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# USE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN AGRICULTURAL EXTENSION

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**ABSTRACT**

*This research was conducted to describe the use of information and communication technology in agricultural extension. The method used is qualitative research using library research techniques. Qualitative research is a research method that focuses on scientific research activities by describing and understanding the social phenomena that are observed. The library study research technique is a series of scientific activities carried out by collecting a number of information that is relevant to the topic or problem that will be or is being studied with the literature as the main source of reference. Researchers carried out library study data collection techniques regarding the use of information and communication technology in agricultural extension through scientific articles, journals, books, etc. The data analysis technique used in qualitative analysis has four stages, namely data collection, data reduction, data presentation and conclusion drawing and verification. The use of information and communication technology in agricultural extension is important to make it easier for instructors to convey information, and farmers can easily access information about agriculture. Apart from that, the use of ICT can be done in various ways, such as using mass media, online media and the internet. From several existing studies, farmers and agricultural extension workers use the internet and online media such as social media for extension activities. Apart from providing farmers with the impact of increasing knowledge from this information, farmers also get an indirect impact, namely increasing the production of their agricultural products. Farmers can also utilize information and communication technology for the purpose of selling their agricultural products and various other needs.*

***Keywords:*** *Communication, Extension Communication, Information Technology*

**ABSTRAK**

*Penelitian ini dilakukan untuk mendeskripsikan pemanfaatan teknologi informasi dan komunikasi dalam penyuluhan pertanian. Metode yang digunakan adalah penelitian kualitatif dengan menggunakan teknik penelitian*

*kepustakaan. Penelitian kualitatif merupakan metode penelitian yang menitikberatkan pada kegiatan penelitian ilmiah dengan mendeskripsikan dan memahami fenomena sosial yang diamati. Teknik penelitian studi kepustakaan merupakan serangkaian kegiatan ilmiah yang dilakukan dengan cara mengumpulkan sejumlah informasi yang relevan dengan topik atau permasalahan yang akan atau sedang diteliti dengan literatur sebagai sumber rujukan utama. Peneliti melakukan teknik pengumpulan data studi kepustakaan mengenai pemanfaatan teknologi informasi dan komunikasi dalam penyuluhan pertanian melalui artikel ilmiah, jurnal, buku, dll. Teknik analisis data yang digunakan dalam analisis kualitatif mempunyai empat tahap yaitu pengumpulan data, reduksi data, penyajian data dan penarikan kesimpulan dan verifikasi. Pemanfaatan teknologi informasi dan komunikasi dalam penyuluhan pertanian penting dilakukan untuk memudahkan penyuluh dalam menyampaikan informasi, dan petani dapat dengan mudah mengakses informasi tentang pertanian. Selain itu pemanfaatan TIK dapat dilakukan dengan berbagai cara, seperti menggunakan media massa, media online, dan internet. Dari beberapa penelitian yang ada, petani dan penyuluh pertanian memanfaatkan internet dan media online seperti media sosial untuk kegiatan penyuluhan. Selain memberikan dampak peningkatan pengetahuan kepada petani dari informasi tersebut, petani juga mendapatkan dampak tidak langsung yaitu meningkatkan produksi produk pertaniannya. Petani juga dapat memanfaatkan teknologi informasi dan komunikasi untuk keperluan penjualan hasil pertaniannya dan berbagai kebutuhan lainnya.*

**Kata Kunci:** *Komunikasi, Komunikasi Penyuluhan, Teknologi Informasi*

## 1. INTRODUCTION

Extension activities in agricultural development act as a bridge that connects the practices carried out by farmers using farmer knowledge and technology which is always developing according to the farmer's needs. So that farmers can carry out practices that support agricultural businesses, farmers need information about innovation in the agricultural sector. This information can also be obtained by farmers, among others, from PPL (Field Agricultural Extension) through the implementation of agricultural extension activities.

Modern technology has changed human civilization and improved the quality and quantity of manufacturing. Each new technology serves as a stepping stone for the previous technology. The emergence of new technology in the industrial revolution will drastically change the way humans live and work. The increasingly advanced development of information and communication technology has encouraged the agricultural sector, including extension, to have the ability to adapt and utilize internet-based digital technology.

According to data from the Ministry of Agriculture, the ratio of extension workers to villages with high potential for agricultural products in Indonesia is not yet ideal. The total

number of national extension workers is 47,606 people, while villages with potential for agricultural products reach 75 thousand. Ideally, each extension worker supervises one village, while the current ratio is that each extension agent supervises two villages. For this reason, the presence of information and communication technology is a hope to be able to increase agricultural productivity with current technological advances and without sacrificing time and costs.

In the era of globalization and rapid technological development, the agricultural sector plays an important role in meeting a country's food and economic needs. Agricultural extension workers have a strategic role in helping farmers increase their productivity and welfare. However, challenges in agricultural extension such as limited access to information, limited resources, and geographical distance between farmers and extension workers are still obstacles that need to be overcome. In this context, the use of information and communication technology has become a promising solution to overcome these obstacles. Information technology such as computers, the internet, mobile devices, and software applications have changed the way agricultural extension workers interact with farmers and convey information to them.

In this case, agricultural extension is really needed, especially to improve the quality of the main actors and agricultural business actors. Agricultural extension is the process of educating farming communities about how best to organize themselves in order to access market information, technology, money, and other resources, and increase their productivity, income, and welfare. On the other hand, as an educational activity, agricultural extension is an effort to help create a conducive learning environment for farming communities, both main actors and business actors.

Counseling is needed to change people's behavior and replace old bad habits with better behavior that suits their needs and potential and is in line with the demands of changing times. The development of science, information and globalization is one of the many changes that occurred during the twentieth century. This development means that ordinary people and farming communities need to be technologically literate. Many new ways to communicate and share information have emerged as a result of advances in current communication and information technology (knowledge sharing).

The need for information is a means of agricultural production apart from land, capital, labor energy and technology, because the availability of agricultural information can help farmers make decisions according to the situation and conditions of market demand for the products produced by farmers. The availability of information such as agricultural innovation information is important in agricultural development to improve farmers' welfare. So that in order to make extension a success, the material delivered to farmers must be conveyed well. This cannot be separated from agricultural extension media. Where the material to be delivered is published in an extension media to make it easier for farmers to receive the information provided by the extension agent.

The meaning of communication comes from the Latin word "Communis" which means to create togetherness or build togetherness between two or more people. According to Cherry in Stuart, communication also comes from the Latin root word "Communico" which means to divide. Rongers and D. Lawrence Kincaid emphasized that

communication is a process in which two or more people form or exchange information, resulting in deep mutual understanding.

The definition of communication according to other experts is:

a. Shanono and Weaver, they say that "Communication is a form of human interaction that influences each other, intentionally or unintentionally or without limits."
b. Carl I. Hovland, he said that "Communication is a process that allows a person (communicator) by conveying stimuli to change the behavior of other people
c. Judy C Pearson & Paul E Melson, they say that "Communication is a process of understanding and sharing meaning".
d. Anwar Arifin, he said that "Communication is a concept that has multiple meanings. The meaning of communication can be differentiated based on communication as a social process. Where social scientists conduct research using a communication approach that generally focuses on human activities and is related to behavioral messages.
e. Lexicographer, he said that "Communication is an effort aimed at sharing to achieve togetherness". If two people communicate, the same understanding of the messages exchanged is the goal desired by both (Ponco, 2018)

In Burhan Bungin's opinion, communication in a group is a part of people's daily activities. In group communication there are two groups, namely the primary group and the secondary group. Primary groups consist of the people closest to us, such as family. Meanwhile, this secondary group is related to our age development and intellectual abilities, such as: schools, religious institutions, places of work and others (Redi Panuju, 2018).

As for group dynamics, it is a study of various aspects of group behavior, group communication only focuses on the communication process in small groups.

Small group communication is communication that provides verbal responses or the communicator can carry out interpersonal communication with one member of the group, such as discussions, study groups, seminars, etc. The feedback that will be received in this communication is rational, and the members concerned can maintain their individual feelings and existing norms. This group communication can also be carried out by the communicator to the communicant in the form of dialogue or questions and answers.

Extension" comes from the word "uluh", which means "a giver of light in the midst of darkness." Extension, in a general sense, is a field of social science that investigates systems and processes of change, both in individuals and society, so that change can occur in a better way and in accordance with expectations. According to Article 1 Paragraph 2 of Law No.16/2006, extension is a learning process for main actors and business actors to increasing productivity, business efficiency, income and welfare as well as increasing awareness of preserving environmental functions. Communities living in and around forests, including farmers, planters, livestock breeders, fishermen, fish cultivators, fish processors and nuclear families, are the main actors in agricultural, fisheries and forestry

activities. Agricultural extension workers are "organizations" that help people involved in agricultural activities solve problems, obtain information, skills and technology with the aim of improving welfare and farming (Davis et al., 2020).

Information and communication technology has revived the role of services in providing information and assisting the decision-making process. ICT functions in instruction, including as instructional materials and media, as well as facilitating the dissemination of information. In addition, the use of ICT can expand networks and reach and narrow the distance, space and time required to complete instructions. ICT makes extension packaging more attractive, enabling extension workers to convey their innovations in creative ways (Rozi & Indraningsih, 2021).

Technological innovation plays a role in increasing agricultural productivity and farmer welfare. However, technological innovation has no effect on farmers because the innovation is not available locally, farmers still rely on extension workers as facilitators to obtain technological information related to agriculture. This requires agricultural instructors to be able to transfer information and technology to farmers so that they can increase their productivity and income (Anang et al., 2020).

In the ongoing transformation process, agricultural extension workers must immediately adapt, considering at least four important components of technology adoption: Teknoware, Humanware, Organoware, and Infoware.

1. Teknoware or technology, both hardware and software, has been created by the Ministry of Agriculture to support the performance of extension workers in the industrial era 4.0, such as SIMLUHTAN (Extension Management System), E-RDKK, and cyber extension.
2. Humanware or humans, both as people who use technology and as people who receive it. Agricultural instructors must always know about information and communication technology (ICT), understand and master ICT technology, and be able to modernize agriculture. Agricultural instructors must always be aware of developments in information and communication technology and be able to use all systems that have been programmed by the Ministry of the Republic of Indonesia.
3. Organoware or agricultural institutions or organizations. The Ministry of Agriculture plans to build an IT-based agricultural extension center. The strategic objective of the agricultural extension center (BPP) is to provide extension facilities and infrastructure and coordinate, synergize and harmonize agricultural development activities in the agricultural extension work area in the sub-district with related parties. Improve the services provided to farmers and improve the abilities and skills of agricultural instructors in management and sociocultural matters, as well as mastery of skills and understanding of information and communication technology. BPP can be improved by increasing the understanding of extension workers and farmers about corporations, strengthening infrastructure and supporting facilities to speed up IT-based services, and exploiting market opportunities to obtain profitable prices for farmers.

4. Infoware or information, namely information, namely how to package data so that it is easy to use and understand. In this case, BPP must also be able to meet farmers' information needs quickly and in a timely manner through online or digital services, as well as provide sufficient education for farmer institutions so that they can advance the agricultural sector in the era of the industrial revolution 4.0, and help farmer economic institutions design management. ICT-based farming (Iskandar, 2019).

## 2. RESEARCH METHODE

This research was conducted to describe the use of information and communication technology in agricultural extension. The method used is qualitative research using library research techniques. Qualitative research is a research method that focuses on scientific research activities by describing and understanding the social phenomena that are observed. The library study research technique is a series of scientific activities carried out by collecting a number of information that is relevant to the topic or problem that will be or is being studied with the literature as the main source of reference. Researchers carried out library study data collection techniques regarding the use of information and communication technology in agricultural extension through scientific articles, journals, books, etc. The data analysis technique used in qualitative analysis has four stages, namely data collection, data reduction, data presentation and conclusion drawing and verification. (Fahrurrozi et al., 2022)

## 3. RESULT AND ANALYSIS

### Communication Concepts in Roman Jakobson's Semiotic Theory

Based on the results of the literature search, 10 scientific articles were obtained. This scientific article identifies the use of information and communication technology in agricultural extension.

**Table: Analysis of the Use of Information and Communication Technology in Agricultural ExtensionThe**

| No | Writer's Name | Title | Research methods | Instrument |
|---|---|---|---|---|
| 1. | 1) Larasati Sukmadewi Wibowo<br>2) Yanti Saleh<br>3) Liawati Lagarusu | The Influence of Media Utilization on the Success of Rice Agricultural Extension Activities in Anggrek District, North Gorontalo Regency | Quantitative Research | Questionnaire |
| 2. | 1) Eni Kustanti<br>2) Agus Rusmana<br>3) Purwanti Hadisiwi | Use of Information Media by Agricultural Extension Officers | Quantitative Research | Questionnaire |
| 3. | 1) Muhammad Sardin Abdul Karim | Use and Use of Internet-Based Communication Media | Quantitative Research | Participant observation interviews, and secondary data searches |

| | | | | |
|---|---|---|---|---|
| | | The information is from the Field Agricultural Extension Officer in the District West Lombok | | |
| 4. | 1) Yoyon Haryanto<br>2) Oeng Anwarudin | Analysis of the Fulfillment of Information Technology for Self-Help Extension Workers in West Java | Quantitative Research | Questionnaire |
| 5. | 1) Siti Aisyah Rizki Nurrahmah<br>2) Asri Sulistiawati | Various Uses of Information and Communication Technology (ICT) for Information Agriculture during the Pandemic | Quantitative Research | In-depth interviews and literature study. |
| 6. | 1) Anisa Haswar<br>2) Ernita Arif<br>3) Zul Irfan | Utilization of Social Media as a Communication Media for Extension Workers Agriculture in Agam Regency | Quantitative Research | Questionnaires and interview techniques |
| 7. | 1) Eni Kustanti<br>2) Agus Rusmana<br>3) Purwanti Hadisiwi | Increasing the Competency of Agricultural Instructors at the Center Agricultural Technology Assessment (BPTP) with Utilization of Communication Media | Quantitative Research | Online surveys |
| 8. | 1) Eza Safitri<br>2) Ernita Arif<br>3) Asmawi | Use of Social Media in Agricultural Extension in Districts Tiumang, Dharmasraya Regency | Qualitative Research | focus groups, in-depth interviews, participant observation |
| 9. | 1) Suratini<br>2) Pudji Muljono<br>3) Cahyono Tri Wibowo | Utilization of Social Media to Support Agricultural Extension Activities in Minahasa Regency, North Sulawesi Province | Qualitative Research | Observation |
| 10. | 1) Agustinus Moonti<br>2) Irwan Bempah<br>3) Yanti Saleh<br>4) Echan Adam | Information Technology Based Agricultural Extension in Bone Bolango district | Experimental Research | Trials |

1. The research results of Siti Aisyah Rizki Nurrahmah & Sulistiawati (2022) explain that users of Information and Communication Technology (ICT) among farmers who are members of the SPI East Java branch in Tuban, Kediri and Ponorogo on average have more than three ICT tools, namely: radio, television, smartphones, even computers/laptops with the most frequently used media being smartphones. Furthermore, the majority of respondents admitted that the level of ICT use was the respondent's intensity in accessing all agricultural information using ICT tools. The results of this research are important for the government to promote equitable

agricultural education regarding the use of ICT. This is because so far the respondents have rarely or almost never received agricultural counseling from the government.

2. Based on the results of research conducted by Wibowo et al (2023), the use of media influences the success of agricultural extension activities in Anggrek District. The use of this media is considered to be able to support the success of agricultural extension activities, as evidenced by the respondents' answers saying that delivering extension material using this media can increase the amount of rice production, because they thought that previously their rice production during the planting season was quite low. This happens because of their lack of knowledge about proper fertilization, which causes plants to be easily attacked by pests and diseases, which results in the amount of production obtained being quite low. However, as time went by, with the extension materials provided by the extension workers regarding the correct fertilization using this media, the amount of their rice production increased because they became more aware of the correct fertilization methods and were more courageous in applying them. From this explanation, it can be interpreted that utilizing information and communication technology through the media in conveying extension information has proven to be effective and has a positive impact on changing farmer behavior based on the knowledge and information obtained, thereby increasing farmer production results.
3. According to Kustanti et al (2020), the type of information media that according to the instructor's perception provides the most agricultural information related to crop production, plant protection, agricultural post-harvest, animal production, agricultural mechanization and agricultural marketing is internet media. Based on the relationship between the type of media content and the instructor, among the four types of media (print, electronic, internet and social media), according to the instructor's perception, the one that has the greatest benefits according to their needs is internet media. Based on this explanation, it can be seen that media, including print, electronic, internet and social media, have an impact on the delivery of extension information carried out by instructors, the use of the internet has a greater impact compared to other types of media.
4. The results of other research conducted by Abdul Karim (2023) showed that the frequency of internet use by field agricultural instructors in West Lombok Regency was still relatively low, namely two to three times a day. And the duration of using the internet is still relatively low, namely one to two hours a day. This is because agricultural instructors' duties take up more time, so the time used by agricultural instructors to use the internet is relatively low. This research shows that agricultural extension workers have made sufficient use of the internet to support agricultural extension activities even though they are still classified as occasional. This is because some extension workers still carry out their duties face to face with farmers. The results of this research show that there are still extension activities that do not make good use of information and communication technology.
5. Based on the research results of Yoyon Haryanto & Anwarudin (2021), self-help extension workers have fairly good access to information technology. This makes it

easier to search for innovations through modern media and convey them back to farmers. The dominant institutions that provide support in fulfilling advanced farmer technology information are private institutions (companies), especially in terms of fulfilling information on agricultural business facilities. Developments in the world of information and communication technology have had a positive impact on farmers' ease of access to information and the search for innovation in the agricultural sector, apart from that, assistance from private institutions has had an impact on fulfilling extension information for farmers.

6. Research conducted by Haswar et al (2022) explains that the level of use of social media as a communication medium for agricultural instructors in Agam Regency is in the medium duration category, namely 4-6 hours/day, where instructors access social media because it is more intended to communicate with extension workers and other farmers as well as getting entertainment. Meanwhile, the frequency of using social media as a communication medium is in the high category, more than 5 times a week because extension workers have the core task of visiting farmer groups almost every day, so they do not have enough time to access the internet. Factors related to the level of use of social media for agricultural instructors in Agam district are characteristics (age and education), motivation (information sources), and external factors (network existence).
7. Based on the results of research conducted by Moonti, A., Bempah, I., Saleh, Y., & Adam, E. (2022), information technology-based agriculture in Bone Bolango Regency has never been implemented, including during the Covid-19 pandemic at the beginning of the year. 2020. Information technology-based (online) extension carried out in this research on farmers in Bone Bolango Regency, found that the online extension model, whether using material content in text or video form, was generally found to be less effective in forming farmers' knowledge and understanding. However, partially the extension content presented in video form received a better score, almost approaching the effective category, because farmers' responses to video presentations were relatively better than to text displays. Some of the obstacles in information technology-based agricultural extension include a lack of mastery of aspects of information technology, obstacles to owning a smartphone device and the cost of getting the internet, as well as farmers' low cognitive abilities and ability to communicate.
8. According to Kustanti et al (2021) the use of communication media and individual characteristics have a significant direct influence on the competency of agricultural instructors. Environmental support has a significant direct influence on the use of communication media by agricultural instructors and a significant indirect influence on instructor competency. The factor that has the greatest influence on the competency of agricultural instructors is the use of communication media.
9. The research results of Eza Safitri et al (2020) stated that the use of social media in outreach activities was carried out to disseminate counseling, training and socialization materials; search for and provide agricultural information; media for discussion and learning; agricultural product sales/marketing activities; and as a medium for

entertainment. Barriers to the use of social media in agricultural extension activities in Tiumang District, Dharmasraya Regency are generally external obstacles or related to facilities, namely poor networks, especially in target locations that are in remote areas, loss of internet networks when power outages and bad weather, and internet quotas. Smartphone runs out while in the field. The impact of using social media in agricultural extension activities in Tiumang District, Dharmasraya Regency is increasing accuracy, effectiveness and efficiency in conveying information by agricultural extension actors (extension workers and farmers); increasing intensity of learning and pilot activities in discussion forums on social media; and increasing the productivity of farmers' farming businesses which has an impact on increasing income and increasing farmers' welfare.

10. The results of research on the use of social media to support the activities of agricultural instructors by Suratini et al (2021), the use of social media by agricultural instructors is classified in the high category, namely the use of social media Facebook and WhatsApp, the use of social media YouTube and Instagram is classified in the medium category. Almost all agricultural instructors access social media, including Facebook, YouTube, WhatsApp and Instagram, for less than three hours a day (low). Factors that are related to the use of social media are (1) instructor characteristics in the form of education level and ownership of information technology tools; (2) instructors' perceptions of the ease of accessing information via social media; (3) information needs of instructors, namely climate and capital, and (4) motivation of instructors to increase knowledge and insight. The management of agricultural information by agricultural instructors is at the stage it should be, where almost all agricultural instructors disseminate information obtained from social media to farmers, only a few instructors use this information to store it as a personal reference or share it with fellow agricultural instructors.

## 4. CONCLUSION

The use of information and communication technology in agricultural extension is important to make it easier for instructors to convey information, and farmers can easily access information about agriculture. Apart from that, the use of ICT can be done in various ways, such as using mass media, online media and the internet. From several existing studies, farmers and agricultural extension workers use the internet and online media such as social media for extension activities. Apart from providing the impact of increasing knowledge from this information to farmers, farmers also get an indirect impact, namely increasing the production of their agricultural products. Farmers can also utilize information and communication technology for the purpose of selling their agricultural products and various other needs.

The use of information and communication technology is also inseparable from several supporting factors which are no less important, for this reason it is recommended that the government play an active role in supporting the application and use of information and communication technology in the fields of agriculture and extension itself, by providing human resources who are able to make good use of ICT for

agricultural extension needs, facilities such as networks for remote areas, and other support expected to make agricultural extension a success.

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