

Implementation of Android Application as Knowledge Management for Agriculture Farmers

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Abstract The research has fresh ideas through activities to explore farmer knowledge management to find out the application of Indo-Good Agricultural Practices as a reflection of the behavior of producing fruits to obtain Prima Certification, and is developed into a knowledge management system with an Android-based application. The purpose of the study was to analyze the level of knowledge management of farmers in implementing Indo-Good Agricultural Practices to support the sustainability of Prima certified fruit production in East Java. Purposive sampling was used to select up to 15 fruit farmers for a total of 45 samples. With true or false assertions, the Guttman Scale measured knowledge creation, sharing, and implementation. Then, each dimension's proportion of knowledge was calculated. Mango Farmers in Pasuruan Regency have good knowledge of knowledge creating, knowledge sharing, and knowledge implementation. Different results are seen among Kediri Regency pineapple growers, who had the lowest level of knowledge sharing understanding since Prima certified producers find it difficult to understand good agriculture practise criteria. The highest level of knowledge formed by starfruit farmers is the Knowledge Sharing dimension, it can be concluded that there is a strong social relationship when a farmer is aware of Indo-Good Agricultural and willing to share knowledge or mutual welfare and reduce harmful mistakes.

Keywords Knowledge Management, Farming Methods, Good Agricultural Practices, Android Apps

1. Introduction

The potential of tropical natural resources and existence of farmers provides an opportunity for Indonesia to develop a tropical fruit industry. Altendorf [1] argues that Indonesia is the largest producer of other tropical fruits in the Southeast Asian region. According to the Directorate General of National Export Development, Indonesia produces around 3% of the world's total production of the primary fruit, placing it in fifth place behind China (21%), India (13.6%), Brazil (6%), and the United States (4%). Based on Horticultural Statistics data from 2016 to 2020, there are several types of fruits that can be produced in large quantities, namely bananas, mango, pineapple, tangerine, and snakefruit. Since 2016 totaled 378,562,048 tons and 2020 totaled 569,315,968 tons, pineapple contributes the largest output value, appears steady, and likely to rise. Bananas come in second place, their output climbed from 104,668,524 tons in 2016 to 105,798,840 tons and 109,422,938 tons in 2019 and 2020, respectively. In addition, snakefruit which contributed 51,327,640 tons of fruit in 2018 and an additional 54,099,594 tons in 2019, is the second-largest fruit producer. Mango production accounts for the majority of domestic fruit output, with an average annual volume of 25,773,624 tons. Tangerine are the fourth-most produced fruit, however, according to data from 2019, they were able to produce 26,521,339 tons [2].

Obstacles and issues with a background of environmental and food security concerns make it difficult to work toward the sustainability of fruit production in the context of quality, quantity, and continuity. Naturally, not

all fruits are always available, as was previously stated. Despite the potential of the world's fruit-producing nations, they all seem to be facing the same difficulties because of the demands brought on by outbreaks of foodborne illness, tainted food, and pest attacks [3], [4]. The relevance of food safety and quality measures in the international food commerce has come to the attention of consumers due to concerns about human health and the environment [5]–[8]. Good agricultural practices is one of the standards for food quality assurance that is frequently used to address these issues [9]–[11]. In addition, the phrase "Indo-Good Agricultural Practices" was proposed as a standard for Good Agriculture Practices used in Indonesia. This is a reference to the rules set forth in the Minister of Agriculture's Regulation No. 48/Permentan/OT.140/10/2009 on Good Fruit and Vegetable Cultivation [12].

Farmers have the chance to get agricultural product certificates known as Prima Certification if they manage tropical fruit farming according to this good agriculture practice. Prima certification is the process of issuing product cultivation system certificates that are created after passing through inspection, testing, and supervision and satisfying all standards to get product labels under the titles Prima Satu (P-1), Prima Dua (P-2), and Prima Tiga (P-3). When a product satisfies the requirements for safe consumption, high quality, and environmentally friendly production processes, The Central Food Safety Competent authority will grant it Prima 1 certification. The Regional Food Safety Competent Authority issues the Prima 2 Certificate under the condition that the product meets the requirements for good quality and safe consumption, while the Regional Food Safety Competent Authority issues the Prima 3 Certificate if the product meets the requirements for safe consumption.

Ironically, it has been discovered that not all actors in the fruit farming industry have registered and certified their products, or perhaps not recertified. There are just 192 farmers nationwide that want to register for the Prima Certificate, according to statistics from the Central Food Safety Competent Authority. In addition, the Regional Food Safety Competency Authority of East Java Province reported that the data of fruit farmer groups that registered for the Prima Certificate indicated that 2015 was the year of expiry for the greatest number of prime certificate applicants, specifically 24 fruit farmer groups in East Java as production centers of fruit. In the subsequent four years, specifically in 2019, 9 group units had their earned prime certificates expire. In the meantime, it will be known that 6 group units' certificates will also expire in 2023. Numerous empirical research support the claim that farmers' behavioral reluctance to implement and comply with good agriculture practices is the reason why they don't apply for certification of their agricultural products [6], [13]–[15]. According to Kusuma[13], knowledge is a crucial component of implementing good agricultural practices, but most farmers either lack the knowledge or do not want

to use it in managing their farms.

Knowledge is important because it serves as the basic capital that drives the organization and makes it competitive. Knowledge is also regarded as an asset for the organization, allowing each member to have intellectual capital. According to Gurteen [16], even if you have the most knowledgeable, skilled people on the planet and provide them with perfect knowledge, they may still fail to do anything useful with it. According to Davenport and Prusak [17], knowledge is a combination of experiences, values, contextual information, expert viewpoints, and fundamental intuitions that provide an environment and framework for evaluating and integrating new experiences with information. Explicit and tacit knowledge are the two categories into which knowledge is classified. Takeuchi [18] defines a tacit knowledge as knowledge that exists in a person's mind, is extremely individualized, and is challenging to formulate. As a result, it is challenging to explain or impart to others. This form of knowledge encompasses emotions, intuition, body language, bodily experience, and useful instructions. b) Explicit knowledge is knowledge that is articulated in words and numbers, making it simple to share and communicate. It can take the shape of facts, formulas, or methods that have been codified and are simple to replicate.

Ma'Arif et al. [19]–[21] stated that in order to get the maximum benefit from the knowledge possessed and to know the knowledge that must be possessed, companies should manage knowledge through knowledge management. Another perspective given Alavi [22] states that if knowledge is seen as an object, or equated with access to information, then knowledge management must focus on building and managing knowledge stocks. If knowledge is a process, then the implied focus of knowledge management is on the flow of knowledge and the process of creating, sharing, and distributing knowledge [23]. These activities are carried out by a combination of technology, organizational structure and cognitive based strategies to acquire knowledge and create new knowledge, by enhancing cognitive systems (organizational, human, technological, or a combination of human and computer systems) in storing and utilizing knowledge, to learn, solve problems and make decisions. Tiwana [24], suggests there is a big question, namely what is the main portion of the knowledge management system and where does knowledge enter the system, and the answer is the rapid collection of knowledge sources in the knowledge management system portion, meaning that knowledge sources can be divided according to the portion to enter into knowledge management system both explicitly and tacitly.

Knowledge management and business performance have been connected in a number of knowledge management reviews articles [25]–[30]. Agriculture has started to use the idea of knowledge management, but it is still in its early stages. According to [31] findings, efficient agricultural knowledge management activities which are

carried out through producing, acquiring, sharing, and utilising knowledge are critical to increasing the adoption of agricultural innovations among Tanzanian rice farmers. [32] highlighted that tacit knowledge was acquired repeatedly in cycles as a "outside" process from one person to the recipient and as a "outsider" process throughout the process of sharing knowledge of the pomelo citrus production system in eastern Thailand, getting knowledge "in-out" of someone, typically on the walk home, at a neighborhood temple, or in a farmer group meeting. When taking into account knowledge, skills, and experiences gained through learning in persons, Intasiri[33] reveals the knowledge transfer strategy is based on the idea of learning by doing, which adds to the professionalism of the traits of cattle producers. What is the level of knowledge management of certified prime farmers in using the Indo-Good Agriculture Practice principle is one of the unanswered research questions that will be formed as a result of the necessary investigation.

Exploring the knowledge management of fruit producers to learn about the use of Good Agriculture Practice as a reflection of the behavior of producing fruits to get Prima Certification is the fresh idea. Furthermore, through the concept of knowledge management developed into an android-based application-based knowledge management system. The application "Farmers Want to Know Good & Right Planting" with the name PINTAR, and also known as "Petani Ingin Tanam Baik dan Benar" in Indonesian, was built for the Android-based platform, namely Android 4.4 (Android Kitkat). The purpose of the study was to analyze the level of knowledge management of farmers in implementing Indo-Good Agricultural Practices to support the sustainability of Prima certified fruit production in East Java.

2. Research Methods

Location

A sample area focused on Pasuruan Regency, Kediri Regency, and Blitar City in East Java Province served as the basis for the selection of the locations. The area sampling technique was selected for a specific reason, namely an area that shows the location of farmer group, which have registered Prima 3 Certification as a key subject and were sourced from the inventory of the Regional Food Safety Competent Authority (OKKPD) of Province of East Java. The research time has been carried out for five months starting in August and ending in December 2021.

Sampling

The goal of the study was to determine the level of knowledge of farmers. Using the Knowledge Management System's usability approach, a purposive sample of up to

15 people per type of fruit was selected, totaling 45 people. The usability of an application should be tested with at least 15 respondents from each user category [34]. Farmers' samples were collected from a population of Prima certified fruit farmers in East Java who were chosen by taking into account the following factors: 1. Farmers with productive age, specifically between 30-45 years; 2. Farmers who have mastered the principles of Indo-Good Agricultural Practices or who have at least taken part in technical assistance from the Department of Agriculture regarding Indo-Good Agricultural Practices; 3. Farmers who own smartphones and are accustomed to using Android applications.

Data Analysis

The assessment of knowledge management systems embraces the dimensions of knowledge management, namely a. Knowledge Creation, which is a process of synthesis through organizations that engage through dynamic interactions between people, organizations, and the environment [25]. According to [35], knowledge sharing is the act of exchanging knowledge among people in order to combine different sources of knowledge and transform them into routines or structured new knowledge. Knowledge implementation, meanwhile, emphasizes the fundamental requirements for analyzing change, carrying out implementation, and monitoring implementation [36]. A hierarchy of solid answers, such as true or false, is used to determine the scale in the study using the Guttman Scale technique. Louiss Guttman created a cumulative scale to persuade researchers that the level of farmer knowledge management in implementing Indo-Good Agricultural Practices is uniform based on the evaluation of its aspects. [37] states that the following formula is used to calculate the proportion of respondents' responses, is:

$$\text{Percentage} = \frac{\text{correct number of values}}{\text{number of questions}} \times 100\%$$

[38] divided a person's knowledge into three categories based on a percentage value, and they are as follows.

- If the value is greater than 76 to 100 percent, the knowledge level is considered to be good.
- If the value is between 60 and 75 percent, the category's knowledge level is considered to be sufficient.
- If the value is lower than or equal 60%, the knowledge level is considered to be less.

3. Result and Discussion

1) Description of the Application

Managing knowledge entails making use of existing knowledge, both from each individual and from the results of a group discussion, for the needs of the knowledge process for fruit farmers. The knowledge management

system is used to model knowledge management. Because it provides unlimited knowledge management to its users, an effective and efficient model can be used to improve the Knowledge Management System. This is a basic explanation of why Prima-certified fruit growers require a Knowledge Management System. The knowledge management system contains knowledge that will be needed by farmers, where the benefit of making this Knowledge Management System is as a means of providing knowledge sources with a good structure, which will make it easier for farmers to obtain knowledge more quickly so as to minimize time. Increased knowledge assets can be utilized in obtaining knowledge sources and can be used as a means for a culture of creating, sharing and implementing Indo-Good Agricultural Practices by building android-based applications. [39] stated adopting and using smart phones in farm management as the future of computing in modern society, will give small size farmers to have a weapon to go with their management difficulties for easy, fast and extraction of up-to-date knowledge which can increase their production.

The Android 4.4 operating system was used to create the "Farmers Want to Know Good & Right Planting" application. The App Inventor, namely Kodular. An open source online tool called Kodular makes it simple and

quick to create Android applications. Kodular fundamentally utilizes Java, but it's packaged with a drag-and-drop mechanism so you can create puzzle blocks instead of lines of code to make android applications more engaging. Using Kodular as a User Interface Design or making all application features visible in application project. Figure 1 shows that using the creator code helps to create menu components as well as the right side view, namely Header Menu, Menu Body, Login Page, Logo, Email Menu and Password through block puzzle arrangement (clearer with yellow lines).

When an application can simply display data rather than being completely functional or usable it is deemed incomplete. The PHP programming language is used to manage all user activities, which are transmitted and saved in a database. The mechanism utilized to accomplish this utilizes the idea of an API (Application Programming Interface). An API established with the use of the CodeIgniter Framework and the PHP programming language to speed up API creation. The Codeigniter framework is a framework with various features to assist programmers in streamlining their code. The framework speeds up the production of code lines while simultaneously securing the files that contain the created code.

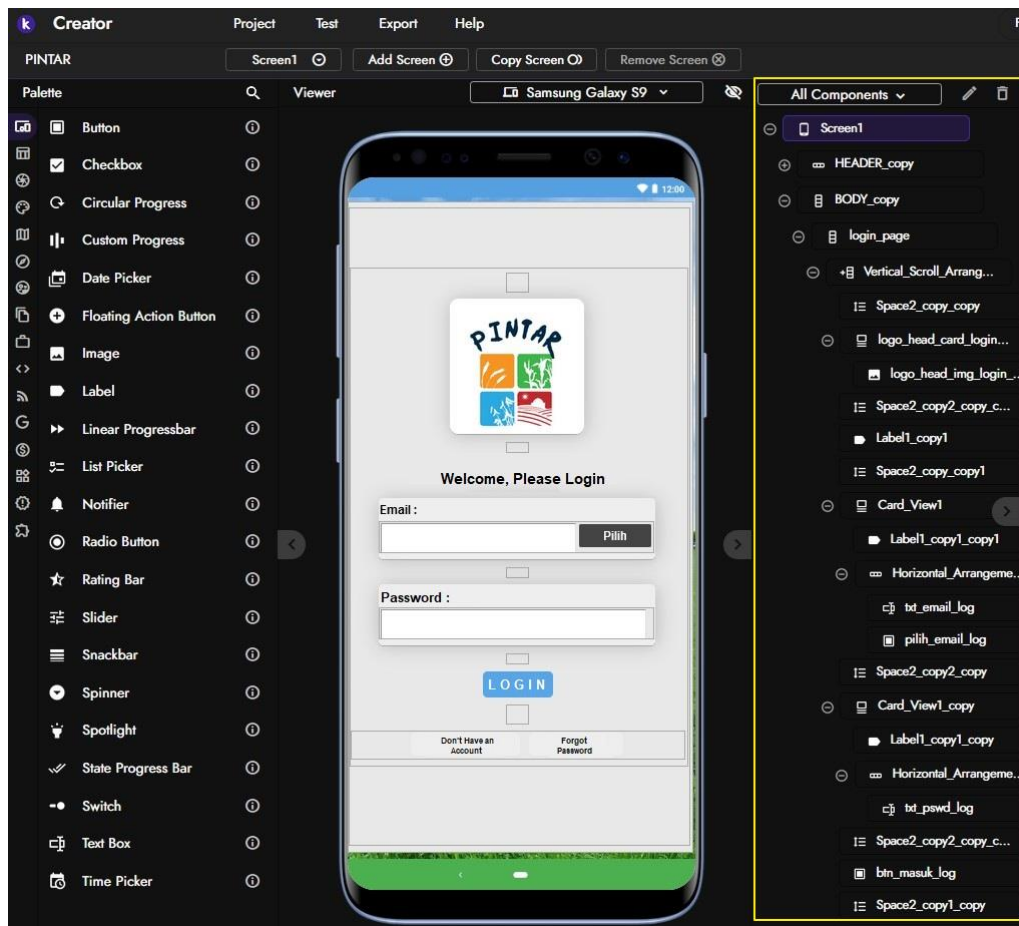


Figure 1. Kodular Creator's Applications Display

The application is intended for two stakeholders: admin and user. The administrator has the authority to add, remove, modify the levels or statement questions, as well as access the complete history of all quiz takers, including the final score and the outcomes of participant answers. The user is authorized to view the quiz page, respond to the quiz, and quickly view the quiz results and the answer key (Figure 2). A MySQL database is used to store all user activities, including login, registration, level data, question data, answer keys, and history of participant quiz outcomes shown in Figure 2. An arrangement of columns and tables that house data for letters, numbers, and symbols is known as a database. Five tables with interrelated relationships and distinct functions of application. Account table

containing information from all admin users' or users' registration activity. A level table that lists each level that each participant will encounter. Questions and answers for a quiz are listed in a quiz table. Each participant's response is listed in the trans quiz table. The last action of each quiz taker is recorded in the log quiz database, which also keeps track of the number of true and false questions answered and the results of those questions' scores. Thus using the principle of create, read, update, and delete (CRUD) to manage data elements into a database. Based on Figure 3. as an example of the display of user results after using application, given that the level of knowledge possessed is in the 'Good' category, it appears that after calculating the 'true' statement is 77% and 'false' is 23%.

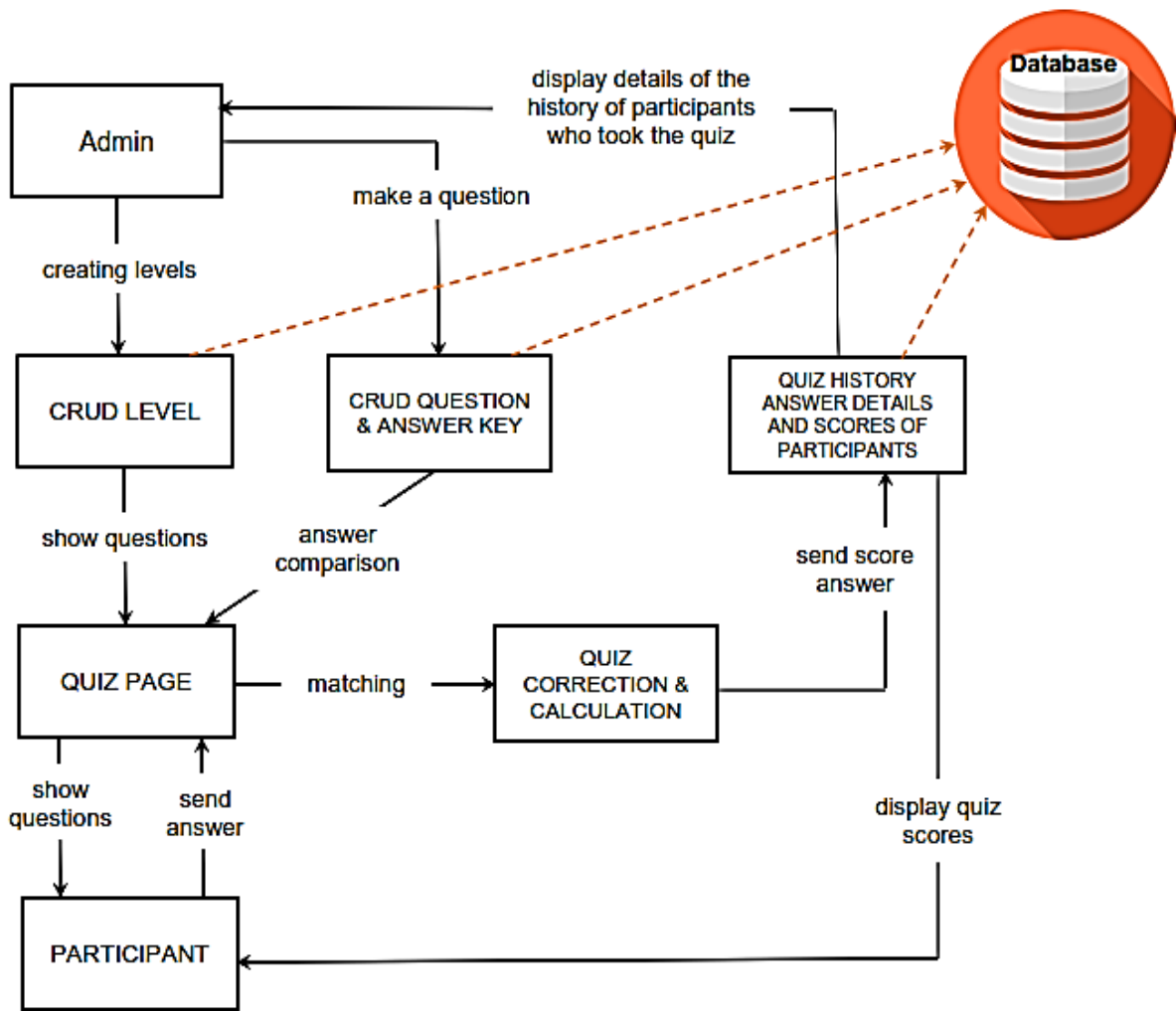


Figure 2. System Infrastructure Design Works.

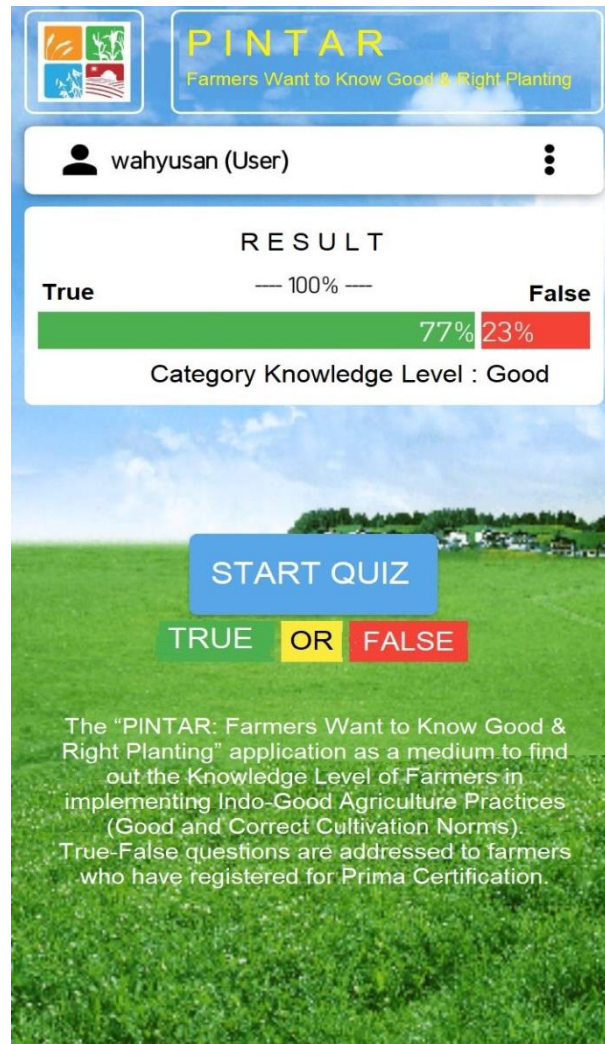


Figure 3. User Result Display

2) Farmer Knowledge Management Level in Indo-Good Agricultural Practices Implementation

The ability to produce fruit that is safe for ingestion is a requirement for tropical fruit growers. Fresh fruit products should be entirely free of pesticides, according to the current evolution of fruit consumption patterns, to avoid having a detrimental effect on bodily health. Thus, a certification in the form of a Prima Certificate 3 is required as proof that the fruit is safe for ingestion. Regional Food Safety Competence Authority has granted the agricultural products in circulation the Prima 3 Certificate, a label indicating that they have met the requirements for safe food to eat. A thorough examination based on the Guidelines for Good Fruit Cultivation, also known as Indo-Good Agriculture Practices, must be completed before getting a Prima Certificate.

In spite of the fact that the Indo-Good Agricultural

Practices principles are a technical need to administer Prima Certification, farmers often find it difficult to implement and adhere with good agriculture practise, which led to a propensity for farmers to be reluctant to seek for certification and re-certification. Investigating the degree to which farmers are aware of this phenomenon is therefore urgent research. Furthermore, 11 Indo-Good Agricultural Practices parameters including site/land selection, fertilization, plant protection, irrigation, harvesting, harvest and post-harvest handling, agricultural tools and machinery, workers, hygiene and worker health facilities, disposal sites, monitoring, recording, and tracing back, were used to assess the level of knowledge management. Additionally, a set of true or untrue statements is used to gauge farmers' knowledge in relation to the three areas of knowledge creation, sharing, and implementation. Table 1 displays the true-false statements for each of the three knowledge management dimensions.

Table 1. Indicators of True or False Indo-Good Agricultural Practices Implementation

No.	True-False Statements		
	<i>Knowledge Creation</i>	<i>Knowledge Sharing</i>	<i>Knowledge Implementing</i>
1.	Disposing of residual pesticides is known to not pollute agricultural land	Very steep agricultural land (>45% slope) suitable for fruit cultivation	Land where the water is stagnant is immediately made a water channel
2.	Compost, soil, husk charcoal or others help the growth of fruit plant roots	Compost, soil, husk charcoal, and other hazardous and toxic materials contaminate the fruit, making it poisonous and dangerous to farmers' health	Fertilizers and pesticides do not have to be stored separately
3.	Every type of fertilizer sold everywhere has a registration number	Fruit plants in fertile soil do not require fertilization because they can grow on their own	The usage of licensed pesticides makes them effective at eradicating pests and diseases.
4.	Fertilizer, seeds, and fruit harvests can all be stored in the same room	Pesticides must be used in accordance with six specific criteria: a. Exact type; b. Correct quality; c. Correct dosage/concentration; d. On time; e. Right on Target (OPT targets and commodities); f. Exact ways and application tools.	Knowing the type, timing, dose, concentration, and how to use of pesticides is not necessary
5.	Pesticide spraying is done before and during fruit harvesting	Irrigation water channels do not require routine cleaning	Packing can protect the fruit from damage while being transported or shipped
6.	Fruit harvesting is best done in the afternoon	Fruit certification label as a sign that the fruit is safe for the buyer to eat	The harvest container must be in good condition, clean, and free of contamination
7.	The location of the fruit collection from the garden/land does not need to be clean	Farmers should follow post-harvest chemical recommendations	Regular maintenance is not required for agricultural equipment and machinery
8.	Chemicals must be used in appropriate doses to preserve harvested fruit	The fruit harvest is washed under running water	It is unnecessary to provide a location for garbage and agricultural waste disposal
9.	To avoid contamination of fruit products, always wash your hands and do not urinate carelessly in the garden	Fertilization is typically done in accordance with information or directions provided by agricultural extension workers	Farmers must receive training in order to cultivate fruit that is safe to eat
10.	It's important to take note of how to plant fruit to harvest	Pesticides must be kept in their original packaging at all times	Training materials attended by farmer group must be properly recorded and stored.

Table 2. Farmers' Knowledge Level Using the Android Application

Farmer Location	Fruit Type	Farmer Knowledge Level Value (percentage)		
		<i>Knowledge Creation</i>	<i>Knowledge Sharing</i>	<i>Knowledge Implementing</i>
Pasuruan Regency	Mango Clone 21	79%	84%	85%
Kediri Regency	Pineapple	71%	69%	79%
Kota Blitar	Star fruit	70%	91%	79%

Source: Data Analysis (2022).

Based on Table 2, it is clear that farmers' understanding on how to adopt Indo-Good Agricultural Practices is divided into different categories. Each value falls into the categories of knowledge creation (79%), knowledge sharing (84%), and knowledge implementation (85%),

indicating that Mango Farmers in Pasuruan Regency have a "Good" level of expertise on all aspects of knowledge management. The quantity and quality of mango produced by farmers can undoubtedly be used to understand the sustainability of Prima certified mango cultivation. The

understanding of mango farmers in their farming endeavors has a significant impact on this. In an effort to better and enhance farmer behavior to implement Indo-Good Agricultural Practices comprehensively from the 11 components required for Prima Certificate 3, it is necessary to present an overview of the capacity of mango farmers, have a shared interest in ensuring that the mango clonal 21 is able to spread continually in international markets and not only able to be marketed in the local market of Pasuruan Regency and its environs. On the other side, it shows the common interest of the farmers so that the market expansion will give maximum profit in selling their mangoes. Interest makes a person to try and pursue something and in the end obtained a deeper knowledge. [33] states that all new data or information received will be considered from the attention of individuals by thinking and comparing with their own previous experiences, by talking and discussing with family members of farmers or other farmers, taking into account the costs and the ease and convenience of implementation. Occasionally, the farmer will decide to disregard this knowledge, but if the information piques his or her attention, the farmer will be motivated to move further. [40] stated that the key factor affecting knowledge sharing should be taken into account and should not just be the extrinsic but also the intrinsic benefits of social interactions. They are also aware that if they wish to export horticulture goods, such as fruit, to other nations, the first need is that the agricultural product certification document be at least issued by an institution from the exporting country or serve as a trade barrier for the importing country.

Knowledge implementing is the highest dimension of knowledge, meaning that mango farmers are able to implement knowledge on various things, such as a) land with stagnant water on the surface, drainage channels must be made, b) storage of fertilizers and pesticides must be separated based on their respective packaging labels, c) pesticides used are pesticides which has been officially registered, d) the harvest container to be used must be in good condition, clean and not contaminated, until e) the need for recording all activities of cultivation carried out. According to [31], efforts are made to carry out the knowledge process by using agricultural knowledge systems in the form of communication tool ownership, reasonably priced cell phone rates, the level of knowledge infrastructure development, broadcast time of radio and TV agricultural programs, membership in farmer groups, and the provision of agricultural extension services. Comparing clonal mango farmers to pineapple and star fruit farmers, it is known that their knowledge creation dimension, which has a value of 79 percent, is the highest. Mango farming needs the right knowledge, attitudes, and actions if it is to enhance annual production. The Gadung Mango (*Mangifera indica*) and Arumanis (*Mangifera indica* L. var. arum sweet) were crossed to produce Avocado Mango, which has been recognized on a patent as a native fruit of Pasuruan Regency as a result of the

issuance of the Decree of the Minister of Agriculture of the Republic of Indonesia number 121/Kpts/SR.120/D.2.7/12/2016 concerning Provision of Horticultural Crop. The Gadung 21 variety of mango, according to the letter, has complied with the standards for horticultural plant varieties, making a registration mark required and deserving. Many of the farmers provided accurate answers to questions about the Knowledge Creation dimension, including: a) that the disposal of pesticide residue on agricultural land is related to pollution and should be treated as hazardous and toxic waste (B3); and b) that both organic and inorganic fertilizers need to be registered and given permits. distribution, c) Storing fertilizers separately from pesticides, seed stocks, or fruit harvests, and d) Harvesting fruit based on age or at the appropriate time. As a result, the process of knowledge formation needs to be context-specific with regard to time, geography, and interpersonal interactions. Knowledge must be developed in a context where information is given greater meaning through interpretation in order to be created [25].

As opposed to Kediri Regency's pineapple farmers, who are reported to have sequentially 71 percent Knowledge Creation, 69 percent Knowledge Sharing, and 79 percent Knowledge Implementing levels of knowledge, these farmers have a lower sequential knowledge level. It is unclear from the analysis's findings why the Knowledge Sharing dimension has the lowest percentage of all the dimensions. Even the Knowledge Sharing value of pineapple farmers is known to be substantially lower than that of manga and starfruit growers. Observations made on the ground show that individual Prima certified farmers have trouble comprehending good agriculture practices standards. Consequently, when making claims like "Fruit trees in fertile soil do not need to be fertilized because they can grow"; "Water channels for irrigation do not need to be cleaned on a regular basis"; "The fruit harvest is washed with running water"; and "All pesticides must be stored in an airtight container"; it is known that 7 out of 15 respondent farmers answered incorrectly. Individually, this suggests that it will be challenging to sharing knowledge to other farmers in a farmer group due to low understanding. The fundamental method for creating knowledge management systems, which is information sharing so that knowledge management performance can be easily measured, is quite opposed to what is stated in numerous research [35]. Although the association and expected contribution are the most important motivating factors for knowledge sharing, other, more limited research has been able to confirm the study's findings. However, attitudes toward knowledge sharing for the level of IT use of a sample of 467 employees in 75 departments in 4 major Korean companies were not significantly correlated with those attitudes. A optimistic outlook, however, causes a positive purpose to share knowledge, as is to be expected [40].

Knowledge sharing dimension has a rather high degree

of knowledge for the star fruit producers in Blitar Regency, at 91%. However, there is not much of a difference between the knowledge levels for knowledge creation and knowledge implementation, which are reported to be 70 and 79 percent, respectively. Overall, the farmers of star fruit are rated as having "Good" expertise of using Indo-Good Agricultural Practices. All sample farmers are genuinely known to adhere to cultivation regulations in accordance with good agriculture practices, as evidenced by the star fruit farmers' knowledge implementation dimension of 79 percent. The reality is since years 2009 to 2012, 2013 to 2016, and 2017 to 2020, starfruit farmers who are members of the cooperative farmer organization "Margomulyo" have repeatedly been successful in gaining top certification. The covid 19 epidemic, which has affected all of Indonesia since March 2020, is the biggest obstacle keeping it from completing its certification once more as of 2022. All operations have been hampered by this condition, including starfruit farming in Karang Sari Village, Blitar City. Enforcement of community activity restrictions refers to the cessation of technical assistance activities for inspection, testing, and supervision of starfruit plantations as a sample of good agriculture practice at the Blitar City Agriculture Office and the regional food safety competent authority of East Java Province. Community activity restrictions was introduced to slow the pace of growth in the number of Covid-19 or coronavirus positive samples. Because of this, a lot of farmers fail to properly record their farming activities, farmer groups are unable to meet, and some even stop planting fruit in favor of trading in consumer items like rice, vegetables, eggs, and so on. This occurs because there is less demand for star fruit outside of Blitar City than there was the year before, yet there is still a large supply of fruit in traditional marketplaces that eventually sells for low prices.

The analysis's findings also became provide interesting findings (Table 2) show that based on farmers' knowledge levels for the Knowledge Sharing dimension, 91 percent represents the level of knowledge with the highest value when compared to respondents from various regions. This indicates that information developed from a farmer's experience about something beneficial can be shared to benefit other farmers. According to [21], knowledge is a more subjective form of knowing and is frequently founded on experiencing values. There have been story repositories in some form for a very long time, and farmers have discovered ways to communicate knowledge by drawing on prior knowledge and avoiding, or at the very least repeating past mistakes. Several true-false statements have been answered properly, such as a) water used for irrigation must be free from hazardous and toxic waste (B3), b) certification labels on fruit provide information on product guarantees that are safe for consumption, c) farmers need to have knowledge and skills applying chemicals for post-harvest, d) washing the harvested produce needs to use clean water, e) application of

fertilization methods referring to the recommendations of agricultural technical instructions and directives of extension workers, and f) all pesticides must be stored in their original packaging. Sharing knowledge in the case of starfruit farmers can also be interpreted as a strong social bond when a farmer knows about good agriculture practices based cultivation activities and is willing to share it with fellow farmers. This result is consistent with studies [32], which discovered that the tacit knowledge acquired repeatedly may be shared by grapefruit farmer groups in Ban Thaen in a variety of settings, including on the way home at a nearby temple or in a setting are more formal ones, such gatherings of farmers. In rural areas, people are more likely to live close to one another and communicate in a way that is based on trust, creating a social environment that is favourable to problem solving and sharing knowledge.

4. Conclusions

Achieving sustainable fruit production in terms of quality, quantity, and continuity is not easy because of the difficulties associated with environmental problems and food safety issues, as well as the fact that not all fruits are always in season. When a product cultivation system is given a Prime Certificate, it has undergone inspection, testing, and monitoring, as well as met all other standards, including the successful implementation of Indo-Good Agricultural Practices. The study's findings show that mango farmers in Pasuruan Regency have a "Good" level of knowledge when the three dimensions of knowledge management, knowledge creation, knowledge sharing, and knowledge implementing, are calculated. Knowledge implementation is the highest knowledge dimension among the three. This farmer's knowledge cannot be separated from his skills in various things, such as a) land with stagnant water on the surface, drainage channels must be made, b) storage of fertilizers and pesticides must be separated based on their respective packaging labels, c) pesticides used are pesticides that have been officially registered, d) the harvest container to be used must be in good condition, clean, and not contaminated, and e) the need for recording all activities. Different results were found in Kediri Regency's pineapple farmers, who are known to have a knowledge level value for the knowledge sharing dimension that has the lowest percentage. The fact that they frequently operate at will in their fruit growing is a result of their comprehension challenges. Starfruit farmers in Blitar City have knowledge sharing dimension reaches 91 percent, the highest value compared to mango farmers in Pasuruan Regency and pineapple farmers in Kediri Regency. This result confirms that if farmers share knowledge by building on previous experience, it will lead to a positive direction, namely mutual prosperity and reduction of the same and very damaging mistakes, as well as the high risk of perishable fruit products not being

accepted in the market due to consumers not wanting to buy from the impact of health-conscious lifestyle trends, and, most importantly, the risk of death from chemical pesticide residues in farmers' bodies.

The android application has been running smoothly, allowing farmers to use it on their smartphones repeatedly and providing accurate and real-time results, making it easier to make decisions to determine the level of farmer knowledge in implementing Indo-Good Agricultural Practices. Future research can build on previous work by incorporating other dimensions of knowledge management theory, such as retention, transfer, capture, accumulation, utilization, diffusion, and acquisition for agricultural and commodity business actors on various objects. More agricultural topics are hoped to be raised in future research so that they complement the development of science to adopt knowledge management and are not limited to a few prominent fields, but given the agricultural sector's complexity from upstream to downstream, it is divided into sub-sectors of food crops, agriculture, horticulture, plantations, fisheries, and forestry, not to mention supporting institutional systems.

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