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Analysis of Fishermen's Basic Skills Training With A Computer-Based SECI Knowledge Management Approach

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Abstract. This study aims to explore an integrated framework that integrates SECI knowledge management, basic fishing techniques, diversity of ecological knowledge, innovation abilities, fisherman's performance. The research design uses descriptive quantitative research, and the research methodology uses survey research with 150 respondents with purposive sampling in Kupang district, West Nusa Tenggara, which forms the target population. Statistical techniques use confirmatory factor analysis and structural equation modeling (SEM) using SmartPLS4 to test hypotheses. The test revealed a significant increase in the overall score of the trainees and skills. The specific score for the X2 table value was 149.334 compared to the calculated X2 value of 944.501, so the form of this model can be said to be FIT because X2 count > X2 table. Furthermore, the value of Adjusted R Square gives a more substantial picture than R Square in assessing the ability of an exogenous construct to explain endogenous constructs, namely BFT_0.788, DEK_0.815, FP_0.636 and IA_0.725. Furthermore, the path coefficient values in this study are FP_ -> IA_0.852, IA_ -> BFT_0.324, IA_ -> DEK_0.525, SKM_ -> BFT_ 0.605, SKM_ -> DEK_0.423 and SKM_-> FP_0.798. From these tests, only BFT and DEK were seen to be less than 0.5. The results show that process knowledge management affects several observational variables, namely organizational knowledge, information management affects the nautical ability, process knowledge management involves Fishing basic techniques, Diversity of ecological expertise, maritime learning through mediators, Information management, and organizational knowledge. Therefore, the application of computer-based SECI knowledge management in this study is said to be significant.

Key words: training, knowledge, management, sharing, fishermen, SECI

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INTRODUCTION

Current conditions emphasize that fishermen need to increase their ability to implement fisheries management to benefit decision-making in implementing fishing strategies (Schumann, 2011). The development of the fisheries sub-sector has challenges from the upstream sector, processing, and industrialization of fishery products to the marketing of fishery products (Nainggolan et al., 2021). The poverty of fishermen is not only due to economic problems, but one of the triggers is low life skills (Shinji et al., 2022). Basic knowledge of the marine world of fishermen can contribute to the sustainability and legitimacy of environmental planning and management, which is widely accepted (Garavito-Bermúdez & Boonstra, 2022). Participation and sharing of resources to build an effective co-management system, the shortcomings of which are often highlighted as one of the leading causes of managerial crises and the natural decline of the common good (Cantino et al., 2017).

The development of fishermen's fundamental knowledge in the use of technology and ecological knowledge can be carried out by a combination of various methods, one of which is the management sharing knowledge method with the SECI Web model (Adesina & Ocholla, 2019). Management sharing knowledge with the SECI Web model allows fishermen to contribute and develop insight into basic fishing techniques, diversity of ecological knowledge, and aspects of maritime knowledge (Yatimah et al., 2022).

The importance of managing information and organizational knowledge for fishermen is very vital. This is the same as processing data at the informal and non-formal education stages within the fishermen group (Darmawan et al., 2021). If a group of fishermen does not know sufficiently about developments in marine technology, the group cannot become a strong group (Cooke et al., 2021). Fishermen's knowledge management systems have become one of the fastest-growing areas in the marine community industrial sector, such as Indonesia (Gómez-Sanabria et al., 2020). Fishing communities live in an information economy where the primary source of wealth and prosperity is producing and distributing information and knowledge in fisheries (Garavito-Bermúdez & Boonstra, 2022).

Training on the use of fishing gear is currently at a computer-based stage with a tutorial model, which is a learning program used in the learning process using software in the form of a computer program that contains subject matter on how fishermen catch fish, management to sales management (Akpalu et al., 2021). In

computer-based learning, the tutorial model for fishermen can be in the form of readings, demonstrations, determining assignments or experiences that require responses orally and in writing as well as taking exams (Tuan Sembok & Wan Ismail, 2022).

The ability of fishing groups to create and manage knowledge is part of out-of-school education which plays an influential role in gaining a sustainable competitive advantage (Arkham et al., 2022). So fishermen groups have a direction to innovate and improve the performance of their catch. The competitive domestic and global fishing market scenarios lead to an emerging need for knowledge management (Jensen et al., 2014). Therefore, the ability to create and distribute fishermen's knowledge within groups is a driving force for knowledge management (Johnson, 2008). It is essential to study the effects of knowledge management practices on the conditions of integrated fishing groups.

The knowledge management process includes knowledge creation, organizing, storage, sharing and utilization of knowledge while the knowledge management strategy is codification and personalization (Choi & Lee, 2002). Modern society is moving towards a knowledge society at a very rapid pace, therefore knowledge is one of the primary sources of competitive advantage for some elements of society (Kefela, 2010). Knowledge management's advantage is facilitating collaboration in the innovation process and identifying gaps between knowledge bases and solutions to fill gaps (Vafaie, 2017). Above all, knowledge management helps develop a knowledge-based culture that encourages innovation (Morina, 2022).

Fishermen in the Kupang NTT district have to create knowledge and utilize knowledge for innovative fishing activities. However, in reality, in the current conditions, there is a lack of knowledge management and innovation management roles for fishermen in the Kupang district, NTT. This is due to several factors that traditional fishermen have not developed. Firstly, the lack of connecting facilities, secondly, the lack of technology development from the government; thirdly, the lack of knowledge on the use of fishing technology, fourthly, the lack of training and skills from the local government. So that, non-formal education efforts are needed to facilitate the knowledge management of fishermen in Kupang district, NTT.

The factors influencing the competence of traditional fishermen are experience, personal characteristics, and intellectual and organizational abilities. The competence of fishermen in Kupang Regency, East Nusa Tenggara, is considered low. This is due to the level of education and experience, and lack of knowledge in mastering fishing equipment and methods. The low knowledge possessed by fishermen, in terms of learning about facilities and infrastructure in the form of fishing equipment such as boats and tools used in work as fishermen. Not only are the facilities and infrastructure still low, but fishermen have also not learned it properly in mastering fishing methods. In addition to knowledge, there are skills that fishermen need to pay attention.

Skills are a factor that fishermen need to have (Asmawati et al., 2020). The skill of fishermen is directly proportional to the catch of the sea. Traditional fishermen in NTT still have many obstacles in using information technology to obtain information to find fish, such as lack of funds, poor network connectivity, and lack of training and seminars on using computer-based applications.

The life skills training program is beneficial for coastal communities because it can improve the community's skills and knowledge in accordance with the natural surroundings. Freeman et al. (2018) found that fishermen's highest level of involvement in empowerment helps encourage the development of new businesses. Fishing communities must attend Life skills training because their participation in the training also determines the success of the empowerment program.

Fishermen information systems play a significant role in improving fishermen's lives (Omar & Chhachhar, 2012). Up-to-date information on weather and market access provided through information systems helps fishermen feel safe and comfortable at sea and expands fish trading (Fisheries & No, 2001). The studies that have been carried out show that the development of information systems has a significant role for fishermen and also increases people's capacity in developing countries (Kiran & Shetti, 2021).

For this reason, this study aims to analyze Fishing basic techniques, Diversity of ecological knowledge, Nautical knowledge, Information management, Organizational knowledge, Process knowledge management, innovation capability, and performance of fishermen. The results of this research are expected to be input for policymakers regarding implementing knowledge sharing for fishermen and can make references and enrich subsequent research.

METHOD

This research approach uses quantitative research with an explanatory or causal design that aims to explain the implementation of the Web-Based SECI Knowledge Management Model (Thyer, 2012). Meanwhile, in the treatment of this study, the SECI model was used (Farnese et al., 2019). The model used is as follows: first, in the process of socialization, there is social interaction between individuals so that there is an interaction between tacit knowledge (Nonaka et al., 2000). Generally, the forms of the socialization

process are discussions, stories, or sharing of experiences. The second is the externalization of the process of changing tacit form into explicit (fundamental) knowledge, generally in writing or pictures. The third is a combination of spreading and developing existing direct knowledge.

Documented knowledge can be disseminated through a meeting document or through an education or training process (Rai, 2011). Fourth, the internalization of changes in explicit knowledge into tacit knowledge is generally carried out through the learning and training process or the experiences experienced by each individual (Natek & Zwilling, 2016). After the SECI model is applied, fishermen who have been given the knowledge are measured again based on the following dimensions:

Table 1. Fisherman knowledge framework

Variable
SECI Knowledge Management (SKM)
Basic fishing technique (BFT)
Diversity of ecological knowledge (DEK)
Innovation ability (IA)
Fisherman's performance (FP)

Data collection was carried out randomly in several coastal areas of East Nusa Tenggara province. The population in this study were fishermen in Kupang Regency, East Nusa Tenggara. The sampling technique used was the aim sample technique. The purpose of taking samples in Kupang Regency was due to several things: the first is the potential of traditional fishermen, the second is the fishermen's economic conditions and the fishermen's cultural life. Where all populations were used as samples of this study, 150 respondents were selected purposively, namely fishermen who had been fishermen for at least ten years. Capture fisheries sustainability status is a combined value of all parameters that are assessed and weighted according to the importance value of each parameter. The eight construct variables were analyzed using path analysis. Statistical techniques use confirmatory factor analysis and structural equation modeling (SEM) using SmartPLS4 to test hypotheses (Sander & Teh, 2014).

RESULTS AND DISCUSSION

The test results obtained based on measurement data processing show the value of the FIT model from the SECI-based knowledge-sharing activity framework as follows:

Table 2. FIT models

	Saturated model	Estimated model
SRMR	0.04	0.03
d_ULS	1.644	2.062
d_G	1.161	1.250
Chi-square	944.501	961.479
NFI	0.725	0.720

Root means square residual (RMR) and standardized root mean square residual (SRMR). RMR and SRMR are the square roots of the difference between the residuals from the sample covariance matrix and the hypothetical covariance model. The SRMR values range from 0 – 1, with a fit model having a value of less than 0.05 (Sarstedt & Cheah, 2019). The value of the X2 table is 149,334 when compared to the calculated X2 value of 944,501, so this form of the model can be said to be FIT because the X2 count > X2 table.

Table 3. Correlation between variables

	R-square	R-square adjusted
BFT_	0.788	0.785
DEK_	0.815	0.812
FP_	0.636	0.634
IA_	0.725	0.723

The criteria for R Square values are 0.67, 0.33, and 0.19 as strong, moderate, and weak (Ghozali & Latan, 2015). Meanwhile, Adjusted R Square is the R Square value that has been corrected based on the standard error value. Based on these data, the value of Adjusted R Square provides a more substantial picture than R Square in assessing the ability of an exogenous construct to explain an endogenous construct.

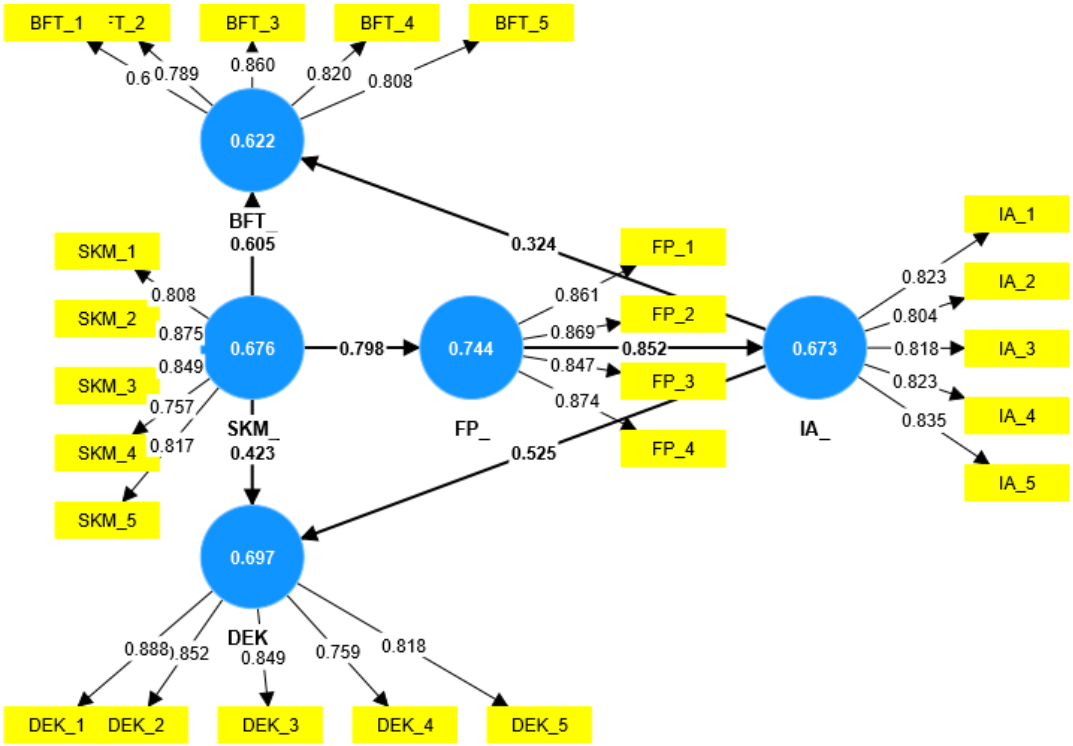

Figure 1. SEM PLS-Model

The value obtained based on the results of statistical calculations means that the process of transferring knowledge influences fishermen's abilities. The results of the direct effects inner model test in the picture above can be concluded as follows:

Table 4. Path coefficients

	Path coefficients
FP_ -> IA_	0.852
IA_ -> BFT_	0.324
IA_ -> DEK_	0.525
SKM_ -> BFT_	0.605
SKM_ -> DEK_	0.423
SKM_ -> FP_	0.798

Diversity of ecological knowledge affects nautical knowledge, Diversity of ecological knowledge affects Information management, Fishing basic techniques involve organizational learning. Additionally, the basic techniques used in fishing also involve organizational learning.

This highlights the interrelated nature of knowledge and skills in fishing, with diversity in one area affecting others, and the importance of continuous learning and adaptation in the industry. By recognizing the relationships between different types of knowledge, the fishing industry can work towards improving overall efficiency and sustainability (Oh & Ditton, 2006; Thiel et al., 2014).

Knowledge is the application of information that is directly used to make decisions in action (Abubakar et al., 2019). Knowledge, which consists of data and information, is then organized and processed to convey understanding, experience, learning and skills that can be applied to problems according to their needs (Mohajan, 2016). It can be concluded that knowledge consisting of information and data is used to make decisions. Knowledge Management is an organizational exercise in overseeing knowledge as a resource, delivering the effort required in the proper knowledge to the right people in the shortest time so that they can connect, share knowledge and apply it in their daily work to improve performance organization (Andrej et al., 2022).

Knowledge management considers the efficient coordination of individual organizations, innovations, processes, and organizational structures to incorporate rewards through reuse and development (Acharya et al., 2022). Knowledge Management is identifying, selecting, and managing usually unstructured organizations. Knowledge Management can encourage learning within organizations, leading to further knowledge creation.

Empowerment, the lives of family members who take part in life skills education have low skills. However, after the existence of the life skills training program, the community changed its behavior in utilizing free time to improve the family's economy by using skills obtained from life skills education.

Empowerment is a real solution to make fundamental changes and catalyze development in various sectors, especially in empowering coastal communities in the fisheries sector (Khrunyk et al., 2020). Fishing can be utilized in their spare time and is a means for this community to improve the family economy as well.

Community empowerment based on life skills aims to improve the skills and knowledge of fishing communities in processing the fish they catch. According to(Stacey et al., 2021), small-scale fishing requires new job skills. On the other hand, Nwagbara et al. (2012) argue that empowerment is an action to produce change toward improvement. Özaralli (2003) say that the effect of empowerment is more effective on group independence. According to, (Lammers et al., 2020; March & Failler, 2022; Simmance et al., 2022) the fisherman empowerment approach is a solution to alleviating poverty. Therefore, fishing community empowerment programs are urgently needed, primarily through life skills programs, so that fishermen have new skills that can be used to create fishing businesses.

It can be concluded that knowledge management can be a tool for managing organizational knowledge as a resource to inject value through reuse and development. Knowledge management helps in the smooth exchange of knowledge, reducing corporate memory loss due to employee departure or retirement. It also enables the identification of valuable knowledge assets and the development of a common understanding of what is important to know and why. By building a set of methods for knowledge sharing, organizations can mitigate the negative effects of losing valuable knowledge and maintain their mental capital (Walter, 2009). These reasons highlight the importance of knowledge management in promoting efficiency, preserving organizational memory, and improving decision-making.

The factors in measuring the SECI Web-based Knowledge Management Model are the level of sustainability that must be handled effectively for successful implementation of knowledge management. These factors identify and prioritize eight critical success factors for knowledge management in fishermen. These factors are fishing basic techniques, diversity of ecological knowledge, nautical knowledge, information management, and organizational knowledge, which affect process knowledge management, innovation capability, and the performance of fishermen. Considering the results of data analysis, it explains that process knowledge management, innovation capability, and the implementation of fishermen.

The strong relationship between empowerment and engagement, demonstrating that tangible and intangible resources, such as knowledge and understanding, support more than just effective decision-making and participation of low-power stakeholders for co-management. Empowerment and engagement have a strong connection, showing that resources like knowledge and understanding not only support effective decision-making and participation by low-power stakeholders for co-management, but also strengthen the ability of MPAs (Marine Protected Areas) to spread values and achieve greater success in shared sustainability (Cabral et al., 2020; Sevwandi Dharmadasa et al., 2021).

The case studies underscore that empowerment is a prerequisite for engagement to be fulfilled. Figure 1 shows that increasing engagement levels are actually linked to key empowerment initiatives and that, progressively, empowering actions require more complex issues, from providing financial resources to a business mindset and skills development (Bhatnagar, 2012; bin Saeed et al., 2019). The figure shows that the highest level of fisherman involvement has not yet been achieved but suggests that current empowerment actions towards new business development may be a prerequisite for achieving higher engagement and for co-management to be fully realized (Bibi & Afsar, 2018). The statement is suggesting that despite attempts to empower fisherman, their involvement in new business development has not yet been fully realized (Bakker et al., 2019; Berrios et al., 2017). To reach full engagement and co-management, it may be necessary to first implement empowerment actions specifically targeted towards new business development (Hüsken & Heck, 2012; Plotnek et al., 2016). This would lay the foundation for greater involvement and a more collaborative approach to decision-making and management in the industry.

This reinforces the notion that homogeneous levels of power and knowledge among stakeholders can contribute, at the same time, to mutual survival and development. The result of these findings is a stakeholder management model (reported in Figure 1) developed by the authors to emphasize how the involvement of weak and vulnerable stakeholders is mainly based on empowerment. The model illustrates the four main areas of empowerment that emerge from the case studies and reveals that empowerment must be done step by step, from guaranteeing a basic condition of trust and support through financial resources to improving relationships among all stakeholders. This is in accordance with the findings of Hu et al. (2022) the model emphasizes the need for a step-by-step approach, starting with building trust and providing support, followed by financial resources, and finally improving relationships between all stakeholders. The model shows that empowering stakeholders is crucial in achieving a balanced and collaborative relationship between stakeholders, which can ultimately lead to mutual success (Larkin, 1996; Nichols, 2008).

The basic skills of fishermen are considered to support for the management and process of fishing for fishermen to achieve activities related to knowledge management. The innovation capability and performance of fishermen are essential determinants of fisherman success and assist in successfully implementing knowledge management. Because SECI-based knowledge management is complex, innovation, performance, and management support are needed to achieve the performance of traditional fishermen groups in the Kupang district.

CONCLUSION

Fishermen groups have access to a wide range of technologies that assist anglers in catching and managing fish. Institutions and stakeholders need to pay attention to both innovations that have been adopted and those that will come because of their potential to affect the sustainability of fisheries. The test revealed a significant increase in the overall score of the trainees, and the specific skills score for the X2 table value was 149,334 when compared to the calculated X2 value of 944,501, so the form of this model can be said to be FIT because X2 count > X2 table. Furthermore, the value of Adjusted R Square gives a stronger picture than R Square in assessing the ability of an exogenous construct to explain endogenous constructs, namely BFT_0.788, DEK_0.815,, FP_0.636 and IA_0.725. Furthermore, the path coefficients in this study are FP_ -> IA_0.852, IA_ -> BFT_0.324, IA_ -> DEK_0.525, SKM_ -> BFT_ 0.605, SKM_ -> DEK_0.423 and SKM_-> FP_0.798. From this test, only BFT and DEK have a value of less than 0.5. In general, this research successfully implemented knowledge management and training with an adult education approach well-known in fishing communities. By keeping an eye on these technological advancements, institutions and stakeholders can work towards promoting sustainable practices and preserving the industry for future generations.

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