers, namely, types of fish, and aquaculture management.

The freshwater fish species that are widely cultivated in Riau are catfish (*Pangasius* spp.), golden fish (*Cyprinus carpio* Linnaeus, 1758), Mozambique tilapia (*Oreochromis mossambicus* (Peters, 1852)), catfish (*Clarias batrachus,* (Linnaeus, 1758)), parrot fish (*Oreochromis niloticus*), and giant gourami (*Osphronemus goramy* Lacepède, 1801). There are three of the seven aspects of aquaculture management that are needed by fish farmers in Riau, namely, water quality management, feed management, and fish marketing (Fauzi et al 2016). Water quality is a strategic issue in the freshwater aquaculture business in Riau, because the four major rivers in Riau (namely, Kampar, Siak, and Indragiri), are important sources of water for aquaculture (Siagian & Simarmata 2018). However, the Siak river has started to be polluted due to industrial waste along the river (Budijono et al 2021).

Conclusions. The findings of this study show that the MFCE website's cyber extension materials improve the attitudes of freshwater fish farmers in Riau Province, but have no impact on their aquaculture activity behavior. This is thought to have occurred because the extension materials presented were not following the needs of fish farmers, especially materials related to fish species, water quality management, feed management, and fish marketing.

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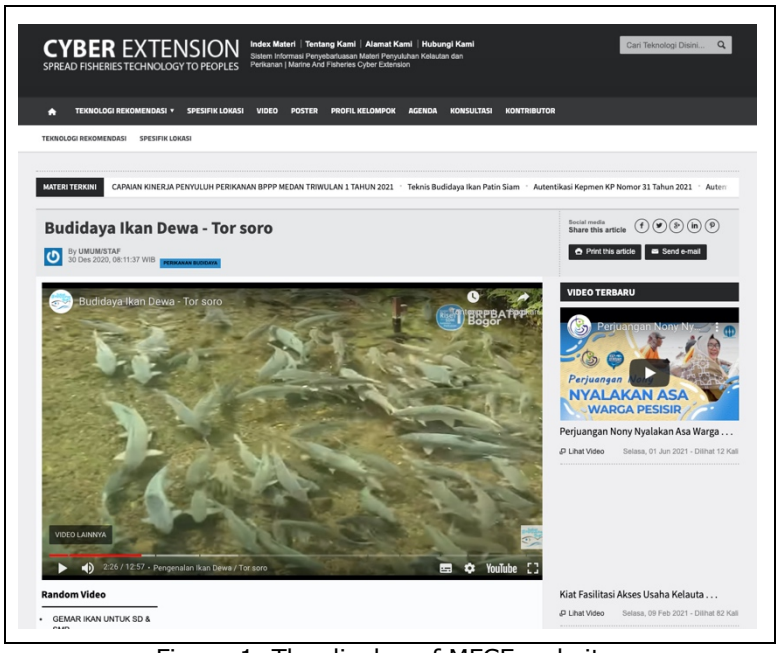

Figure 1. The display of MFCE website.

Riau Province is one of the centers of freshwater aquaculture in Indonesia. Fish farmers in Riau are the target of MFCE cyber media (Hendri et al 2018). Almost all areas in Riau develop freshwater aquaculture. Aquaculture was developed in 10 of the 12 regencies/cities, namely, Kampar, Pekanbaru, Rokan Hulu, Pelalawan, Kuantan Singingi, Indragiri Hulu, Indragiri Hilir, Rokan Hilir, and Bengkalis. It is not developed in Dumai, and Meranti Islands. The aquaculture in Riau is carried out in ponds, reservoirs, rivers, and swamps. This business involves 28,962 fish farmers who can produce 97.910 tons of fish a year (Dinas Perikanan dan Kelautan Provinsi Riau 2019). A total of 5,792 fish farmers used the MFCE website to find information about good freshwater aquaculture techniques (Hendri et al 2018).

The aquaculture cyber extension material on the MFCE website is expected to improve the attitudes and behavior of fish farmers in Riau Province. Attitudes are defined as psychological constructs, mental and emotional entities that are attached to or characterize a person (Perloff 2016). A person's predisposition to act, think, and feel his best while dealing with ideas, situations, or objects is sometimes referred to as attitude. People, locations, ideas, and situations in groups can all be objects (Rakhmat 2012).

While behavior is a series of actions made by individuals, organisms, systems, or artificial entities in relation to themselves or their environment (Hemakumara & Rainis 2018). Behavior is a response to various internal or external stimuli, conscious or subconscious, overt or covert, and voluntary or involuntary (Minton & Khale 2014). There are five stages of audience acceptance of an extension or innovation material: knowing, being interested (wanting to learn more), assessing (evaluating and contemplating), trying, and putting the innovations presented into practice (Riadi 2020). Attitude refers to one's level of interest and judgment, whereas behavior refers to one's willingness to test and execute new ideas. However, so far, the extension material impact on the fish farmers' attitudes and behavior in Riau is not known. Research like the present one need to be done to fill in this gap.

The main material of an aquaculture extension presented on the MFCE website is the seven principles of aquaculture management (*Sapta Usaha Budidaya Perikanan*). The material consists of pond preparation, water supply, handling fish seed stocking, water quality management, feed management, fish pest control, and harvest/post-harvest activities/and fish marketing (Agustina 2018; Zaelani 2018). Thus, aquaculture extension aims to change the attitudes and behaviour of fish farmers regarding the application of the seven principles of aquaculture management towards a better direction than before.

Several studies have shown that aquaculture extension materials have a significant impact on public attitudes. Sugiharto et al (2019) prove that extension materials have a

significant effect on improving the attitudes of members of the freshwater fish farmer group in Samarinda, Indonesia. Mustaqim & Nuraini (2019) also stated that Fishery extension materials improved the attitude of fishery business actors by 75.6% in developing their businesses for the better.

The extension material impact on fish farmer's behaviour. Several studies have stated that the extension materials given to fish farmers can change their behaviour, namely, carrying out aquaculture activities according to the guidelines for extension materials. According to Andiski et al (2017), freshwater aquaculture extension has a significant impact on the behaviour of the "Sejiwa" fish farmer group member in Pasaman, West Sumatra, Indonesia. Rosiah et al (2018) also explained that freshwater aquaculture extension materials had a significant effect on the behaviour of fish farmers in aquaculture. Once they know the extension materials provided, they begin to apply them to their business.

However, the impact of the cyber extension materials presented on the MFCE website on the attitudes and behaviour of fish farmers in Riau is unknown. For that, this research needs to be done.

Material and Method

Description of the study sites. This study was conducted from August - October 2020 in the Province of Riau, Indonesia, using a quantitative descriptive approach. Descriptive research is collecting measurable data to be able to describe the situation precisely (DeFranzo 2020; Robson & McCartan 2016). While the quantitative approach is the process of finding knowledge using data in the form of numbers as a tool to analyze information about what you want to know (Kasiram 2010).

The unit of analysis is fish farmers who use the MFCE website in Riau. The population consists of 5,792 fish farmers (Hendri et al 2018). While the respondent sample size is 259 fish farmers, determined based on Isaac and Michael's table (Sugiyono 2019). They are spread across 10 cities/regencies: Pekanbaru (16 respondents), Kampar (78), Rokan Hulu (35), Rokan Hilir (13), Bengkalis (5), Pelalawan (40), Kuantan Singingi (15), Indragiri Hulu (25), Siak (25), and Indragiri Hilir (7 respondents), as shown in Figure 2. Respondents were selected purposive proportional (Creswell 2009). Data collection was done by distributing questionnaires with open-ended questions to respondents (Bandhari 2020).

Figure 2. Map of research location in Riau Province, Indonesia.

Statistical analysis. Instrument validity and reliability tests were carried out using SPSS 25 software to ensure all data were valid and reliable. The validity test was carried out by looking at the Pearson Correlation coefficient (r). If the value of r-statistics > r-table, then all questionnaire items are considered valid (Sugiyono 2019). Meanwhile, the

reliability test was carried out by looking at the value of the Cronbach's Alpha coefficient. According to Hinton et al (2014), if the coefficient value is 0.50 – 0.70, then all items in the questionnaire are considered moderately reliable.

Furthermore, the Kolmogorov-Smirnov test (KS test) was carried out to analyze the normality of data regarding attitudes and behavior of fish farmers before and after using the MFCE website. If the value of KS-statistical > KS-table, then the data is considered to be normally distributed (Ghasemi & Zahediasl 2012), so that the next analysis, Paired-Sample T-Test, can be carried out. According to Akbar (2020), Paired-Sample T-Test can only be done if the research data is normally distributed. This analysis is used to see the impact of extension materials on the attitudes and behavior of fish farmers can be seen from differences in levels before and after using the MFCE website.

Paired Sample T-Test method with SPSS Statistics 25 software was performed to analyze the difference. According to Creswell (2009), if the significance value (Sig.) < probability 0.05, it can be said that there is a relationship between variables (fish farmers' attitudes or behavior) before and after using the MFCE website. Otherwise, if the value of Sig. > 0.05 probability, there is no relationship between variables before and before using the website.

Two hypotheses were proposed in this study:

H1 = There is an average difference between attitudes before and after using the website. This means freshwater aquaculture cyber extension materials are presented on the MFCE website can improve the attitude of fish farmers in Riau Province.

H2 = There is an average difference between behavior before and after using the website. This means freshwater aquaculture cyber extension materials are presented on the MFCE website can improve the behavior of fish farmers in Riau Province.

If the value of Sig. (2-tailed) < 0.05, then the hypothesis is accepted. If the value of Sig. (2-tailed) > 0.05, then the hypothesis is rejected (Sugiyono 2019).

Results and Discussion

The impact of cyber extension materials on the attitude of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' attitudes before and after using the MFCE website ranged from 0.127 to 0.440. It can be seen that all values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the attitude in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.793 > 0.50. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' attitude before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about attitudes are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.000 < 0.05 (Table 1), then H1 is accepted. It can be concluded that there is an average difference between the attitudes of fish farmers before and after using the MFCE website. In other words, there is an impact of aquaculture extension materials presented on the MFCE website in improving the fish farmers attitude in Riau Province to a better direction.

Table 1

Paired samples T-Test output for attitude of fish farmers

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	AttBeforeMFCE – AttAfterMFCE*	3.57196	10.23844	0.63619	2.31918	4.82474	5.615	258	0.000

*.....

These results are in line with the research of Ahmed et al (2018) which states that aquaculture extension has succeeded to improve the fish farmers' attitude in Bangladesh. The extension was able to improve the attitude of most of them (61.11%) to a moderate level. Meijer et al (2015) also revealed that innovative extension materials about agro-industry (including aquaculture) affect the attitudes of small-scale fish farmers in sub-Saharan Africa. In line with this, Pramitasari et al (2015) discovered that extension of local wisdom improved the fishermen's attitude toward fish conservation in the Mae Klong River in Songkram, Thailand.

The increasing attitude of fish farmers in Riau proves that they already know the content and benefits of the extension materials presented on the MFCE website, so they want to try it. This may occur because the cyber extension materials available on the MFCE website are considered interesting and easy to understand.

According to Surya (2019), agricultural extension materials (including fisheries) on websites can impact on the user attitudes, if the material presented is interesting and easily understandable. According to the fish farmers, the extension materials on the MFCE website are quite easy, because they only consist of three content formats, namely, text, images/graphics, and video. Extension content in text format is understood easily if popular language is used, is not too long, and is not wordy (Hendri & Yulinda 2019).

The ideal text formatted content consists of 700 – 1,700 words (Miladi 2018; Sall 2013). Image/graphic content will be interesting if it is displayed in a large size, which is the size of a gadget screen (Minimatters 2020). Meanwhile, video content must have sharp images, clean sound, and a short duration. The ideal duration is 4-10 minutes (Bahrul 2019). However, fish farmers will practice the extension materials if useful for their business development (Hermawan et al 2017).

The impact of cyber extension materials on the behaviour of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' behavior before and after using the MFCE website ranged from 0.126 to 0.492. It can be seen that all values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the behavior in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.597 > 0.50. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' behavior before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about behavior are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.351 < 0.05 (Table 2), then H2 is rejected. It can be concluded that there is no average difference between the fish farmers' behavior before and after using the MFCE website. In other words, the aquaculture extension materials presented on the MFCE website have no impact on improving the fish farmers' behavior in Riau Province.

Table 2

Paired samples T-Test output for the behavior of fish farmers

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	BehvBeforeMFCE – BehvAfterMFCE*	-0.34430	5.93418	0.36873	-1.07041	0.38181	-0.934	258	0.351

*.....

These findings suggest that, while there is a willingness to try to implement all extension resources on the MFCE website, they do not do so right away. This may be due to the material presented on the website, which is not following the needs of fish farmers in Riau. According to Ardiyanti (2016) and Hakim & Eriyanti (2019), fish farmers will only practice the extension material if it suits their business needs. I, fish farmers will only practice the extension material if it suits their business needs. It is not yet known what the extension material content presented on the MFCE website should be, according to fish farmers' needs. However, several researchers stated that there are two types of fishery extension materials needed by fish farmers, namely, types of fish, and aquaculture management.

The freshwater fish species that are widely cultivated in Riau are catfish (*Pangasius* spp.), golden fish (*Cyprinus carpio* Linnaeus, 1758), Mozambique tilapia (*Oreochromis mossambicus* (Peters, 1852)), catfish (*Clarias batrachus,* (Linnaeus, 1758)), parrot fish (*Oreochromis niloticus*), and giant gourami (*Osphronemus goramy* Lacepède, 1801). There are three of the seven aspects of aquaculture management that are needed by fish farmers in Riau, namely, water quality management, feed management, and fish marketing (Fauzi et al 2016). Water quality is a strategic issue in the freshwater aquaculture business in Riau, because the four major rivers in Riau (namely, Kampar, Siak, and Indragiri), are important sources of water for aquaculture (Siagian & Simarmata 2018). However, the Siak river has started to be polluted due to industrial waste along the river (Budijono et al 2021).

Conclusions. The findings of this study show that the MFCE website's cyber extension materials improve the attitudes of freshwater fish farmers in Riau Province, but have no impact on their aquaculture activity behavior. This is thought to have occurred because the extension materials presented were not following the needs of fish farmers, especially materials related to fish species, water quality management, feed management, and fish marketing.

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Your Future Starts Here

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Latin names

8 pesan

Bioflux Journals <biofluxeditor1@gmail.com> 3 Agustus 2021 pukul 20.11
Kepada: Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

Dear Dr Ridar Hendri,

In relation to the paragraph with Latin names:

The species were written according to taxonomic rules recognized at international level. The parentheses have a specific significance. So, the final version is the one attached. This is the final form, revised by the our editor who is a specialist in fisheries:

The freshwater fish species that are widely cultivated in Riau are catfish (*Pangasius* spp.), carp (*Cyprinus carpio* Linnaeus, 1758), Mozambique tilapia (*Oreochromis mossambicus* (Peters, 1852)), catfish (*Clarias batrachus* (Linnaeus, 1758)), nile tilapia (*Oreochromis niloticus* (Linnaeus, 1758)), and giant gourami (*Osphronemus goramy* Lacepède, 1801). There are three of the seven aspects of aquaculture management that are needed by fish farmers in Riau, namely, water quality management, feed management, and fish marketing (Fauzi et al 2016). Water quality is a strategic issue in the freshwater aquaculture business in Riau, because the four major rivers in Riau (namely, Kampar, Siak, Rokan and Indragiri) are important sources of water for aquaculture (Siagian & Simarmata 2018). However, the Siak river has started to be polluted due to industrial waste along the river (Budiiono et al 2021).

You have the paragraph in word attached in my previous email.

Please let me know if you agree with this form and also, answer to my previous email. Thank you.

Kind regards,
Crina Petrescu

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 3 Agustus 2021 pukul 20.36
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Dear Dr Crina Petrescu

Thank you for replying my email. I would like to explain as follows:

Ten sampling areas had actually been written in previous manuscripts, namely: Kampar, Pekanbaru, Rokan Hulu, Pelalawan, Kuantan Singingi, Indragiri Hulu, Indragiri Hilir, Rokan Hilir, Bengkalis, and Siak. Incidentally **Siak** escapes your attention.

I agree with the modifications you made to The impact of cyber extension (ie the sentence: "The reliability test results showed that Cronbach's Alpha coefficient value was 0.597, which is poor, but still acceptable. This suggests that different questions should be used in the future.").

(See attachment)

Additional information:

1. The attitude of the fish farmer is related to his strong desire to implement all the recommendations contained in the extension materials on the MFCE website. For example, the desire to keep other types of economic fish that they have never kept, but are discussed on the website. Or the desire to carry out certain fish farming management, such as technology for making fish feed.
2. The behaviour of fish farmers is related to the act of carrying out aquaculture activities following the messages presented in the extension materials on the website. The farmers have not done this, their behaviour has not changed even though they have received extension materials from the website.

I'm translating the questionnaire, after this I'll email it

I agree with the form.

Kind regards,
Ridar Hendri
[Kutipan teks disembunyikan]

2021.1965-1973 corrected.doc
577K

Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id> 4 Agustus 2021 pukul 01.19
Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Dear Dr. Crina Petrescu

Here I send the Research Questionnaire. Thank you.

Best regards,
Ridar Hendri

[Kutipan teks disembunyikan]

Tesis Ridar Kuisioner Melayu new version kirim rev3 Bioflux2.docx
54K

Bioflux Journals <biofluxeditor1@gmail.com> 4 Agustus 2021 pukul 01.28
Kepada: Ridar Hendri 19610828 198703 1 004 <ridar.hendri@lecturer.unri.ac.id>

Dear Dr. Ridar Hendri,

Thank you for your email. I added the explanation from your previous email regarding "attitude" and "behavior" and I skipped the questionnaire because if I add it the total number of pages modifies and this makes the replacement of the old version with the new one impossible.
So, the final version is now online. Please see and check at: http://www.bioflux.com.ro/docs/2021.1965-1973.pdf
If you see the old ms instead of the new version, click Ctrl and R simultaneously.
I attach here the published version.
Pls let me know if all is ok.

Best,
Crina
[Kutipan teks disembunyikan]

2021.1965-1973.pdf
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Kepada: Bioflux Journals <biofluxeditor1@gmail.com>

Dear Dr Crina Petrescu

Okay. I've seen the new version you attached. Very good. Thanks again for bothering you enough. However, for the sake of science, we must be honest.

Best regards
Ridar Hendri
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The impact of aquaculture cyber extension on fish farmers' attitudes and behavior in Riau, Indonesia

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Abstract. The purpose of this survey is to see how the aquaculture cyber extension materials on the MFCE (Marine and Fisheries Cyber Extension) website affect the attitudes and behavior of freshwater fish farmers in Riau Province, Indonesia. Using Isaac and Michael's table, a sample of 259 fish farmers who used the MFCE website was used. The data and information were gathered via a closed questionnaire that was purposive proportionally distributed to respondents in ten districts. With the help of SPSS 25 software, the data were analyzed using the Paired Sample T-Test. The findings concluded that the MFCE website's cyber aquaculture extension content was able to change the attitudes of fish producers in Riau Province. This is possible because the extension materials are engaging, simple to comprehend, and tailored to their specific needs. Results also showed that the extension materials do not change their behavior regarding how a freshwater aquaculture business is managed. This may be happen because the material presented is not in accordance with the needs of fish farmers, especially fish species, water quality management, feed management, and fish marketing.
Key words: freshwater aquaculture, media impact, MFCE website, non-formal education.

Introduction. Aquaculture is an important sector that supports the Indonesian economy with 4,15 billion USD per year (Ministry of Marine Affairs and Fisheries Republic of Indonesia 2018). Aquaculture is a human economic activity that utilizes and converts natural resources into commodities of value to society, such as fish, shrimp, shellfish, and other aquatic environmental organisms (Kautsky et al 2000). Freshwater aquaculture activities are carried out in rivers, lakes, reservoirs, and swamps (Lesa 2020).

The government continues to develop this sector, among others, through fisheries extension programs. The extension is non-formal education (Sadono 2010) or education for adults, which involves someone conveying information to help audiences make the right decisions (Ban & Hawkins 1999) so that aspects of their life change to be better than the existing conditions (Riadi 2020). The extension purpose is to change the knowledge, attitudes, and behavior of the audience for the better (Oakley & Garforth 1985; Ibrahim et al 2003; Amanah 2007).

To achieve the maximum results, the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia (MMAF-RI) has implemented an internet-based extension system (cyber extension) since 2017. The ministry created the *Marine and Fisheries Cyber Extension* (MFCE) website to disseminate extension materials to extension workers and fish farmers in the regions (Marine and Fishery Extension KKP-RI 2018). The MFCE website display is shown in Figure 1.

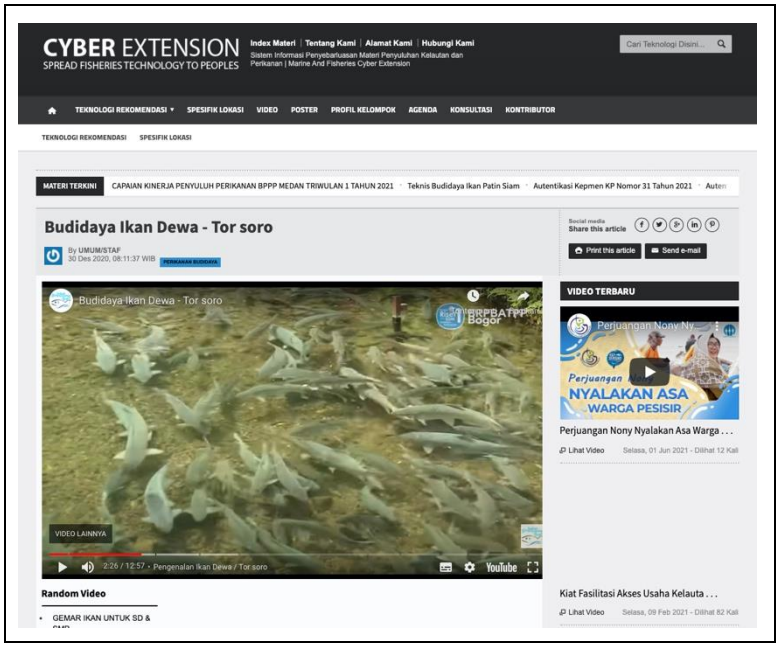

Figure 1. The display of MFCE website.

Riau Province is one of the centers of freshwater aquaculture in Indonesia. Fish farmers in Riau are the target of MFCE cyber media (Hendri et al 2018). Almost all areas in Riau develop freshwater aquaculture. Aquaculture was developed in 10 of the 12 regencies/cities, namely, Kampar, Pekanbaru, Rokan Hulu, Pelalawan, Kuantan Singingi, Indragiri Hulu, Indragiri Hilir, Rokan Hilir, Bengkalis, and Siak. It is not developed in Dumai, and Meranti Islands. The aquaculture in Riau is carried out in ponds, reservoirs, rivers, and swamps. This business involves 28,962 fish farmers who can produce 97.910 tons of fish a year (Dinas Perikanan dan Kelautan Provinsi Riau 2019). A total of 5,792 fish farmers used the MFCE website to find information about good freshwater aquaculture techniques (Hendri et al 2018).

The aquaculture cyber extension material on the MFCE website is expected to improve the attitudes and behavior of fish farmers in Riau Province. Attitudes are defined as psychological constructs, mental and emotional entities that are attached to or characterize a person (Perloff 2016). A person's predisposition to act, think, and feel his best while dealing with ideas, situations, or objects is sometimes referred to as attitude. People, locations, ideas, and situations in groups can all be objects (Rakhmat 2012).

While behavior is a series of actions made by individuals, organisms, systems, or artificial entities in relation to themselves or their environment (Hemakumara & Rainis 2018). Behavior is a response to various internal or external stimuli, conscious or subconscious, overt or covert, and voluntary or involuntary (Minton & Khale 2014). There are five stages of audience acceptance of an extension or innovation material: knowing, being interested (wanting to learn more), assessing (evaluating and contemplating), trying, and putting the innovations presented into practice (Riadi 2020). Attitude refers to one's level of interest and judgment, whereas behavior refers to one's willingness to test and execute new ideas. However, so far, the extension material impact on the fish farmers' attitudes and behavior in Riau is not known. Research like the present one need to be done to fill in this gap.

The main material of an aquaculture extension presented on the MFCE website is the seven principles of aquaculture management (*Sapta Usaha Budidaya Perikanan*) adopted by the ministry. The material consists of pond preparation, water supply, handling fish seed stocking, water quality management, feed management, fish pest control, and harvest/post-harvest activities/and fish marketing (Agustina 2018; Zaelani 2018). Thus, aquaculture extension aims to change the attitudes and behaviour of fish farmers regarding the application of the seven principles of aquaculture management towards a better direction than before.

Several studies have shown that aquaculture extension materials have a significant impact on public attitudes. Sugiharto et al (2019) proved that extension materials had a significant effect on improving the attitudes of members of the freshwater fish farmer group in Samarinda, Indonesia. Mustaqim & Nuraini (2019) also stated that Fishery extension materials improved the attitude of fishery business actors by 75.6% in developing their businesses for the better.

Several studies highlighted the impact of the extension material on fish farmer's behaviour. Studies indicated that the extension materials given to fish farmers can change their behaviour, namely, carrying out aquaculture activities according to the guidelines for extension materials. According to Andiski et al (2017), freshwater aquaculture extension had a significant impact on the behaviour of the "Sejiwa" fish farmer group member in Pasaman, West Sumatra, Indonesia. Rosiah et al (2018) also explained that freshwater aquaculture extension materials had a significant effect on the behaviour of fish farmers in aquaculture. Once they knew the extension materials provided, they begun to apply them to their business.

However, the impact of the cyber extension materials presented on the MFCE website on the attitudes and behaviour of fish farmers in Riau is unknown. For that, this research needs to be done.

Material and Method

Description of the study sites. This study was conducted from August - October 2020 in the Province of Riau, Indonesia, using a quantitative descriptive approach. Descriptive research is collecting measurable data to describe the situation as precisely as possible (DeFranzo 2020; Robson & McCartan 2016). In exchange, the quantitative approach is the process of finding knowledge using data in the form of numbers as a tool to analyze information about what you want to know (Kasiram 2010).

The unit of analysis is the fish farmer who uses the MFCE website in Riau. The population consists of 5,792 fish farmers (Hendri et al 2018). The respondent sample size is 259 fish farmers, determined based on Isaac and Michael's table (Sugiyono 2019). They are spread across 10 cities/regencies: Pekanbaru (16 respondents), Kampar (78), Rokan Hulu (35), Rokan Hilir (13), Bengkalis (5), Pelalawan (40), Kuantan Singingi (15), Indragiri Hulu (25), Siak (25), and Indragiri Hilir (7 respondents), as shown in Figure 2. Respondents were selected by a purposive proportional method (Creswell 2009). Data collection was done by distributing questionnaires with open-ended questions to respondents (Bandhari 2020).

In the present study, attitudes and behaviours of fish farmer were investigated. The attitude is related to his strong desire to implement all the recommendations included in the extension materials on the MFCE website. For example, the desire to breed other types of fish that they have not bread before, but are presented on the website; and the desire to carry out certain fish farming management actions, such as using technology for fish feeding. The behaviour of fish farmers is related to the actions of carrying out aquaculture activities as a consequence of reading the messages presented in the extension materials posted on the website.

Figure 2. Map of research location in Riau Province, Indonesia.

Statistical analysis. Instrument validity and reliability tests were carried out using SPSS 25 software to ensure all data were valid and reliable. The validity test was carried out by looking at the Pearson Correlation coefficient (r). If the value of r-statistics > r-table, then all questionnaire items are considered valid (Sugiyono 2019). Meanwhile, the reliability test was carried out by looking at the value of the Cronbach's Alpha coefficient. According to Hinton et al (2014), if the coefficient value is between 0.50 and 0.70, then, all items in the questionnaire are considered moderately reliable.

Furthermore, the Kolmogorov-Smirnov test (KS test) was applied to analyze the normality of data regarding attitudes and behavior of fish farmers before and after using the MFCE website. If the value of KS-statistics > KS-table, then the data is considered to be normally distributed (Ghasemi & Zahediasl 2012), so that the next analysis, Paired-Sample T-Test, can be carried out. According to Akbar (2020), Paired-Sample T-Test can only be done if the research data is normally distributed. This analysis is used to see the impact of extension materials on the attitudes and behavior of fish farmers can be seen from differences in levels before and after using the MFCE website.

Paired Sample T-Test method with SPSS Statistics 25 software was performed to analyze the difference before-after. According to Creswell (2009), if the significance value (Sig.) < 0.05, it can be said that there is a statistically significant difference before and after using the MFCE website regarding fish farmers' attitudes or behavior. Otherwise, if the value of Sig. > 0.05, the difference between farmers' attitude/ behavior before and after using the website is not statistically significant.

Two hypotheses were proposed in this study:

H1 = There is an average difference between the attitudes measured before and after using the website. This means freshwater aquaculture cyber extension materials presented on the MFCE website can improve the attitude of fish farmers in Riau Province.

H2 = There is an average difference between the behavior measured before and after using the website. This means freshwater aquaculture cyber extension materials presented on the MFCE website can improve the behavior of fish farmers in Riau Province.

If the value of Sig. (2-tailed) < 0.05, then the hypothesis is accepted. If the value of Sig. (2-tailed) > 0.05, then the hypothesis is rejected (Sugiyono 2019).

Results and Discussion

The impact of cyber extension materials on the attitude of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' attitudes before and after using the MFCE website ranged from 0.127 to 0.440. Values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the attitude in the questionnaire are valid. The reliability test

results showed that Cronbach's Alpha coefficient value was 0.793, which is higher that the required threshold of 0.7. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' attitude before and after using the MFCE website were 0.200, a value higher than the KS-table value of 0.05. This means that all data about attitudes are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.000 < 0.05 (Table 1), then H1 is accepted. It can be concluded that there is an average difference between the attitudes of fish farmers before and after using the MFCE website. In other words, there is an impact of aquaculture extension materials presented on the MFCE website in improving the fish farmers attitude in Riau Province to a better direction.

Table 1

Paired samples T-Test output for attitude of fish farmers

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	AttBeforeMFCE – AttAfterMFCE*	3.57196	10.23844	0.63619	2.31918	4.82474	5.615	258	0.000

*AttBeforeMFCE = Attitude level of fish farmers before using the MFCE website; AttAfterMFCE = Attitude level of fish farmers after using the MFCE website.

These results are in line with the research of Ahmed et al (2018) which states that aquaculture extension has succeeded to improve the fish farmers' attitude in Bangladesh. The extension was able to improve the attitude of most of them (61.11%) to a moderate level. Meijer et al (2015) also revealed that innovative extension materials about agro-industry (including aquaculture) affect the attitudes of small-scale fish farmers in sub-Saharan Africa. In line with this, Pramitasari et al (2015) discovered that extension of local wisdom improved the fishermen's attitude toward fish conservation in the Mae Klong River in Songkram, Thailand.

The attitude of fish farmers in Riau revealed by the study proves that they already know the content and benefits of the extension materials presented on the MFCE website, so they want to try it. This may occur because the cyber extension materials available on the MFCE website are considered interesting and easy to understand.

According to Surya (2019), agricultural extension materials (including fisheries) on websites can have an impact on the user attitudes, if the material presented is interesting and easily understandable. According to the fish farmers, the extension materials on the MFCE website are quite easy, because they only consist of three content formats, namely, text, images/graphics, and video. Extension content in text format is understood easily if popular language is used, is not too long, and is not wordy (Hendri & Yulinda 2019).

The ideal text formatted content consists of 700 – 1,700 words (Miladi 2018; Sall 2013). Image/graphic content will be interesting if it is displayed in a large size, which is the size of a gadget screen (Minimatters 2020). Meanwhile, video content must have sharp images, clean sound, and a short duration. The ideal duration is 4-10 minutes (Bahrul 2019). However, fish farmers will practice the extension materials if useful for their business development (Hermawan et al 2017).

The impact of cyber extension materials on the behaviour of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' behavior before and after using the MFCE website ranged from 0.126 to 0.492. Values of r-statistic > r-

table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the behavior in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.597, which is poor, but still acceptable. This suggests that different questions should be used in the future. The normality test results showed that the KS-statistical values of the fish farmers' behavior before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about behavior are normally distributed.

The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.351 < 0.05 (Table 2), then H2 is rejected. It can be concluded that there is no average difference between the fish farmers' behavior before and after using the MFCE website. In other words, the aquaculture extension materials presented on the MFCE website have no impact on improving the fish farmers' behavior in Riau Province.

Table 2

Paired samples T-Test output for the behavior of fish farmers

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	BehvBeforeMFCE – BehvAfterMFCE*	-0.34430	5.93418	0.36873	-1.07041	0.38181	-0.934	258	0.351

*BehvBeforeMFCE = Behavior level of fish farmers before using the MFCE website; BehvAfterMFCE = Behavior level of fish farmers after using the MFCE website.

These findings suggest that, while farmers have the willingness to try to implement all extension resources on the MFCE website, they do not do so right away. This may be due to the material presented on the website, which is not following the needs of fish farmers in Riau. According to Ardiyanti (2016) and Hakim & Eriyanti (2019), fish farmers will only practice the extension material if it suits their business needs. It is not yet known what the extension material content presented on the MFCE website should be, according to fish farmers' needs. However, several researchers stated that there were two types of fishery extension materials needed by fish farmers, namely, types of fish, and aquaculture management.

The freshwater fish species that are widely cultivated in Riau are catfish (*Pangasius* spp.), carp (*Cyprinus carpio* Linnaeus, 1758), Mozambique tilapia (*Oreochromis mossambicus* (Peters, 1852)), catfish (*Clarias batrachus* (Linnaeus, 1758)), nile tilapia (*Oreochromis niloticus* (Linnaeus, 1758)), and giant gourami (*Osphronemus goramy* Lacepède, 1801). There are three of the seven aspects of aquaculture management that are needed by fish farmers in Riau, namely, water quality management, feed management, and fish marketing (Fauzi et al 2016). Water quality is a strategic issue in the freshwater aquaculture business in Riau, because the four major rivers in Riau (namely, Kampar, Siak, Rokan and Indragiri) are important sources of water for aquaculture (Siagian & Simarmata 2018). However, the Siak river has started to be polluted due to industrial waste along the river (Budijono et al 2021).

Conclusions. The findings of this study show that the MFCE website's cyber extension materials improve the attitudes of freshwater fish farmers in Riau Province, but have no impact on their aquaculture activity behavior. This is may happen because the extension materials presented were not in accordance to fish farmers' needs, especially materials related to fish species, water quality management, feed management, and fish marketing.

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Abstract. The purpose of this survey is to see how the aquaculture cyber extension materials on the MFCE (Marine and Fisheries Cyber Extension) website affect the attitudes and behavior of freshwater fish farmers in Riau Province, Indonesia. Using Isaac and Michael's table, a sample of 259 fish farmers who used the MFCE website was used. The data and information were gathered via a closed questionnaire that was purposive proportionally distributed to respondents in ten districts. With the help of SPSS 25 software, the data were analyzed using the Paired Sample T-Test. The findings concluded that the MFCE website's cyber aquaculture extension content was able to change the attitudes of fish producers in Riau Province. This is possible because the extension materials are engaging, simple to comprehend, and tailored to their specific needs. Results also showed that the extension materials do not change their behavior regarding how a freshwater aquaculture business is managed. This may be happen because the material presented is not in accordance with the needs of fish farmers, especially fish species, water quality management, feed management, and fish marketing.
Key words: freshwater aquaculture, media impact, MFCE website, non-formal education.

Introduction. Aquaculture is an important sector that supports the Indonesian economy with 4,15 billion USD per year (Ministry of Marine Affairs and Fisheries Republic of Indonesia 2018). Aquaculture is a human economic activity that utilizes and converts natural resources into commodities of value to society, such as fish, shrimp, shellfish, and other aquatic environmental organisms (Kautsky et al 2000). Freshwater aquaculture activities are carried out in rivers, lakes, reservoirs, and swamps (Lesa 2020).

The government continues to develop this sector, among others, through fisheries extension programs. The extension is non-formal education (Sadono 2010) or education for adults, which involves someone conveying information to help audiences make the right decisions (Ban & Hawkins 1999) so that aspects of their life change to be better than the existing conditions (Riadi 2020). The extension purpose is to change the knowledge, attitudes, and behavior of the audience for the better (Oakley & Garforth 1985; Ibrahim et al 2003; Amanah 2007).

To achieve the maximum results, the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia (MMAF-RI) has implemented an internet-based extension system (cyber extension) since 2017. The ministry created the *Marine and Fisheries Cyber Extension* (MFCE) website to disseminate extension materials to extension workers and fish farmers in the regions (Marine and Fishery Extension KKP-RI 2018). The MFCE website display is shown in Figure 1.

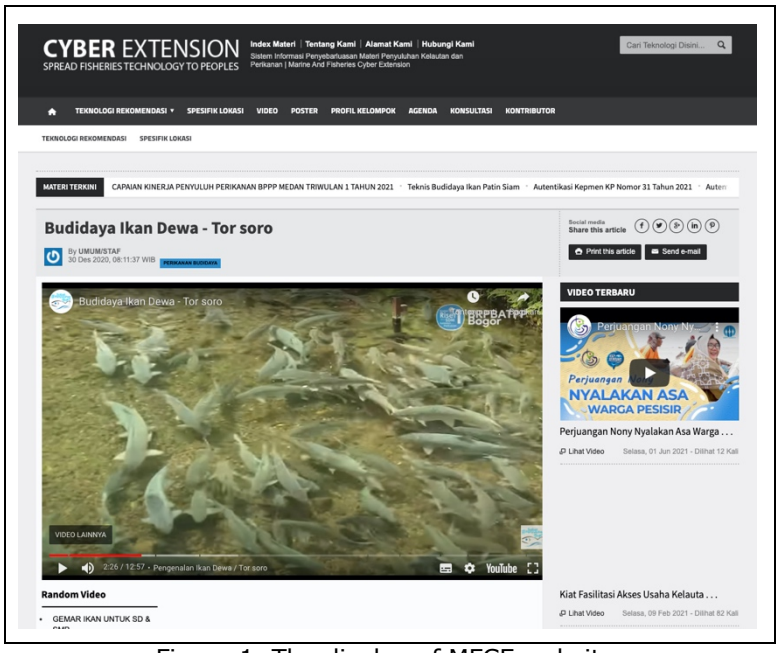

Figure 1. The display of MFCE website.

Riau Province is one of the centers of freshwater aquaculture in Indonesia. Fish farmers in Riau are the target of MFCE cyber media (Hendri et al 2018). Almost all areas in Riau develop freshwater aquaculture. Aquaculture was developed in 10 of the 12 regencies/cities, namely, Kampar, Pekanbaru, Rokan Hulu, Pelalawan, Kuantan Singingi, Indragiri Hulu, Indragiri Hilir, Rokan Hilir, and Bengkalis. It is not developed in Dumai, and Meranti Islands. The aquaculture in Riau is carried out in ponds, reservoirs, rivers, and swamps. This business involves 28,962 fish farmers who can produce 97.910 tons of fish a year (Dinas Perikanan dan Kelautan Provinsi Riau 2019). A total of 5,792 fish farmers used the MFCE website to find information about good freshwater aquaculture techniques (Hendri et al 2018).

The aquaculture cyber extension material on the MFCE website is expected to improve the attitudes and behavior of fish farmers in Riau Province. Attitudes are defined as psychological constructs, mental and emotional entities that are attached to or characterize a person (Perloff 2016). A person's predisposition to act, think, and feel his best while dealing with ideas, situations, or objects is sometimes referred to as attitude. People, locations, ideas, and situations in groups can all be objects (Rakhmat 2012).

While behavior is a series of actions made by individuals, organisms, systems, or artificial entities in relation to themselves or their environment (Hemakumara & Rainis 2018). Behavior is a response to various internal or external stimuli, conscious or subconscious, overt or covert, and voluntary or involuntary (Minton & Khale 2014). There are five stages of audience acceptance of an extension or innovation material: knowing, being interested (wanting to learn more), assessing (evaluating and contemplating), trying, and putting the innovations presented into practice (Riadi 2020). Attitude refers to one's level of interest and judgment, whereas behavior refers to one's willingness to test and execute new ideas. However, so far, the extension material impact on the fish farmers' attitudes and behavior in Riau is not known. Research like the present one need to be done to fill in this gap.

The main material of an aquaculture extension presented on the MFCE website is the seven principles of aquaculture management (*Sapta Usaha Budidaya Perikanan*) adopted by the ministry. The material consists of pond preparation, water supply, handling fish seed stocking, water quality management, feed management, fish pest control, and harvest/post-harvest activities/and fish marketing (Agustina 2018; Zaelani 2018). Thus, aquaculture extension aims to change the attitudes and behaviour of fish farmers regarding the application of the seven principles of aquaculture management towards a better direction than before.

Several studies have shown that aquaculture extension materials have a significant impact on public attitudes. Sugiharto et al (2019) proved that extension materials had a significant effect on improving the attitudes of members of the freshwater fish farmer group in Samarinda, Indonesia. Mustaqim & Nuraini (2019) also stated that Fishery extension materials improved the attitude of fishery business actors by 75.6% in developing their businesses for the better.

Several studies highlighted the impact of the extension material on fish farmer's behaviour. Studies indicated that the extension materials given to fish farmers can change their behaviour, namely, carrying out aquaculture activities according to the guidelines for extension materials. According to Andiski et al (2017), freshwater aquaculture extension had a significant impact on the behaviour of the "Sejiwa" fish farmer group member in Pasaman, West Sumatra, Indonesia. Rosiah et al (2018) also explained that freshwater aquaculture extension materials had a significant effect on the behaviour of fish farmers in aquaculture. Once they knew the extension materials provided, they begun to apply them to their business.

However, the impact of the cyber extension materials presented on the MFCE website on the attitudes and behaviour of fish farmers in Riau is unknown. For that, this research needs to be done.

Material and Method

Description of the study sites. This study was conducted from August - October 2020 in the Province of Riau, Indonesia, using a quantitative descriptive approach. Descriptive research is collecting measurable data to describe the situation as precisely as possible (DeFranzo 2020; Robson & McCartan 2016). In exchange, the quantitative approach is the process of finding knowledge using data in the form of numbers as a tool to analyze information about what you want to know (Kasiram 2010).

The unit of analysis is the fish farmer who uses the MFCE website in Riau. The population consists of 5,792 fish farmers (Hendri et al 2018). The respondent sample size is 259 fish farmers, determined based on Isaac and Michael's table (Sugiyono 2019). They are spread across 10 cities/regencies: Pekanbaru (16 respondents), Kampar (78), Rokan Hulu (35), Rokan Hilir (13), Bengkalis (5), Pelalawan (40), Kuantan Singingi (15), Indragiri Hulu (25), Siak (25), and Indragiri Hilir (7 respondents), as shown in Figure 2. Respondents were selected by a purposive proportional method (Creswell 2009). Data collection was done by distributing questionnaires with open-ended questions to respondents (Bandhari 2020).

Figure 2. Map of research location in Riau Province, Indonesia.

Statistical analysis. Instrument validity and reliability tests were carried out using SPSS 25 software to ensure all data were valid and reliable. The validity test was carried

out by looking at the Pearson Correlation coefficient (r). If the value of r-statistics > r-table, then all questionnaire items are considered valid (Sugiyono 2019). Meanwhile, the reliability test was carried out by looking at the value of the Cronbach's Alpha coefficient. According to Hinton et al (2014), if the coefficient value is between 0.50 and 0.70, then, all items in the questionnaire are considered moderately reliable.

Furthermore, the Kolmogorov-Smirnov test (KS test) was applied to analyze the normality of data regarding attitudes and behavior of fish farmers before and after using the MFCE website. If the value of KS-statistics > KS-table, then the data is considered to be normally distributed (Ghasemi & Zahediasl 2012), so that the next analysis, Paired-Sample T-Test, can be carried out. According to Akbar (2020), Paired-Sample T-Test can only be done if the research data is normally distributed. This analysis is used to see the impact of extension materials on the attitudes and behavior of fish farmers can be seen from differences in levels before and after using the MFCE website.

Paired Sample T-Test method with SPSS Statistics 25 software was performed to analyze the difference before-after. According to Creswell (2009), if the significance value (Sig.) < 0.05, it can be said that there is a statistically significant difference before and after using the MFCE website regarding fish farmers' attitudes or behavior. Otherwise, if the value of Sig. > 0.05, the difference between farmers' attitude/ behavior before and after using the website is not statistically significant.

Two hypotheses were proposed in this study:

H1 = There is an average difference between the attitudes measured before and after using the website. This means freshwater aquaculture cyber extension materials presented on the MFCE website can improve the attitude of fish farmers in Riau Province.

H2 = There is an average difference between the behavior measured before and after using the website. This means freshwater aquaculture cyber extension materials presented on the MFCE website can improve the behavior of fish farmers in Riau Province.

If the value of Sig. (2-tailed) < 0.05, then the hypothesis is accepted. If the value of Sig. (2-tailed) > 0.05, then the hypothesis is rejected (Sugiyono 2019).

Results and Discussion

The impact of cyber extension materials on the attitude of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' attitudes before and after using the MFCE website ranged from 0.127 to 0.440. Values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the attitude in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.793, which is higher that the required threshold of 0.7. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' attitude before and after using the MFCE website were 0.200, a value higher than the KS-table value of 0.05. This means that all data about attitudes are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.000 < 0.05 (Table 1), then H1 is accepted. It can be concluded that there is an average difference between the attitudes of fish farmers before and after using the MFCE website. In other words, there is an impact of aquaculture extension materials presented on the MFCE website in improving the fish farmers attitude in Riau Province to a better direction.

Table 1

Paired samples T-Test output for attitude of fish farmers

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	AttBeforeMFCE – AttAfterMFCE*	3.57196	10.23844	0.63619	2.31918	4.82474	5.615	258	0.000

*AttBeforeMFCE = Attitude level of fish farmers before using the MFCE website; AttAfterMFCE = Attitude level of fish farmers after using the MFCE website.

These results are in line with the research of Ahmed et al (2018) which states that aquaculture extension has succeeded to improve the fish farmers' attitude in Bangladesh. The extension was able to improve the attitude of most of them (61.11%) to a moderate level. Meijer et al (2015) also revealed that innovative extension materials about agro-industry (including aquaculture) affect the attitudes of small-scale fish farmers in sub-Saharan Africa. In line with this, Pramitasari et al (2015) discovered that extension of local wisdom improved the fishermen's attitude toward fish conservation in the Mae Klong River in Songkram, Thailand.

The attitude of fish farmers in Riau revealed by the study proves that they already know the content and benefits of the extension materials presented on the MFCE website, so they want to try it. This may occur because the cyber extension materials available on the MFCE website are considered interesting and easy to understand.

According to Surya (2019), agricultural extension materials (including fisheries) on websites can have an impact on the user attitudes, if the material presented is interesting and easily understandable. According to the fish farmers, the extension materials on the MFCE website are quite easy, because they only consist of three content formats, namely, text, images/graphics, and video. Extension content in text format is understood easily if popular language is used, is not too long, and is not wordy (Hendri & Yulinda 2019).

The ideal text formatted content consists of 700 – 1,700 words (Miladi 2018; Sall 2013). Image/graphic content will be interesting if it is displayed in a large size, which is the size of a gadget screen (Minimatters 2020). Meanwhile, video content must have sharp images, clean sound, and a short duration. The ideal duration is 4-10 minutes (Bahrul 2019). However, fish farmers will practice the extension materials if useful for their business development (Hermawan et al 2017).

The impact of cyber extension materials on the behaviour of fish farmers*.* The validity test results showed that the r-statistic value of the fish farmers' behavior before and after using the MFCE website ranged from 0.126 to 0.492. Values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the behavior in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.597, which is poor, but still acceptable. This suggests that different questions should be used in the future. The normality test results showed that the KS-statistical values of the fish farmers' behavior before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about behavior are normally distributed.

The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.351 < 0.05 (Table 2), then H2 is rejected. It can be concluded that there is no average

difference between the fish farmers' behavior before and after using the MFCE website. In other words, the aquaculture extension materials presented on the MFCE website have no impact on improving the fish farmers' behavior in Riau Province.

Table 2

Paired samples T-Test output for the behavior of fish farmers

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	BehvBeforeMFCE – BehvAfterMFCE*	-0.34430	5.93418	0.36873	-1.07041	0.38181	-0.934	258	0.351

*BehvBeforeMFCE = Behavior level of fish farmers before using the MFCE website; BehvAfterMFCE = Behavior level of fish farmers after using the MFCE website.

These findings suggest that, while farmers have the willingness to try to implement all extension resources on the MFCE website, they do not do so right away. This may be due to the material presented on the website, which is not following the needs of fish farmers in Riau. According to Ardiyanti (2016) and Hakim & Eriyanti (2019), fish farmers will only practice the extension material if it suits their business needs. It is not yet known what the extension material content presented on the MFCE website should be, according to fish farmers' needs. However, several researchers stated that there were two types of fishery extension materials needed by fish farmers, namely, types of fish, and aquaculture management.

The freshwater fish species that are widely cultivated in Riau are catfish (*Pangasius* spp.), carp (*Cyprinus carpio* Linnaeus, 1758), Mozambique tilapia (*Oreochromis mossambicus* (Peters, 1852)), catfish (*Clarias batrachus* (Linnaeus, 1758)), nile tilapia (*Oreochromis niloticus* (Linnaeus, 1758)), and giant gourami (*Osphronemus goramy* Lacepède, 1801). There are three of the seven aspects of aquaculture management that are needed by fish farmers in Riau, namely, water quality management, feed management, and fish marketing (Fauzi et al 2016). Water quality is a strategic issue in the freshwater aquaculture business in Riau, because the four major rivers in Riau (namely, Kampar, Siak, Rokan and Indragiri) are important sources of water for aquaculture (Siagian & Simarmata 2018). However, the Siak river has started to be polluted due to industrial waste along the river (Budijono et al 2021).

Conclusions. The findings of this study show that the MFCE website's cyber extension materials improve the attitudes of freshwater fish farmers in Riau Province, but have no impact on their aquaculture activity behavior. This is may happen because the extension materials presented were not in accordance to fish farmers' needs, especially materials related to fish species, water quality management, feed management, and fish marketing.

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The impact of aquaculture cyber extension on fish farmers' attitudes and behavior in Riau, Indonesia

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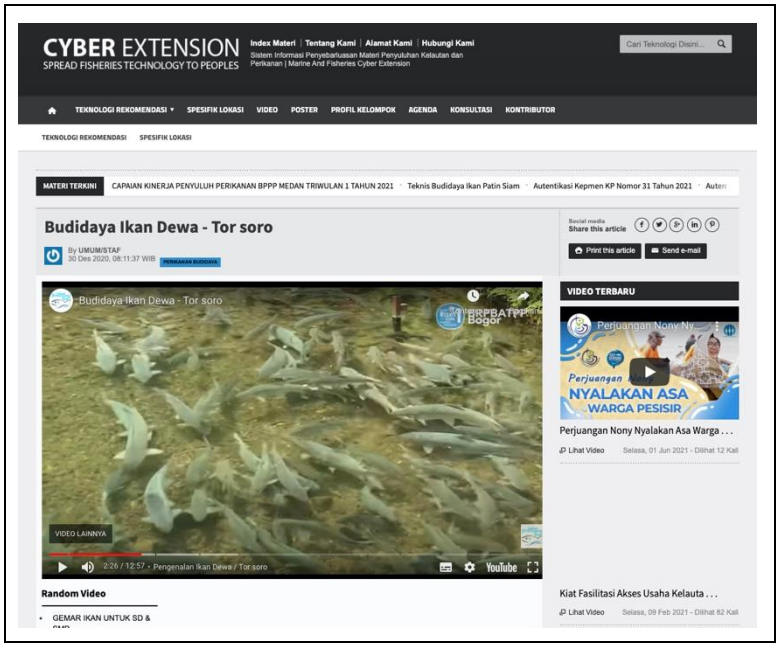

Figure 1. The display of MFCE website.

Riau Province is one of the centers of freshwater aquaculture in Indonesia. Fish farmers in Riau are the target of MFCE cyber media (Hendri et al 2018). Almost all areas in Riau develop freshwater aquaculture. Aquaculture was developed in 10 of the 12 regencies/cities, namely, Kampar, Pekanbaru, Rokan Hulu, Pelalawan, Kuantan Singingi, Indragiri Hulu, Indragiri Hilir, Rokan Hilir, Bengkalis, and Siak. It is not developed in Dumai, and Meranti Islands. The aquaculture in Riau is carried out in ponds, reservoirs, rivers, and swamps. This business involves 28,962 fish farmers who can produce 97.910 tons of fish a year (Dinas Perikanan dan Kelautan Provinsi Riau 2019). A total of 5,792 fish farmers used the MFCE website to find information about good freshwater aquaculture techniques (Hendri et al 2018).

The aquaculture cyber extension material on the MFCE website is expected to improve the attitudes and behavior of fish farmers in Riau Province. Attitudes are defined as psychological constructs, mental and emotional entities that are attached to or characterize a person (Perloff 2016). A person's predisposition to act, think, and feel his best while dealing with ideas, situations, or objects is sometimes referred to as attitude. People, locations, ideas, and situations in groups can all be objects (Rakhmat 2012).

While behavior is a series of actions made by individuals, organisms, systems, or artificial entities in relation to themselves or their environment (Hemakumara & Rainis 2018). Behavior is a response to various internal or external stimuli, conscious or subconscious, overt or covert, and voluntary or involuntary (Minton & Khale 2014). There are five stages of audience acceptance of an extension or innovation material: knowing, being interested (wanting to learn more), assessing (evaluating and contemplating), trying, and putting the innovations presented into practice (Riadi 2020). Attitude refers to one's level of interest and judgment, whereas behavior refers to one's willingness to test and execute new ideas. However, so far, the extension material impact on the fish farmers' attitudes and behavior in Riau is not known. Research like the present one need to be done to fill in this gap.

The main material of an aquaculture extension presented on the MFCE website is the seven principles of aquaculture management (*Sapta Usaha Budidaya Perikanan*) adopted by the ministry. The material consists of pond preparation, water supply, handling fish seed stocking, water quality management, feed management, fish pest control, and harvest/post-harvest activities/and fish marketing (Agustina 2018; Zaelani 2018). Thus, aquaculture extension aims to change the attitudes and behaviour of fish farmers regarding the application of the seven principles of aquaculture management towards a better direction than before.

Several studies have shown that aquaculture extension materials have a significant impact on public attitudes. Sugiharto et al (2019) proved that extension materials had a significant effect on improving the attitudes of members of the freshwater fish farmer group in Samarinda, Indonesia. Mustaqim & Nuraini (2019) also stated that Fishery extension materials improved the attitude of fishery business actors by 75.6% in developing their businesses for the better.

Several studies highlighted the impact of the extension material on fish farmer's behaviour. Studies indicated that the extension materials given to fish farmers can change their behaviour, namely, carrying out aquaculture activities according to the guidelines for extension materials. According to Andiski et al (2017), freshwater aquaculture extension had a significant impact on the behaviour of the "Sejiwa" fish farmer group member in Pasaman, West Sumatra, Indonesia. Rosiah et al (2018) also explained that freshwater aquaculture extension materials had a significant effect on the behaviour of fish farmers in aquaculture. Once they knew the extension materials provided, they begun to apply them to their business.

However, the impact of the cyber extension materials presented on the MFCE website on the attitudes and behaviour of fish farmers in Riau is unknown. For that, this research needs to be done.

Material and Method

Description of the study sites. This study was conducted from August - October 2020 in the Province of Riau, Indonesia, using a quantitative descriptive approach. Descriptive research is collecting measurable data to describe the situation as precisely as possible (DeFranzo 2020; Robson & McCartan 2016). In exchange, the quantitative approach is the process of finding knowledge using data in the form of numbers as a tool to analyze information about what you want to know (Kasiram 2010).

The unit of analysis is the fish farmer who uses the MFCE website in Riau. The population consists of 5,792 fish farmers (Hendri et al 2018). The respondent sample size is 259 fish farmers, determined based on Isaac and Michael's table (Sugiyono 2019). They are spread across 10 cities/regencies: Pekanbaru (16 respondents), Kampar (78), Rokan Hulu (35), Rokan Hilir (13), Bengkalis (5), Pelalawan (40), Kuantan Singingi (15), Indragiri Hulu (25), Siak (25), and Indragiri Hilir (7 respondents), as shown in Figure 2. Respondents were selected by a purposive proportional method (Creswell 2009). Data collection was done by distributing questionnaires with open-ended questions to respondents (Bandhari 2020).

In the present study, attitudes and behaviours of fish farmer were investigated. The attitude is related to his strong desire to implement all the recommendations included in the extension materials on the MFCE website. For example, the desire to breed other types of fish that they have not bread before, but are presented on the website; and the desire to carry out certain fish farming management actions, such as using technology for fish feeding. The behaviour of fish farmers is related to the actions of carrying out aquaculture activities as a consequence of reading the messages presented in the extension materials posted on the website.

Figure 2. Map of research location in Riau Province, Indonesia.

Statistical analysis. Instrument validity and reliability tests were carried out using SPSS 25 software to ensure all data were valid and reliable. The validity test was carried out by looking at the Pearson Correlation coefficient (r). If the value of r-statistics > r-table, then all questionnaire items are considered valid (Sugiyono 2019). Meanwhile, the reliability test was carried out by looking at the value of the Cronbach's Alpha coefficient. According to Hinton et al (2014), if the coefficient value is between 0.50 and 0.70, then, all items in the questionnaire are considered moderately reliable.

Furthermore, the Kolmogorov-Smirnov test (KS test) was applied to analyze the normality of data regarding attitudes and behavior of fish farmers before and after using the MFCE website. If the value of KS-statistics > KS-table, then the data is considered to be normally distributed (Ghasemi & Zahediasl 2012), so that the next analysis, Paired-Sample T-Test, can be carried out. According to Akbar (2020), Paired-Sample T-Test can only be done if the research data is normally distributed. This analysis is used to see the impact of extension materials on the attitudes and behavior of fish farmers can be seen from differences in levels before and after using the MFCE website.

Paired Sample T-Test method with SPSS Statistics 25 software was performed to analyze the difference before-after. According to Creswell (2009), if the significance value (Sig.) < 0.05, it can be said that there is a statistically significant difference before and after using the MFCE website regarding fish farmers' attitudes or behavior. Otherwise, if the value of Sig. > 0.05, the difference between farmers' attitude/ behavior before and after using the website is not statistically significant.

Two hypotheses were proposed in this study:

H1 = There is an average difference between the attitudes measured before and after using the website. This means freshwater aquaculture cyber extension materials presented on the MFCE website can improve the attitude of fish farmers in Riau Province.

H2 = There is an average difference between the behavior measured before and after using the website. This means freshwater aquaculture cyber extension materials presented on the MFCE website can improve the behavior of fish farmers in Riau Province.

If the value of Sig. (2-tailed) < 0.05, then the hypothesis is accepted. If the value of Sig. (2-tailed) > 0.05, then the hypothesis is rejected (Sugiyono 2019).

Results and Discussion

The impact of cyber extension materials on the attitude of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' attitudes before and after using the MFCE website ranged from 0.127 to 0.440. Values of r-statistic > r-table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the attitude in the questionnaire are valid. The reliability test

results showed that Cronbach's Alpha coefficient value was 0.793, which is higher that the required threshold of 0.7. In other words, all statement items in the questionnaire are reliable. Furthermore, the normality test results showed that the KS-statistical values of the fish farmers' attitude before and after using the MFCE website were 0.200, a value higher than the KS-table value of 0.05. This means that all data about attitudes are normally distributed.

Thus, the next analysis, Paired Sample T-Test, can be performed. The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.000 < 0.05 (Table 1), then H1 is accepted. It can be concluded that there is an average difference between the attitudes of fish farmers before and after using the MFCE website. In other words, there is an impact of aquaculture extension materials presented on the MFCE website in improving the fish farmers attitude in Riau Province to a better direction.

Table 1

Paired samples T-Test output for attitude of fish farmers

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	AttBeforeMFCE – AttAfterMFCE*	3.57196	10.23844	0.63619	2.31918	4.82474	5.615	258	0.000

*AttBeforeMFCE = Attitude level of fish farmers before using the MFCE website; AttAfterMFCE = Attitude level of fish farmers after using the MFCE website.

These results are in line with the research of Ahmed et al (2018) which states that aquaculture extension has succeeded to improve the fish farmers' attitude in Bangladesh. The extension was able to improve the attitude of most of them (61.11%) to a moderate level. Meijer et al (2015) also revealed that innovative extension materials about agro-industry (including aquaculture) affect the attitudes of small-scale fish farmers in sub-Saharan Africa. In line with this, Pramitasari et al (2015) discovered that extension of local wisdom improved the fishermen's attitude toward fish conservation in the Mae Klong River in Songkram, Thailand.

The attitude of fish farmers in Riau revealed by the study proves that they already know the content and benefits of the extension materials presented on the MFCE website, so they want to try it. This may occur because the cyber extension materials available on the MFCE website are considered interesting and easy to understand.

According to Surya (2019), agricultural extension materials (including fisheries) on websites can have an impact on the user attitudes, if the material presented is interesting and easily understandable. According to the fish farmers, the extension materials on the MFCE website are quite easy, because they only consist of three content formats, namely, text, images/graphics, and video. Extension content in text format is understood easily if popular language is used, is not too long, and is not wordy (Hendri & Yulinda 2019).

The ideal text formatted content consists of 700 – 1,700 words (Miladi 2018; Sall 2013). Image/graphic content will be interesting if it is displayed in a large size, which is the size of a gadget screen (Minimatters 2020). Meanwhile, video content must have sharp images, clean sound, and a short duration. The ideal duration is 4-10 minutes (Bahrul 2019). However, fish farmers will practice the extension materials if useful for their business development (Hermawan et al 2017).

The impact of cyber extension materials on the behaviour of fish farmers. The validity test results showed that the r-statistic value of the fish farmers' behavior before and after using the MFCE website ranged from 0.126 to 0.492. Values of r-statistic > r-

table are 0.113 (with df=257 at a significance level of 0.05). This means that all statement items about the behavior in the questionnaire are valid. The reliability test results showed that Cronbach's Alpha coefficient value was 0.597, which is poor, but still acceptable. This suggests that different questions should be used in the future. The normality test results showed that the KS-statistical values of the fish farmers' behavior before and after using the MFCE website were 0.200 > the KS-table value of 0.05. This means that all data about behavior are normally distributed.

The Paired Sample Test output table shows that the value of Sig. (2-tailed) is 0.351 < 0.05 (Table 2), then H2 is rejected. It can be concluded that there is no average difference between the fish farmers' behavior before and after using the MFCE website. In other words, the aquaculture extension materials presented on the MFCE website have no impact on improving the fish farmers' behavior in Riau Province.

Table 2

Paired samples T-Test output for the behavior of fish farmers

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	BehvBeforeMFCE – BehvAfterMFCE*	-0.34430	5.93418	0.36873	-1.07041	0.38181	-0.934	258	0.351

*BehvBeforeMFCE = Behavior level of fish farmers before using the MFCE website; BehvAfterMFCE = Behavior level of fish farmers after using the MFCE website.

These findings suggest that, while farmers have the willingness to try to implement all extension resources on the MFCE website, they do not do so right away. This may be due to the material presented on the website, which is not following the needs of fish farmers in Riau. According to Ardiyanti (2016) and Hakim & Eriyanti (2019), fish farmers will only practice the extension material if it suits their business needs. It is not yet known what the extension material content presented on the MFCE website should be, according to fish farmers' needs. However, several researchers stated that there were two types of fishery extension materials needed by fish farmers, namely, types of fish, and aquaculture management.

The freshwater fish species that are widely cultivated in Riau are catfish (*Pangasius* spp.), carp (*Cyprinus carpio* Linnaeus, 1758), Mozambique tilapia (*Oreochromis mossambicus* (Peters, 1852)), catfish (*Clarias batrachus* (Linnaeus, 1758)), nile tilapia (*Oreochromis niloticus* (Linnaeus, 1758)), and giant gourami (*Osphronemus goramy* Lacepède, 1801). There are three of the seven aspects of aquaculture management that are needed by fish farmers in Riau, namely, water quality management, feed management, and fish marketing (Fauzi et al 2016). Water quality is a strategic issue in the freshwater aquaculture business in Riau, because the four major rivers in Riau (namely, Kampar, Siak, Rokan and Indragiri) are important sources of water for aquaculture (Siagian & Simarmata 2018). However, the Siak river has started to be polluted due to industrial waste along the river (Budijono et al 2021).

Conclusions. The findings of this study show that the MFCE website's cyber extension materials improve the attitudes of freshwater fish farmers in Riau Province, but have no impact on their aquaculture activity behavior. This is may happen because the extension materials presented were not in accordance to fish farmers' needs, especially materials related to fish species, water quality management, feed management, and fish marketing.

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