

AGRICULTURAL TECHNOLOGY DISSEMINATION IN THE 4.0 INDUSTRIAL REVOLUTION THROUGH USING OF iTANI APPLICATIONS

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ABSTRACT:The 4.0 industrial revolution had a significant impact on the people of Indonesia, one of which was the behavior in seeking information. The demand for information services that is easy, fast, precise and accurate requires the Ministry of Agriculture to innovate in disseminating agricultural technology that has been produced so far. Therefore, one of the efforts taken is to develop applications that are named iTani applications. iTani application is a digital library that provides a variety of agricultural information sourced from publications from each work unit in the Ministry of Agriculture. The purpose of this research is to describe the use of iTani applications in disseminating agricultural technology, as well as analyzing iTani application users. This is important in providing supporting data to formulate the next development step. The method used is a descriptive approach, with secondary data obtained from application statistical data (iTani dashboard) as well as data sourced from google analytic. iTani application as a dissemination media has been utilized by stakeholders in obtaining agricultural information. This is indicated by the increasing number of iTani application users every year. In addition, there are 3,264 titles of ebooks from all ePustaka, which have never been borrowed at all, 419 ebook titles, or around 12.8 percent. iTani application users have almost covered all regions of Indonesia, namely approximately 70 regions in Indonesia, and are accessed in several foreign countries such as the United Kingdom, United State, Germany and Japan. In the era of the industrial revolution 4.0, the iTani application has become one of the appropriate media in disseminating agricultural technology, so it is necessary to formulate a strategic plan for future development. Admin in each work unit is the spearhead in the dissemination of agricultural technology through the iTani application, so its success is greatly influenced by the active role of each admin. The continued use of the iTani application, among others, is influenced by the speed and ease of use of the application and the diversity of information, so that the support of agricultural technology information must always be updated by the admin in each work unit.

KEYWORDS: *agricultural technology, application, dissemination, iTani*

I. INTRODUCTION

In Indonesia, the era of the industrial revolution 4.0 had a major impact on behavior change in society, one of which was the behavior in seeking information. The rapid development of information and communication technology requires the availability of information services that are fast, accurate and easily accessible to all levels of society. This is supported by the results of a survey by APJII (2018) which states that internet users reach 64.8 percent of the total population of Indonesia. The growth of internet users in one year reached 10.12 percent and 93.9 percent was connected to the internet via smartphone devices. However, the shift to industry 4.0 not only requires equipment and material readiness, but it is also important to prepare human resources, both in terms of quantity, mental and intellectual capacity (Azmar, 2018).

Various efforts have been made in the context of disseminating agricultural technology innovation, including the MultiChannel Dissemination Spectrum model approach, which is a breakthrough accelerating and expanding the reach of dissemination of agricultural technology innovation by utilizing various communication channels and related stakeholders optimally through various media simultaneously and coordinated (Balitbangtan, 2011). Specifically, the aim of SDMC is to accelerate, increase, and expand the prevalence of adoption of innovation technology produced by the IAARD, and solicit feedback for future refinement and development references. The expected general output is the expansion of the reach of disseminating information on Balitbangtan technology to users (Balitbangtan 2014).

Therefore, in the context of facing the industrial revolution era 4.0 and responding to the demands of information needs by the community, the Ministry of Agriculture must innovate in disseminating agricultural technology to relevant stakeholders. One of them is by designing an application that can be accessed by anyone, anytime with the right information, quickly and accurately. For more than three years since the launch of the iTani application, there has been no study of the extent of its use by the community, so this study aims to describe the utilization of the iTani application in disseminating agricultural technology, as well as analyzing iTani application users. Of course this is very important in formulating the next development steps.

II. LITERATURE REVIEW

1. Dissemination of Agricultural Technology

The availability of technological innovation that is constantly developing is one of the main keys to empowering farmers. However, the availability of technological innovations alone is not enough, because these technological innovations must be disseminated and adopted by users, especially farmers, in order to have a positive impact on agricultural development. For this reason, integration between the creation (generating system), delivery (delivery system) and technology acceptance systems must be realized in the agricultural innovation system (Syakir, 2016). Still according to Syakir (2016) in the context of increasing the range of innovation dissemination activities, the Agricultural Research and Development Agency in 2011 also launched the Rural Agricultural Development Model Through Innovation (MP3MI). This is another example of a success story of institutional innovation in agricultural technology dissemination by the IAARD. M-P3MI is a mode of dissemination through a concrete pilot in the field. This activity is designed to strengthen agricultural development programs, as a model of dissemination and field research and development laboratory for IAARD.

The integration of agriculture and ICT through the dissemination of agricultural technology media will have a positive impact on agricultural progress, because it can provide information updates for farmers, increase farmers' income with input efficiency and reduce costs (Reddy and Ankaiah, 2005). Dissemination of agricultural research / assessment innovations is an important communication activity in driving the process of dissemination and application of technology in a rural social system. The results of the research / assessment will provide benefits to the farming community if the technology component produced is applied by farmers in managing their farming business. For this reason, information on research / assessment results needs to be disseminated to both intermediate and end-user users, through various extension methods and information media that will support agricultural extension activities in the region and ultimately help farmers improve efficiency in managing farming.

Agricultural information needs in the area are different from one another. Areas with easy access to agricultural information will provide easy access to information. Agricultural information accessed by farmers based on research conducted by Harmoko and Darmansyah (2016), conveyed that there are differences in agricultural information accessed between vegetable and rice farmers. The biggest percentage for vegetable farmers is information about marketing, which is 45.45 percent, while 78.20 percent of rice farmers access rice production or cultivation technology. Andriaty (2012) emphasized that information technology from agricultural research is needed by farmers to support farming activities. The type of information that is most widely available at research sites is production technology (56.25 percent), while more information sources are obtained from agricultural extension activities (90 percent). Along with the development of information technology, 95 percent of farmers stated that mobile phones were available as a means of access to information, followed by meeting media.

2. iTani Application

Various applications with the theme of agriculture emerged, namely: iGrow, Kecipir, TaniHub, Karsa, Eragano, Farmers, and Price Monitor. This application has many functions such as breaking the distribution chain, providing complete agricultural information, providing investors with access to capital, and can conduct direct consultations with experts and other farmers in different places. As a result, the dissemination of information on agricultural innovations can be programmed, timely, and relevant in supporting farmers' decision making processes. With this kind of application, it is expected that in the future the distribution of information will be more evenly distributed among farmers, participating in development activities, attracting the interest of youth, and more who sell their crops online so that they are not exposed to collectors' snares (Prayoga, 2017).

The development of applications in the agricultural world is an innovation that is needed in the current digital era, one of which is research conducted by Yudhana et al (2018) about android applications to facilitate the control and monitoring of a rice field. Sensor devices integrated with the android application will be able to monitor paddy fields, so farmers can see the quality of land and water through the android application (Yudhana et al, 2018). According to Nasution (2017), iTani is a digital library application of the Ministry of Agriculture of the Republic of Indonesia based on social media that is equipped with eReaders to read ebooks. Through the iTani application, readers can join ePustaka members to borrow and read digital books anywhere and anytime. In order for iTani to work properly, the appropriate specifications are required.

iTani application is one of the library innovations that can support the goal of sustainable development, especially in the dissemination of information for farmers. The iTani application epustaka database totals 1545 consisting of research and agricultural data on how to increase food crops that are more productive and sustainable, prices (commodities) in the local market, weather reports, and new farming tools can be easily accessed via mobile device. Through the innovation of iTani application services, it is expected that the distribution of collections such as the results of agricultural research can be used by users to achieve their goals (Nasution, 2017).

III. RESEARCH METHOD

This study was conducted with a descriptive approach, with the aim to describe the performance of agricultural technology information presented on the iTani application and explain the condition of the iTani application as a medium for agricultural technology dissemination. This study uses statistical data available on the iTani application dashboard, as well as statistical data obtained from Google Analytics. The research location was conducted at the Central Library and Agricultural Technology Distribution Office, Ministry of Agriculture during October 2019 to January 2020.

IV. ANALYSIS AND RESULT

Since its launch at the end of 2016, the iTani application has been downloaded by 15,270 downloaders (data as of September 29, 2019), and is equipped with tens of thousands of ebook titles from the Ministry of Work unit library collection contained in ePustaka, which can be accessed free of charge by users who have become members in each ePustaka. The iTani application has unique content that is not possessed by other applications, the content available is a publication published by each work unit within the Ministry of Agriculture. In addition, it is also complemented by collections from other book publishers through the procurement channels of each ePustaka or work unit. Recapitulation of the largest number of ePustaka collections registered on iTani can be presented in table 1. It is known that there are still 8 ePustaka that have not uploaded content at all, 37.5 percent or 30 ePustaka collections under 10 titles. This is due to the limitations of the admin work unit in managing iTani applications, especially in terms of time. In addition, there are also admin assisted in other fields such as finance so that they cannot manage the iTani application to the maximum and not a few administrators in work units who have retired, so there are no more human resources to continue the management of the iTani application.

Table 1 Ten ePustaka with the highest number of members and the number of collections and copies

| No | Name of ePustaka | Number of members ePustaka | Total collection (title) | Total copies |
|----|---|----------------------------|--------------------------|--------------|
| 1 | Pusat Perpustakaan dan Penyebaran Teknologi Pertanian (Pustaka) | 2,811 | 667 | 2275 |
| 2 | BB Pengkajian dan Pengembangan Teknologi Pertanian | 1,441 | 204 | 2003 |
| 3 | Balai Pengkajian Teknologi Pertanian Yogyakarta | 687 | 156 | 1105 |
| 4 | Balitbangtan (Badan Penelitian dan Pengembangan Pertanian) | 680 | 26 | 260 |
| 5 | Politeknik Pembangunan Pertanian Medan | 558 | 400 | 3963 |
| 6 | Sekretariat Jenderal Pertanian | 557 | 168 | 1632 |
| 7 | Balai Pengkajian Teknologi Pertanian Kalimantan Selatan | 517 | 110 | 567 |
| 8 | Balai Pengkajian Teknologi Pertanian Kalimantan Tengah | 485 | 96 | 785 |
| 9 | Balai Penelitian Pertanian Lahan Rawa | 444 | 310 | 2846 |
| 10 | Balai Pengkajian Teknologi Pertanian Riau | 415 | 80 | 927 |

Noted that as many as 3,674 collection titles that can be borrowed by users with a variety of information such as technical guidelines for farming, cultivation and agribusiness strategic commodities, technical guidelines for raising livestock, description of agricultural commodity varieties, post-harvest technology, farmer

institutions, agricultural mechanization, operational standards of action procedures animal quarantine, Ministry of Agriculture strategic policies, land management recommendations, land resource maps, guidelines for implementing supervision and food quality, research results conducted by the Ministry of Agriculture, and site-specific technological innovations that have been reviewed by the IAARD.

The titles of books that have been borrowed from 2016 to January 10, 2020 are 3,264 titles from all ePustaka, while ebooks that have never been borrowed are 419 titles at all. The title of the book that is often borrowed as many as 622 times is "Budidaya Sayuran Secara Vertikultur" written by Dalmadi, Iman Priyadi, Achmad Subaidi, then an ebook with the title "Pedoman Umum Standar Operasional Prosedur (SOP) Budidaya Terung" published by the Directorate of Vegetable Cultivation and Biofarmaka with a total of 370 borrowers. On the other hand, a number of collections that have never been borrowed at all like the title "2 Years Development of Indonesia Agriculture 2015-2016" by Dr. Agung Hendriadi, M. Eng, there is an ebook with the title "Adaptasi Dan Mitigasi Perubahan Iklim Di Lahan Rawa Lebak" by Dedi Nursyamsi, et al. The ten most borrowed ebook titles and ebook titles that have never been borrowed are presented in Table 2 and Table 3.

Table 2 Ten collection titles with the most loans

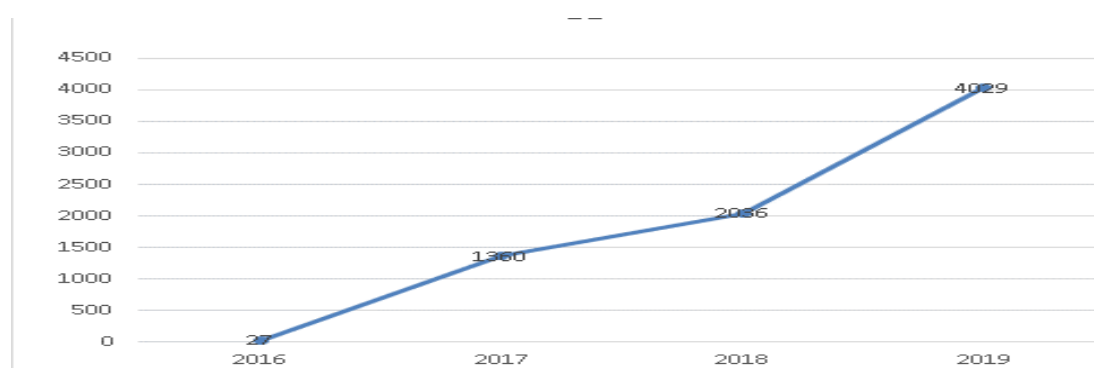
| No. | Title ebook | Writer | Number of borrow (times) |
|-----|--|--|--------------------------|
| 1. | Budidaya Sayuran Secara Vertikultur | Dalmadi, Iman Priyadi, Achmad Subaidi | 622 |
| 2. | Pedoman Umum Standar Operasional Prosedur (SOP) Budidaya Terung | Direktorat Budidaya Tanaman Sayuran dan Biofarmaka | 370 |
| 3. | Outlook Komoditi Bawang Merah | Pusdatin KEMENTAN | 193 |
| 4. | Buletin Analisis Perkembangan Harga Komoditas Pertanian - September 2014 | Pusdatin KEMENTAN | 184 |
| 5. | Respon Petani Dalam Budidaya Bawang Merah Di Kabupaten Batu Bara Provinsi Sumatera Utara | Darma Aditya | 182 |
| 6. | Budidaya Tanaman Sistem Akuaponik Dan Hidroponik | Tim Tagrimart | 175 |
| 7. | Hidroponik Sayuran | Kunto Herwibowo; N.S. Budiana | 173 |
| 8. | Outlook Komoditi Durian | Pusdatin KEMENTAN | 157 |
| 9. | Teknologi Pengomposan Limbah Organik Kota Menggunakan Black Soldier Fly | Yudi Sastro | 157 |
| 10. | Petani Butuh Modal | Hari Hermawan; Sri Hartati | 148 |

Table 3 Ten collection titles that have never been borrowed

| No. | Title ebook | Writer |
|-----|--|---|
| 1. | 2 Years Development of Indonesia Agriculture 2015-2016 | Dr. Agung Hendriadi, M.Eng |
| 2. | 25 Teknologi Inovatif Spesifikasi Lokasi Sumbar | Hardiyanto et al |
| 3. | Adaptasi Dan Mitigasi Perubahan Iklim Di Lahan Rawa Lebak | Dedi Nursyamsi, Suaidi Raihan, Muhammad Noor, Khairil Anwar, Muhammad Alwi, Eni Maftuah, Izhar Khairullah, Isdijanto Ar-Riza, R. Smith Simatupang, Noorginayuwati, Yanti Rina |
| 4. | Adaptasi Kedelai Budidaya Jenuh Air untuk Produktivitas Tinggi di Lahan Pasang-Surut | Prof. Dr. Ir. Munif Ghulamahdi, MS |
| 5. | Adaptasi Perubahan Iklim Di Lahan Rawa Lebak Untuk Tanaman Pangan | Eni Maftu'ah, Wahida Annisa Yusuf, dan Siti Nurzakiah (Balai Peneliti Pertanian Lahan Rawa |
| 6. | Adopsi Petani Pada Komponen Teknologi Pengelolaan Tanaman Terpadu (PTT) Cabai Di Kecamatan Air Putih Kabupaten Batu Bara Provinsi Sumatera Utara | Andrie Juliansyah |

- | | | |
|-----|--|---|
| 7. | Beternak Ayam Kub Kampung Unggul Sasongko Balitbangtan | |
| 8. | Agrotek Jembatan Inovasi Pertanian Suplemen Majalah Sains Indonesia edisi 57 September 2016 | Badan Penelitian dan Pengembangan Pertanian |
| 9. | Aku Suka Sayuran Buah-buahan | Weni Rahayu |
| 10. | Aneka Olahan Gadung: Dalam Rangka Pengkajian Peningkatan Kelompok Wanita Tani (KWT) Dalam Diversifikasi Olahan Gadung di Desa ADU Kecamatan Hu'u Kabupaten Dompu | Ria Rustiana; Nurul Agustini; Sri Hastuti; Achmad Muzni; |

The number of iTani application users based on Figure 1 has increased from year to year. This is in line with the socialization to users both at the central level and at the work unit level. The number of users listed in Figure 1 is intended to be an active user who has at least borrowed a collection once. If accumulated from 2016 to 2019, the number of active users is 7,452.



Picture 1 Number of iTani users

The end of 2016, the beginning of the iTani application was introduced, so that the active users were still limited to 27 people. Furthermore in 2017, Central Library and Dissemination of Agricultural Technology, Ministry of Agriculture, in this case as an application manager at the central level, in accordance with their duties and functions, disseminating iTani applications to related work units, in addition, this year an admin was formed in each work unit, so the number of iTani application contents increased and diverse from the scope of the Ministry of e-Library. With both internal and internal socialization, and supported by a variety of existing content, iTani users have increased by 17, 88 percent from the previous year. Based on Figure 1, it is known that a significant increase occurred in 2019, amounting to 26.74 percent from the previous year. The increase in the number of users is in line with the increasing amount of content, in addition to the socialization carried out by both the central admin and admin at the work unit level.

The iTani application provides users with different sensations and reading experiences, and one of the features available is the status badge, which is the user's reading level. There are three levels of reading on iTani namely Newbie, Bookworm and Socializer. If you want to level up then the user must meet the following requirements:

- a. Newbie to Bookworm
 - Complete profile
 - Provides more than 5 reviews related to the ebook
 - Have read at least five books
- b. Bookworm to Socializer
 - At least follow 10 other accounts
 - At least 10 times shared content
 - Minimum recommend 5 ebooks
 - Must have a minimum of 10 followers

Utilization of the iTani Application

Dissemination of digital library service innovations in digital platforms allows users to be accessed without limitation of distance and time. This is proven that the iTani application is also accessed by users located outside the territory of Indonesia, such as the UK, US, Germany and even Japan. Location data for iTani application users are presented in Table 4.

Table 4 iTani access countries as of January 14, 2020

| Location | Number of user |
|----------------|----------------|
| Indonesia | 5.331 |
| Not set | 125 |
| United Kingdom | 52 |
| United States | 40 |
| Jerman | 7 |
| Jepang | 1 |
| Total | 5.556 |

The data presented in Table 4 is data that came from Google Analytics as of January 14, 2020. Based on these data, there are 125 active users whose access locations have not been identified (in the written table not set) but in this case the position is outside the territory of Indonesia. In addition, there are 52 users located in the United Kingdom, 40 users are in the United States, 7 users are in Germany and in Japan there are 1 user, so the total active users located in foreign countries is 225 users. Although the amount is not too much, but at least the iTani application has begun to be accepted in other countries. The active users in the territory of Indonesia amounted to 5,331 users spread in a number of cities, detailed in the Table 5.

Table 5 Locations of iTani users in Indonesia as of January 14, 2020

| Location | Number of city | Number of user | Percentage (%) |
|--|----------------|----------------|----------------|
| <ul style="list-style-type: none"> ▪ Indonesia Bagian Barat, meliputi: Banda Aceh, Medan, Tebing Tinggi, Padang, Pekanbaru, Batam, Tanjung Pinang, Pangkal Pinang, Bengkulu, Palembang, Muara Enim, Bandar Lampung, Tangerang Selatan, Tangerang, Jakarta, Bogor, Depok, Cirebon, Telukjambe, Tasikmalaya, Cikampek, Cileunyi, Lembang, Cimahi, Balongan, Dramaga, Semarang, Magelang, Pekalongan, Banjarnegara, Surakarta, Kajen, Klaten, Depok, Yogyakarta, Surabaya, Wates, Malang, Kediri, Batu, Blitar, Pasuruan, Banyuwangi, Jember, Tulungagung, Pontianak, Palangkaraya, Bandung, Bekasi, Boyolali, Salatiga, Karawang Barat, Ngawi | 53 | 4.165 | 78.13 |
| <ul style="list-style-type: none"> ▪ Indonesia Bagian Tengah, meliputi: Denpasar, Kuta, Ubud, Mataram, Kupang, Banjarmasin, Banjarbaru, Samarinda, Balikpapan, Bontang, Tenggarong, Manado, Makassar, Palu | 14 | 864 | 16.21 |
| <ul style="list-style-type: none"> ▪ Indonesia Bagian Timur, meliputi: Teluk Ambon, Timika, Sorong | 3 | 58 | 1.09 |
| <ul style="list-style-type: none"> ▪ Not Set | | 244 | 4.57 |
| Total | 70 | 5.331 | 100 |

Based on Table 5, it is known that the iTani application as of January 14, 2020 has been accessed in 70 cities in Indonesia by 5,087 active users, while the remaining 244 users have not yet been able to identify their access location. Most (78.13 percent) are users in Western Indonesia with 53 cities. Furthermore, 14 cities in the Central part of Indonesia with 864 active users, and the remaining 58 users in the Eastern part of Indonesia, namely Ambon Bay, Timika and Sorong. Although the utilization of iTani applications based on location is still relatively low at around 13.62 percent of the total cities / districts (514 cities / districts) in Indonesia, at least the iTani applications have begun to be accessed in Central and Eastern Indonesia. Given the existence of the iTani application can also be said to be still young, which is about 3 years since it was introduced in 2017, so that even now it is still in the process of socialization to all regions in Indonesia.

V. CONCLUSION

iTani application as a dissemination media has been utilized by stakeholders in obtaining agricultural information. Admin in each work unit is the spearhead in the dissemination of agricultural technology through the iTani application, so its success is greatly influenced by the active role and participation of each admin. In the era of the industrial revolution 4.0, the iTani application has become one of the appropriate media in disseminating agricultural technology, so it is necessary to formulate a strategic plan for future development.

Statistical data from year to year can be supporting data to formulate further recommendations. The continued use of the iTani application, among others, is influenced by the speed and ease of use of the application and the diversity of information, so that agricultural technology information support must always be updated by the admin in each work unit.

VI. SUGGESTION

There are still a number of ePustaka that do not have members and are not yet collecting existing collections, so there is a need for intensive supervision and assistance in order to maximize the performance of the admin in the work unit. Regarding technology updates, in the context of maintaining and updating technology on application systems, it is important to increase collaboration with third parties. In addition, improving coordination between iTani managers needs to be done regularly in order to improve the performance of each section and the importance of socialization that must be carried out simultaneously, massively and continuously so that the iTani application is better known to the wider community. In the future, research needs to be done related to the satisfaction of iTani application users so that it can be a benchmark in analyzing the success of an information system.

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