

The Measurement of Information and Communication Technology Literacy: A Case Study of the Village Officials in Purbalingga

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Abstract—The application of e-government for agencies from the basic level, sub-district, aims to create single-united data to be accessed from sub-district to district and even national. Then, human resources capability in Information and Communication Technology (ICT) literacy is also essential to maximize the application of e-government. However, the implementation of e-government in Purbalingga has not been carried out optimally due to the lack of use of computers and the Internet by village officials. The research aims to measure the level of ICT literacy of village officials and the correlation between computer literacy and Internet literacy. The research is a quantitative study using a survey method with the People Capability Maturity Model (P-CMM) concept. Around 108 village officials in Purbalingga are involved in the research. The results show that ICT literacy is still at level 2. It implies that the village officials use computers and the Internet many times with the same usage pattern to assist their jobs. In addition, the correlation between computer literacy and Internet literacy is positive and strong. It means that if computer literacy increases, Internet literacy will also increase. Therefore, it is concluded that village officials in Purbalingga are accustomed to doing daily activities using computers and the Internet with the same usage pattern.

Index Terms—Literacy Measurement, Information and Communication Technology (ICT), Village Officials

I. INTRODUCTION

THE enhancement of Information and Communication Technology (ICT) has several impacts on society. It eases people to find information and support

their work [1]. In accordance with Presidential Instruction No. 3 of 2003 to provide more effective and efficient public services, service management in government utilizes ICT by implementing e-government [2]. The government expects that all regions can run e-government. However, it is constrained by the ICT support infrastructure that has not reached all regions. The quality of public services in Indonesia seems to be not good. There is a need for changes in the bureaucracy to improve the quality of public services. Hence, implementing e-government can improve the quality of public services to the community [3].

The application of e-government in the village aims to create a single database. Hence, there is a single data unit from the village level to the district or national level. According to Law No. 6/2014, the information system in a village includes hardware and software facilities, networks, and human resources [4]. Information systems that have been used at the village are Village Information System, Financial Information System, Village and Sub-District Development Evaluation System, and Village and Sub-District Profile System.

Moreover, the ability of human resources in terms of ICT literacy becomes an important enabler factor in maximizing the application of e-government [5]. Information and communication technology literacy includes all knowledge and skills in utilizing technology, starting from knowing the device, operating it, processing and communicating information [6]. ICT literacy has six aspects: information literacy, computer literacy, digital literacy, Internet literacy, early literacy, and cultural literacy [7].

ICT literacy is a condition that is fulfilled by ac-

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tors in the government system to provide services to the community [8]. It can be said that ICT literacy becomes one of the prerequisites for the readiness of human or community resources to optimize the use of e-government [9]. At the village government level, village officials are human resources that operate e-government. They need to have ICT literacy to support the implementation of e-government. Their ability will affect the use of e-government to improve governance and create an independent village. Therefore, ICT literacy is essential for village officials [5]. However, all of the workers have not mastered the ICT skills. In fact, there are only two to three people who have ICT skills in every village.

Several government agencies in Purbalingga, such as local or regional government agencies, sub-district, village, and community health centers, have implemented e-government as a form of support for bureaucratic reform. However, the use of ICT at the village level is still constrained due to the lack of budget and human resources for ICT [10]. The educational background of village officials is one of the factors that makes them less proficient in the skills to use computer technology since most of them are vocational and high school graduates [11]. The commitment of the village officials and budget allocation are needed to support the improvement of ICT skills.

One of the problems in dealing with the use of computers and the Internet is that the village officials have not optimally used computer hardware or software to support their work in the village government. They also cannot use computers and the Internet to ease their work. Computers and Internet in the village government are only used by people who can operate them. As a result, there is a delay in processing village administrative data, such as compiling village budget (Anggaran Pendapatan dan Belanja (APB)), making financial reports, processing data for recording data and information about the population, making proposals, recording development plans that are implemented or will be done in the future, and making cover letters for the community. This situation makes the work carried out by the village officials ineffective and inefficient. It also causes other jobs to be neglected and not completed on time.

From the mentioned description, the main problem is how to improve the level of ICT literacy of village officials in Purbalingga. However, the limitation of the problem raised is regarding computer literacy and Internet literacy, which are part of ICT literacy. The research aims to measure the level of ICT literacy of village officials and find the correlation between the levels of computer literacy and Internet literacy in Purbalingga.

TABLE I
LEVELS IN THE PEOPLE CAPABILITY MATURITY MODEL (P-CMM).

Levels	Explanation
0	If an individual does not know or care about the importance of information and technology for everyday life.
1	If an individual has had one or two experiences, that information is an essential component for the achievement of desires and problem solving and involves information technology to look for it.
2	If an individual has repeatedly used technology to help his/her daily activities and had a repetitive pattern in its use.
3	If an individual already has a standard of mastery and understanding of information and technology and consistently uses these standards as a reference for carrying out daily activities.
4	If an individual has been able to significantly increase (it can be stated quantitatively) the performance of his/her daily activities through the use of information and technology.
5	If an individual has considered information and technology as an inseparable part of his/her daily activities and directly or indirectly influenced his/her behavior and culture

II. LITERATURE REVIEW

In general, ICT as part of science and technology is related to retrieval, collection (acquisition), processing, storage, dissemination, and presentation of information [12]. It is basically an amalgamation of the basic concepts of information technology and communication technology. Everything related to the process of using it as a tool, manipulation, and management of information can be said as ICT [13].

ICT literacy combines the words literacy and ICT. Literacy means ability or knowledge, while ICT is a term that covers hardware and software [14]. In short, ICT literacy is a combination of intellectual abilities, fundamental concepts, and a person's contemporary skills in utilizing or using ICT [15]. The concept of ICT literacy includes technical literacy (computer literacy and digital literacy) and information skills (Internet literacy and information literacy) [16]. The model used to measure the level of ICT literacy is the People Capability Maturity Model (P-CMM) with the levels in Table I [17].

Previous researchers state that most students already understand and master the basics of the Internet. However, a few of them do not understand and master it. The students have not mastered and comprehended the medium of the Internet as a whole [18]. In the Lamongan district, the human resources in the village are not ready to implement ICT because of their inabilities to operate it [4]. In addition, the previous research concludes that the young and highly educated people constitute the majority of ICT users [19]. However, in general, the level of community ICT literacy in the Mamminasata area is relatively low. On the contrary, people in South Sulawesi are already at the level of five for the use of computers and cell phones and

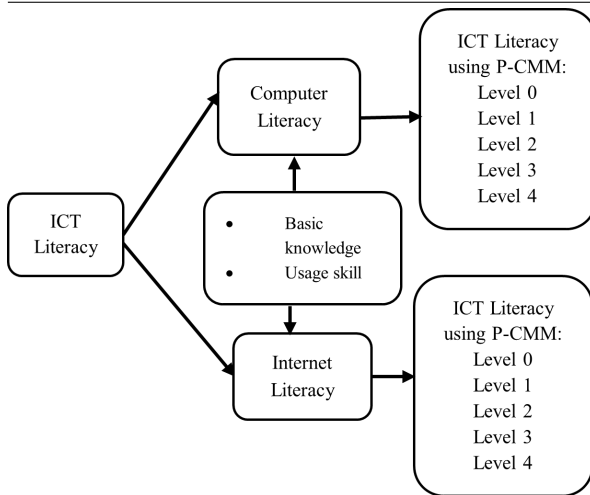


Fig. 1. Research framework.

level of three for the use of the Internet [20]. Then, previous research measures Internet literacy with skill indicators [18], while the other studies analyze the use of computers, cell phones, and the Internet [19]. Another previous research uses the factors of skill, place, and frequency for computer, Internet, and cell phone usage [20]. Hence, the research measures computer and Internet literacy using indicators of basic knowledge, usage skills, and utilization of computers and the Internet.

III. RESEARCH METHOD

The method applied in the research is a survey method through a quantitative approach. The data collection method consists of interviews, documentation, and questionnaires. The population is 108 village officials in Purbalingga. This number is in accordance with the opinion that the suitable number of samples for research is at least 30 people [21].

Respondents are taken as samples using the sampling technique. Simple random sampling is used. It is included in the type of probability sampling as a random sampling regardless of the level in the population [21].

Moreover, the measurement of the ICT literacy of village officials in the Purbalingga area uses the P-CMM. The conceptual research framework used is as shown in Fig. 1. Then, the measurement of computer literacy uses indicators of basic computer knowledge, computer usage skill, and computer utilization. For Internet literacy, the indicators are basic Internet knowledge, Internet usage skill, and Internet utilization.

The data analysis process is carried out after the questionnaire from the respondents has been collected. The data are processed to obtain research results. After

TABLE II
INDEX OF MATURITY SCALE.

Level of P-CMM	Index of Maturity (IM)
0	$0.00 < IM < 0.33$
1	$0.34 < IM < 0.67$
2	$0.68 < IM < 1.00$
3	$1.01 < IM < 1.34$
4	$1.35 < IM < 1.68$
5	$1.69 < IM < 2.00$

(Source: Modified from P-CMM)

knowing the score of each category, the researchers calculate the value of each respondent for each variable. Furthermore, the calculation of the Index of Maturity (IM) uses the following equation [22].

$$\text{Index of Maturity (IM)} = \frac{\text{Number of answer}}{\text{Number of question}} \quad (1)$$

After knowing the IM for each variable, it is followed by scaling, which refers to P-CMM [22]. The maximum IM is 2, and the minimum IM is 0. So, the range obtained is 2. After it is known that there are 6 classes, the length of the interval (I) is range/class ($2/6 = 0.33$). The IM scale for mapping to the maturity model level can be seen in Table II.

IV. RESULTS AND DISCUSSION

The majority of respondents are male, with 88 respondents (81%). The others are female (20 respondents or 19%). Based on age, respondents aged over 50 years are more dominant (59 respondents or 55%). It is followed by respondents aged 40–49 years (39 respondents or 36%), 30–39 years (9 respondents or 8%), and 20–29 years (1 respondent or 1%). In terms of education, most of them have high school education (79 respondents or 73%). The other respondents have junior high school education (5 respondents or 5%), diploma (7 respondents or 6%), undergraduate education (16 respondents or 15%), and postgraduate education (1 respondent or 1%).

A. Computer Literacy

The basic computer literacy level includes knowledge of how to turn off and on the computer, understand input and output devices and hardware and software on computers, manage files and folders, and know-how to install and remove applications.

Figure 2 shows the respondents’ literacy level of basic computer knowledge. It consists of literacy level 0 with 10% (11 respondents), level 1 with 20% (21 respondents), literacy level 2 with 42% (45 respondents), literacy level 3 with 7% (8 respondents), level 4 with 10% (11 respondents), and literacy level 5 with 11% (12 respondents). Thus, the average literacy level

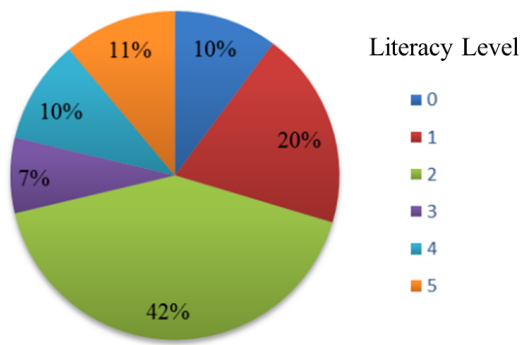


Fig. 2. Literacy level of basic computer knowledge.

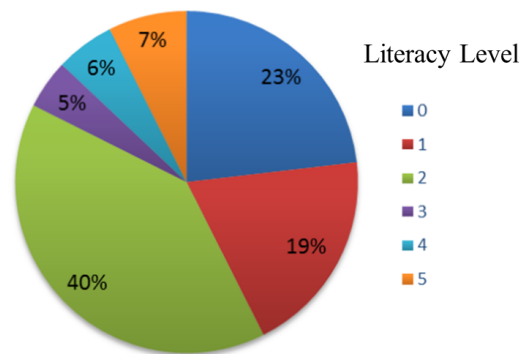


Fig. 4. Literacy level of computer utilization.

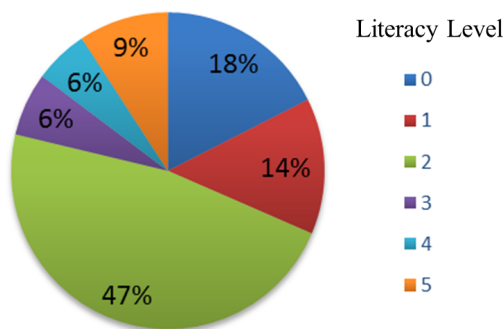


Fig. 3. Literacy level of computer usage skill.

regarding basic computer knowledge is still at level 2. It means that they use their basic knowledge repeatedly to help daily activities with repetitive usage patterns.

From the data processing results regarding basic computer knowledge, each respondent has a more dominant ability than the other abilities. Around 14% of the respondents know how to turn on and turn off computers. Then, 11% of the respondents know about computer hardware, and 12% understand input devices and output tools. Moreover, 9% of the respondents know about computer software, 12% understand file and folder management, and 8% know how to install and uninstall applications.

Next, the literacy level of computer usage skills from village officials consists of knowing the technical knowledge of the operating system, Microsoft Word and Excel, and printing documents. The result is presented in Fig. 3.

Figure 3 shows the literacy level 0 is 18% (19 respondents). Then, the literacy level 1 has 14% (15 respondents). It is followed by literacy level 2 with 47% (51 respondents), literacy level 3 and literacy level 4 with 6% (6 respondents) respectively, and literacy level 5 with 9% (10 respondents). Therefore, the average literacy level regarding computer skills

is still at level 2. It means that computer skills are used repeatedly to assist their daily activities with a repetitive usage pattern.

From the data processing results regarding computer skills, each respondent has a more dominant ability than the other abilities. For example, 26% of the respondents know about the technical use of operating systems. Similarly, 25% and 24% of the respondents have technical knowledge of Microsoft Word and Microsoft Excel, respectively. Meanwhile, 25% of the respondents understand technical knowledge of printing documents.

Furthermore, the literacy level of computer utilization includes using Microsoft Word and Microsoft Excel for work, other applications, and computers to listen to songs, watch videos, and play games. The result is shown in Fig. 4.

Figure 4 shows the literacy level 0 is 23% (25 respondents). Then, there are also literacy level 1 with 19% (21 respondents), literacy level 2 with 40% (43 respondents), literacy level 3 with 5% (5 respondents), literacy level 4 with 6% (6 respondents), and literacy level 5 with 7% (8 respondents). Hence, the average literacy level regarding computer skills is still at level 2. The existing computers are used repeatedly to assist daily activities with a repetitive usage pattern.

From the data processing results regarding computer utilization, each respondent has a more dominant use of computers than other uses. It can be seen that around 26% of the respondents use Microsoft Word to support village administration. Around 20% of the respondents utilize Microsoft Excel for processing numbers, such as village financial reports and the preparation of the village budget. Then, others use Corel Draw application to support graphic design (13%) and computers to listen to music and watch videos (22%) and to play games (20%).

Based on calculations on computer literacy which consists of basic knowledge about computers at level

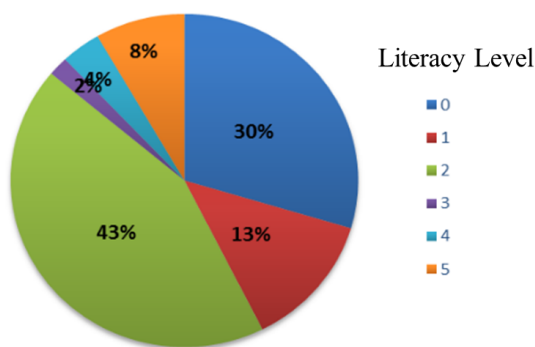


Fig. 5. Literacy level of Internet basic knowledge.

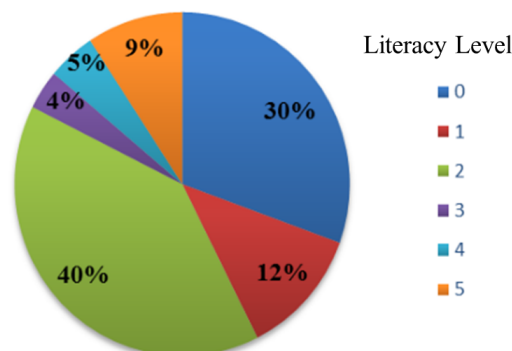


Fig. 6. Literacy level of Internet usage skill.

2, technical skills in computer usage at level 2, and computer usage at level 2, it can be concluded that the level of computer literacy of village officials in the Purbalingga is at level 2. The respondents (village officials) use the computer many times with the same usage pattern to help their daily activities.

B. Internet Literacy

Basic Internet knowledge literacy includes knowing about the Internet, software to support Internet access, and applications to browse. Figure 5 shows the percentage of each literacy level. It consists of literacy level 0 with 30% (32 respondents), literacy level 1 with 13% (14 respondents), literacy level 2 with 43% (47 respondents), literacy level 3 with 2% (2 respondents), literacy level 4 with 4% (4 respondents), and literacy level 5 with 8% (9 respondents). Thus, the average literacy level regarding basic Internet is still at level 2. It means that basic knowledge is used repeatedly to assist their daily activities with repetitive usage patterns.

From the data processing results regarding basic Internet knowledge, each respondent has a more dominant ability than the other abilities. Around 30% of the respondents know about the Internet. Then, 23% of the respondents recognize software to support Internet access, and 25% know about the applications to browse the Internet. Moreover, 22% of the respondents are aware of features in web browsing and e-mail.

Next, there is a literacy level of using the Internet for village officials. It consists of logging into the Internet network, using a search engine, entering keywords into the search engine, creating an account and using the e-mail feature, uploading and downloading files via the Internet, searching for information, and using the Internet to communicate. The results are presented in Fig. 6.

From Fig. 6, there are several literacy levels. It consists of literacy level 0 with 30% (33 respondents),

literacy level 1 with 12% (13 respondents), literacy level 2 with 40% (43 respondents), literacy level 3 with 4% (4 respondents), literacy level 4 with 5% (5 respondents), and literacy level 5 with 9% (10 respondents). Therefore, the average literacy level regarding Internet skills is still at level 2. It implies that the Internet skill is used repeatedly to help daily activities with a repetitive usage pattern.

From the data processing results regarding Internet skills, each respondent has a more dominant ability than the other abilities. Around 14% of the respondents can log into the Internet network. Then, 12% of the respondents can use a search engine on the Internet and enter keywords into a search engine. Meanwhile, 11% of the respondents can create an account and use the e-mail feature. Around 14% of the respondents can upload and download files via the Internet, 19% can search for information via the Internet, and 18% can use the Internet to communicate with others.

Next, the literacy level of Internet utilization includes using the Internet to manage village websites, looking for data or information for village administration needs, supporting village fund management, operating social media, watching online videos, playing online games, and shopping online. The results are presented in Fig. 7.

From Fig. 7, there are several literacy levels. It includes literacy level 0 with 29% (31 respondents), literacy level 1 with 17% (18 respondents), literacy level 2 with 42% (46 respondents), the literacy level 3 and 4 with 3% (3 respondents) respectively, and literacy level 5 with 6% (7 respondents). Therefore, the average literacy level regarding Internet utilization is still at level 2. It means that the existing Internet is used repeatedly to assist daily activities with a repetitive usage pattern.

From the data processing results regarding the use of the Internet, each respondent has more dominant uses

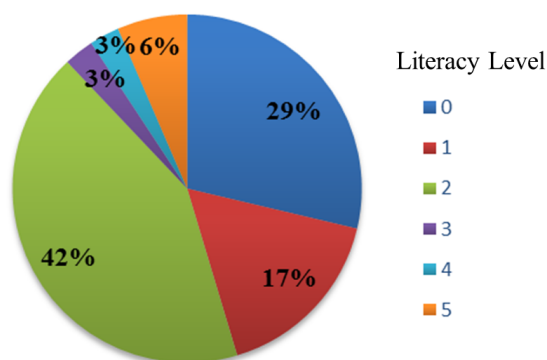


Fig. 7. Literacy level of Internet utilization.

TABLE III
PEARSON CORRELATION TEST.

		Internet Literacy	Computer Literacy
Internet Literacy	Pearson Correlation	1	0.769**
	Sig. (2-tailed)		0.000
	N	108	108
Computer Literacy	Pearson Correlation	0.769**	1
	Sig. (2-tailed)	0.000	
	N	108	108

** . Correlation is significant at the 0.01 level (2-tailed).

than others. It consists of respondents using the Internet to manage village websites (12%), to search for data or information for village administration purposes (15%), and to support the management of village funds (12%). Moreover, some respondents utilize the Internet for social media (19%), online videos (20%), online games (12%), and online shopping (11%).

Then, there are calculations on Internet literacy which consists of basic Internet knowledge at level 2, technical skills for Internet use at level 2, and Internet utilization at level 2. It can be concluded that the Internet literacy level for village officials in the Purbalingga is at level 2. The respondents (village officials) use the Internet many times with the same usage pattern to help their daily activities.

C. Correlation between Computer Literacy and Internet Literacy

Pearson correlation test applies SPSS. It aims to measure the strength of the relationship between Internet literacy and computer literacy. The results are presented in Table III.

Based on Table III, the correlation between Internet literacy and computer literacy is 0.769. It means that Internet literacy and computer literacy have a strong positive relationship. If computer literacy increases, Internet literacy will also increase.

Based on the result, it can be summarized that the level of ICT literacy in village officials in Purbalingga is still at level 2. It is based on the P-CMM with the indicators of basic knowledge, usage skill, and utilization of computers and the Internet. Moreover, the correlation between computer literacy and Internet literacy is strong and positive. Therefore, the increasing computer literacy will also increase the Internet literacy in village officials.

V. CONCLUSION

According to P-CMM, the village officials' ICT literacy level in Purbalingga is still 2. It means that computers and the Internet are used several times with the same usage pattern to assist their jobs. Moreover, there is a positive and strong relationship between computer literacy and Internet literacy. Increasing computer literacy will increase Internet literacy too.

From the measurement using the P-CMM concept, it shows that the ICT literacy of the village officials is still low. Improvement is needed since they should master these skills. It deals with their job to develop a strong and perfect relationship to ICT literacy. The research limitation is in the variable for measuring ICT literacy. The research only uses computer and Internet literacy variables. Further research can measure ICT 'literacy with digital literacy variables and other indicators. The more accurate measurement of ICT Literacy leads to the better accuracy of measurement using the concept of P-CMM.

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