The Effect of Tangible and Intangible Aspects on Satisfaction of Seaweed Information Center's End-Users in Indonesia

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ABSTRACT

Southeast Maluku District was one of the largest producers of seaweed in Eastern Indonesia, but the production and number of farmers have decreased significantly since 2013 due to the effective use of information center in the region. This has been discovered to be as a result of the tangible and intangible factors affecting the satisfaction of the end-users of this center. Therefore, the primary objective of the paper was to determine the effect of these factors on the satisfaction of end-users of the information center. The research was conducted quantitatively through the use of questionnaires distributed to 296 respondents living in the region. The areas sampled include 13 villages spread in 6 sub-districts of Southeast Maluku District, Indonesia, and the research was conducted between April to August 2018. The results showed that tangible factors play significant roles in satisfying the users of seaweed information center while intangible factors like service was found to have negative effect on the satisfaction of the end-users. The main factors found contributing to the anomaly of the findings include the socio-economic and socio-cultural conditions of coastal communities as well as the lack of infrastructures especially road and communication access and other geographical characteristics of the region.

I.   INTRODUCTION

From 2007 to 2013 Southeast Maluku District was one of the largest producers of seaweed in Eastern Indonesia, but the production and number of farmers have decreased significantly since 2013 (Teniwut and Kabalmay, 2015; Teniwut and Teniwut, 2018). Therefore, in order to tackle this challenge, the regional government, through the RPJMD (Region Medium-Term Development Plan), launched two top priority development programs for the region in 2016. One of which was to increase the productivity and revenue from seaweed farming. However, the underlying problems causing a decline in production have not been appropriately resolved (Teniwut et al. 2017b).

It was observed from the research conducted by Teniwut et al. (2017a) that pests and diseases, price volatility, and lack of knowledge were the causes of the asymmetric information on the supply chain of seaweed in the region. In addition to these, the geographical condition of Southeast Maluku District is also complicating the effort to deal with the obstacles. This is due to the lack of sufficient access to transportation such that some villages become inaccessible because of sea wave and current at some period in a year. Another reason is the wide gap between urban and rural areas with respect to infrastructures which makes the cost of accessing information to be very high. Therefore, to minimize the impact of these problems on the farmers, sellers, and distributors of seaweed and address the infrastructure and geographical conditions of the region, it is important to have a seaweed information center which will act as a hub to connect these stakeholders to the information relating to seaweed cultivation.

The hub provides several information and aids on seaweed farming ranging from maintenance to post-production as well as market factors such as prices within and outside the region. However, in order to make the services of this center available to all farmers, (Teniwut et al. 2019) gathered the locations suitable for the seaweed information center within the four sub-districts and two largest islands in Southeast Maluku District.

Furthermore, the role of information center has evolved rapidly since the '80s, however, the initial functions were to train, support and consult while providing information about a lot of things, all in one place (Igbaria and Guimaires, 1993). It was reported that, in general, these centers are needed most when there are more information output and less personnel (Chatterjee, 2017). However, from the early '80s and in the '90s, the existence of information centers has decreased rapidly because of growth of the internet, information technology, and computerization as well as the focus on self-service information centers (Izzettin et al. 2019). In recent years, the format used in establishing these centers have changed and more attention is being placed on augmented reality (del Amo et al. 2018), use of mobile phones (McEwen and Scheaffer, 2012) and self-service (Izzettin et al. 2019).

For the purpose of this study, the information center is defined as an establishment developed to train and organize resources in order to provide information to the end user with attention being placed on the production of seaweed in the Southeast Maluku District. The proposed model of the center was based on intangible and tangible factors. The indicators of the tangible factors include facility, program, building, and equipment while the intangibles include service and quality.
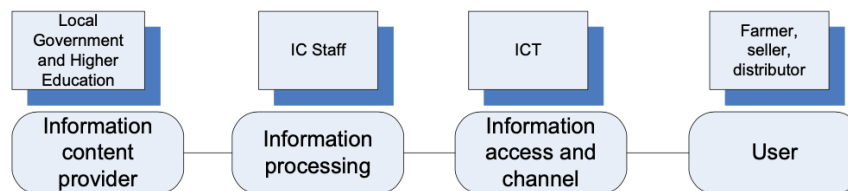The primary objective of the paper was to formulate a seaweed information center model based on farmers, distributors and sellers' socio-economy, socio-cultural and geo-graphical conditions in the region. Thus, the composition of the rest of this paper includes

Section II for theory development, Section III for material and method, Section IV for results, Section V for discussion, and Section VI for the conclusion and future implications of the study.

II.   THEORY DEVELOPMENT

The existence of information center still has few significant roles to play in all sectors, ranging from tourism (Connell and Reynolds, 1999; Deery et al. 2007; Cora et al. 2011) to health and medicals (Marks et al. 2016; Schenk et al. 2018). However, researchers have been making use of a web-based decision support system instead of the physical information centers in agriculture and fisheries in particular and this can be observed in the report on planning fishing activity (Carrick and Ostendorf, 2007), fisheries management (Azadivar et al. 2009; Truong et al. 2005), evaluation of water quality for aquaculture activity (Wang et al. 2006), and estimating growth parameters of commercial fish stock in fisheries industries (Supriatna et al. 2015).

Figure 1
Seaweed information center's business model

The important role of ICT in channeling information to the user is crucial in minimizing cost and increasing the effectiveness of information flow to end users (farmer, seller, and distributor) as shown in Figure 1. The main objective is to decrease asymmetric information on seaweed related business from downstream to upstream in order to increase and optimize profit of in the region.

However, there are many factors to be considered such as the shift from a physical building to virtual information center due to the rapid development of technology, especially information communication technology (ICT). This recent development has been observed to have impacts in developing countries, for example, Kante et al. (2018) pointed out ICT is being used in Africa to support small-scale agriculture in Mali while Asongu and Biekpe (2018) reported it is also being applied in the banking sector. Nevertheless, the use of ICT to fasten the spread of information has been met with cliché obstacles especially with the low level of education and lack of motivation as observed by Aldosari et al. (2017) in Pakistan and Hanafizadeh et al. (2017) in Iran.

Furthermore, from previous studies, it has been discovered that the two important factors in creating an ICT-oriented information center include tangible and intangible factors. Therefore, the proposed hypothesis of this study was divided into two parts which are the effects of intangible and tangible factors on the satisfaction of information center end users. The intangible factors focused on the effect of easiness and services while the tangible factors focused on the review of facilities, building, and staff.

A.   Intangible Factors of the Information Center

The behavior of end-users has the ability to influence the form of an information center. This is reflective in recent times where they are created to be self-operated by end-users through computer and cellphone applications. Furthermore, Wilson (1999) reported that information searching depends on personal characteristics, therefore, figuring out the basic needs of end-users and their previous inquiries can help understand the proper form of information center to increase their satisfaction. Jennings and Weiler (2006) also revealed that the quality of interaction between the end-end user and the center determines the success of its establishment. Moreover, with respect to service quality, intangible factors tend to have a more significant role in influencing the satisfaction of customers (Zeithaml et al., 1996) because the information obtained and processed by them is the intangible core of the service (Keh and Lee, 2006). Therefore, the intangible attributes of an information center, service, and easiness to operate, have a significant impact on the satisfaction of end-users. The first hypothesis was constructed as follows:

H1: Intangible aspects have a significant effect on the satisfaction of the end-users of the seaweed information center.
H1a: Easiness in use has a significant effect on the service of the seaweed information center.
H1b: Service has a significant effect on the satisfaction of end-users of the seaweed information center.
H1c: Easiness in use has a significant effect on the satisfaction of end-users of the seaweed information center.

B.   Tangible Factors of the Information Center

Tangible aspects for service-based business such as information centers are not as effective as the intangible aspects. The low duration of contact between provider and user (Parasuraman et al., 1991; Zeithaml et al. 1996) and more response to an effective than a cognitive approach of tangible aspects are some of the causes. The perception of service quality was also found to have a limited measurement (Wakefield and Bldgett, 1999). In a previous study, tangibles aspects such as facilities and staff appearance, in general, had a significant effect on the satisfaction of customer (Chaniotakis et al. 2009). This is mostly due to the direct experience of the customer while using the service and goods, however, on many occasions, the influence is not always positive (Kitapci et al. 2017) and significant (Yeşilada and Direktör, 2010). Despite these contradictions, tangibles aspects in business are expected to positively influence the satisfaction of customers especially in the region where the user is still conservative about a product. Therefore, the second hypothesis was constructed as follows:

H2: Tangible aspects have a significant effect on the satisfaction of end-users of the seaweed information center.
H2a: Facilities has a significant effect on service in the seaweed information center.
H2b: Facilities has a significant effect on the satisfaction of end-users of the seaweed information center.
H2c: Facilities has a significant effect on easiness to use.

H2d: Building and staff appearance have a significant effect on service in the seaweed information center.
H2e: Building and staff appearance have a significant effect on the satisfaction of end-users of the seaweed information center.
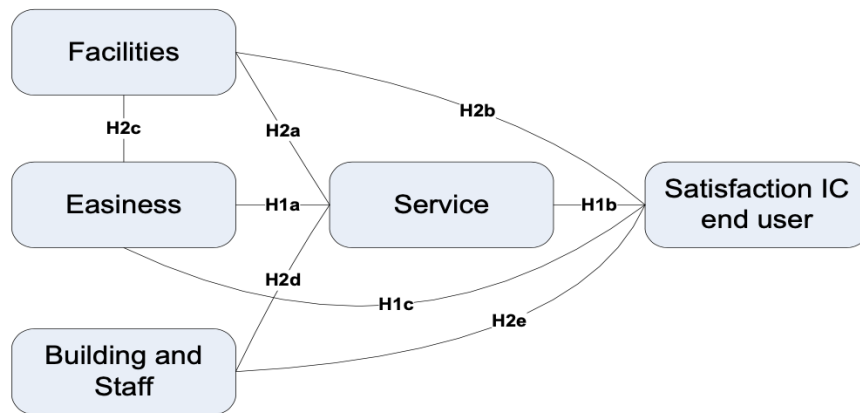
III.   METHODOLOGY

A.   Sample Design and Data Collection

The research methodology was quantitative and to obtain sufficient data, a survey was conducted on seaweed micro-enterprises in the region, from the seller, farmers to the distributors. The areas sampled include 13 villages spread in 6 sub-districts of Southeast Maluku District, Indonesia, and the research was conducted between April to August 2018 with a total of 350 respondents. However, only 296 of them could be used as valid samples for data analysis. The questionnaire used incorporated a 5 Likert-scale adopted from researches conducted by Parasuraman et al. (1985) and Chau (1997) with some adjustment based on the practical situations of the area of research.

B.   Conceptual Framework

Based on an overview of the theory discussed above, the model of the conceptual framework of this research is as shown in figure 2. In general, it postulated intangible and tangible aspects to have a positive and significant impact on the level of end-user satisfaction.

Figure 2
Conceptual framework

C.   Sample Characteristics

Table 1 shows the characteristics of the 296 respondents sampled in this research. Most of them were male as predicted. Comparison with other fisheries activities such as fishing and deep-sea farming shows that seaweed cultivation requires a physical attribute, therefore, it was discovered that a higher number of males were in the seaweed related

business except for the selling aspect where more female was recorded. It was also found that more than half of the respondents were between 41 to 5 years of age, and this shows that older people mostly conduct seaweed related activities in this region. Furthermore, it was discovered that most of the respondents have a low formal education with more fifty percent of them having only elementary to junior high school certificates.

The data obtained for the age and education reveal the common socio-economic condition of farmers in developing countries where they tend to have a large number of families because they mostly marry at a younger age and stop pursuing formal education. This, however, makes seaweed farming an important source of steady revenue for the economic households in coastal regions, where they majorly live a low standard of living compared to an average person in the urban area of Southeast Maluku District.

Table 1
Sample characteristics

Characteristic	Frequency	Percentage
Gender		
Male	260	87.8
Female	36	12.2
Age		
Less than 20	4	1.4
20 - 30	33	11.1
31 – 40	72	24.3
41 – 50	75	25.3
Over 50	112	37.9
Education		
Elementary School	96	32.4
Junior High	95	32.1
High School	104	35.1
Undergrad	1	0.3
Number of families in responsibility		
0-2	60	20.3
3-5	158	53.4
6-8	70	23.7
9-12	8	2.7

D.   Analysis Method

AMOS for confirmatory factor analysis (CFA) was used to measure the model while data was analyzed by using SEM (Arbuckle, 1997). Other methods used for analysis include maximum-likelihood estimation, the goodness of fit of the models, absolute indices through the use of root-mean-square error of approximation (RMSEA), the goodness-of-fit index (GFI), and the adjusted goodness-of-fit index (AGFI) while comparative fit index (CFI) was used for relative indices.

E.   Reliability and Validity Test

Based on the CFA test, several constructs were removed because their values were below 0.7, for instance, the facility originally had five indicators but one was below 0.7, the satisfaction of end users had six indicators but two were below 0.7 while others all met

the criteria. It has been reported that construct reliability (CR) can be used to measure the reliability test for all constructs (Hair et al. 2012). Therefore, Table 2 shows that the reliability value for all the constructs in this study was over 0.7 indicating a high level of internal consistency and reliability among them. The table also shows the result for the validity test, based on average variance extracted (AVE), to be above 0.5 for all the constructs. This, according to Anderson and Gerbing (1988), shows that all the constructs pass the validity test.

Table 2
Reliability and validity test

Variables	Factor Loadings	AVE	CR
Service		0.864	0.970
Serv1	0.898		
Serv2	0.877		
Serv3	0.951		
Serv4	0.970		
Serv5	0.949		
Facilities		0.824	0.949
Fac1	0.923		
Fac2	0.898		
Fac3	0.888		
Fac4	0.922		
Building and staff		0.865	0.975
Buildst1	0.898		
Buildst2	0.980		
Buildst3	0.954		
Buildst4	0.921		
Buildst5	0.864		
Buildst6	0.959		
Easiness		0.729	0.941
Eas1	0.867		
Eas2	0.738		
Eas3	0.935		
Eas4	0.890		
Eas5	0.933		
Eas6	0.734		
Satisfaction of end-user		0.618	0.865
Sat1	0.740		
Sat2	0.799		
Sat3	0.859		
Sat4	0.739		

CMIN/DF 2.979' CFI 0.950 ; GFI 0.847; NFI 0.927; RMSEA 0.082; All factors loading $p < 0.05$
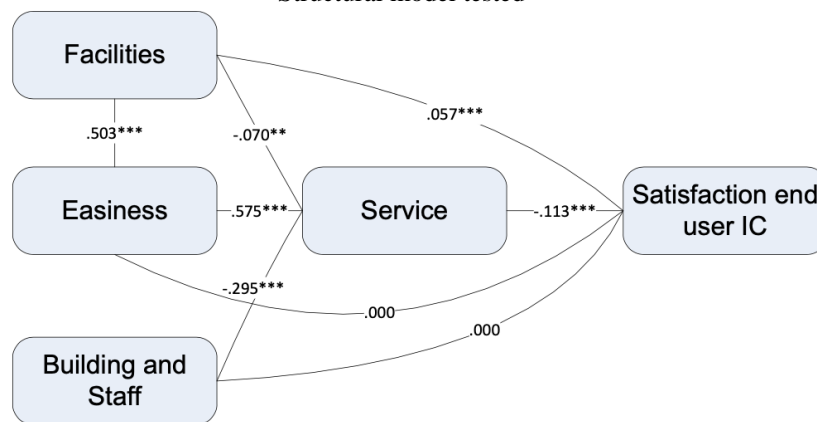
IV.   RESULTS

A.   Hypothesis Test

Based on the structural equation modeling and the model fit as shown by GFI = 0.847 (>0.800) (Baumgartner and Homburg, 1996; Doll et al. 1994), NFI 0.927; (>0.900); CFI = 0.950 (>0.900); RMSEA = 0.059 (<0.100) (MacCallum et al. 1996) the model used in

this research was fit. Furthermore, the first hypothesis was partially accepted and not accepted because of all the three items, only two, H1a and H1b, were supported while (H1c) was not supported. Therefore, intangible aspects have a significant negative effect on the satisfaction of end-users of the seaweed information center.

Moreover, the second hypothesis was also partially accepted and partially not accepted because of all the five items, H2a, H2b, H2c, and H2d were supported while H2e was not supported. Despite the partial support on tangible aspects, in general, the number of supported hypothesizes in this study were overwhelmingly ahead compare with intangible aspects related to the seaweed information center. The notable result on the second hypothesis was that farmers, sellers, and distributors were not concerned about physical appearances like building and staff but more on the functions like facilities as shown in Figure 3 and Table 3.

Figure 3
Structural model tested

*** Significant at 1% (p < 0.01).

B.   Discussion and Limitation

Even though many previous studies had pointed the critical and more crucial role of intangible aspects of service-related business, including an information center, this study presents findings that tend to oppose the majority result by showing tangible aspects play a more important role, especially for facilities, in the seaweed information center. This was observed to be due to the socio-economic and geographical characteristics of the coastal community in Southeast Maluku where limited infrastructure and inadequate access to some of the area in the region make the facilities become more critical factors in their perceived satisfaction. Although, seaweed micro-enterprises on the region prefer the functionality of the information center than the actual physical appearance of the building and number of staffs.

For the intangible aspects, service had a negative effect on the satisfaction of the end-user of the seaweed information center. This shows that service given through physical contact does not always increase the satisfaction of the user of the seaweed

information center in the region due to their social-cultural beliefs of the coastal communities. It was found that most of them still hold the indigenous livelihood where certain rules must be followed, for instance, willingness to accept new information from younger people and/or stranger. The findings of this research showed they prefer a combination of self-service and light contact between them and the staff in the information center.

The result indicates the needs for a better seaweed information center that suits the social-economic and socio-cultural of the coastal community in the region with facilities to meet the technical problems facing seaweed related business in the region. It also includes the use of ICT to reduce hands-on contact between staffs and the user in order to make them comfortable when using the information center to increase the profitability of seaweed produce in the region.

This study has some limitations. The first includes the limited variables used, especially for the intangibles aspects, as a result of the lack of previous studies on the information center in general. *Second,* the case study is limited to only Southeast Maluku District, therefore, there is need to conduct research on other coastal and small islands region in Indonesia to obtain a more comprehensive result, but for the region with similar socio-economic and socio-cultural characteristics, these findings may represent the overall condition. *Third*, the measurement of the effect of intangible and tangible aspects of the study is not strictly divided, therefore, future study must be based on at least two models to preview the effect of each intangible and tangible aspects on the satisfaction of users of the seaweed information center.

Table 3
Hypothesis testing

Structural Path			Coef.	P value	Decision
Easiness	<---	Facilities	.503	***	H2c supported
Service	<---	Facilities	-.070	.073	H2a not supported
Service	<---	Easiness	.575	***	H1a supported
Service	<---	Building and Staff	-.295	***	H2d not supported
Satisfaction of end-user of IC	<---	Building and Staff	.000	.995	H2e not supported
Satisfaction of end-user of IC	<---	Easiness	.000	.988	H1c not supported
Satisfaction of end-user of IC	<---	Facilities	.057	***	H2b supported
Satisfaction of end-user of IC	<---	Service	-.113	***	H1b supported

*** Significant at 1% (p< 0.01).

V.   CONCLUSION

This study provided the additional information needed in measuring the satisfaction of end-users when using information center. It also gave contrary findings to previous research works conducted which showed that tangible factors play significant roles in satisfying the users of seaweed information center. Intangible factors like service was found to have negative effect on the satisfaction of the end-users. The main factors found contributing to the anomaly of the findings include the socio-economic and socio-cultural conditions of coastal communities as well as the lack of infrastructures especially road and communication access and other geographical characteristics of the region.

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