AGRISOCIONOMICS
Jurnal Sosial Ekonomi dan Kebijakan Pertanian
ISSN 2580-0566 EISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
5(2): 19-28, November 2021

THE READINESS OF GAPOKTAN SIMPATIK'S ORGANIC RICE FARMERS, MANONJAYA SUB-DISTRICT, TASIKMALAYA REGENCY, IN THE IMPLEMENTATION OF INDUSTRY 4.0

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Submitted 28 February 2020; Accepted 03 February 2021

ABSTRAK

Indonesia saat ini sedang memasuki revolusi industri 4.0 yang memiliki konsep *Smart Factories, Industrial Internet of Things, Smart Industry, Advanced Manufacturing, big data,* dan *artificial intellegence*. Salah satu perkembangan industri 4.0 adalah teknologi pertanian. Teknologi pada bidang pertanian diharapkan dapat menunjang produktivitas pertanian baik kuantitas, kualitas dan kontinuitas. Penelitian ini bertujuan untuk mengetahui sejauhmana kesiapan petani padi organik pada gapoktan simpatik dalam implementasi industry 4.0. Penelitian dilakukan di kelompok tani gapoktan simpatik Kecamatan Manonjaya, Kabupaten Tasikmalaya. Desain penelitian yang digunakan adalah kuantitatif dengan metode survey. Alat analisis yang digunakan dalam penelitian ini adalah Mutula & Brakel. Pemilihan sampel dalam penelitian ini menggunakan Teknik *simple random sampling* dengan rumus Slovin diperoleh sebanyak 51 responden, dan digunakan rumus alokasi proporsional untuk menentukan jumlah sampel pada setiap kelompok tani. Berdasarkan perhitungan menggunakan perhitungan Mutula & brakel menunjukan hasil tidak siap pada komponen *Enterprise Readiness, Human Resourcess Readiness,* dan *ICT Readiness*, sedangkan kategori *information Readiness* dan *External* Readiness termasuk dalam kategori siap sehingga dapat disimpulkan bahwa petani masih belum siap dalam implementasi teknologi industri 4.0.
Kata kunci: *industri 4.0, kesiapan petani, mutula & brakel, padi organik*

ABSTRACT

Indonesia is currently entering the 4.0 Industrial Revolution that has the concept of Smart Factories, Industrial Internet of Things, Smart Industry, Advanced Manufacturing, Big Data, and artificial intelligence. The development of the 4.0 industry is agricultural technology. Technology in the field of agriculture is expected to support agricultural productivity in both quantity, quality, and continuity. This research aims to determine the readiness of organic rice farmers in the Gapoktan Simpatik in the implementation of the 4.0 industry. Research was conducted in Gapoktan Simpatik's farmer, Sub-district Manonjaya, Tasikmalaya District. The research design used quantitative with survey method. The analysis tool used in this research was Mutula & Brakel. The selection of samples in this research used a simple random sampling technique with the formula Slovin of 51 respondents and used the proportional allocation formula to determine the number of samples in each farmer group. Based on calculations using Mutula & Brakel, it showed unprepared results in the Enterprise Readiness. Human Resources Readiness, and ICT Readiness components, while the information Readiness and External Readiness categories were included in the Category ready. Thus, it can be concluded that farmers are still not ready for the implementation of Industrial Technology 4.0.
Keyword: *industry 4.0, farmer's readiness, mutula & brakel, organic rice*

INTRODUCTION

The industrial revolution was a phenomenon in 1760 – 1880. The industrial revolution has made major changes in agriculture, manufacturing, mining, transportation, and technology. The beginning of the industrial revolution began in England. It was then spread throughout the world. According to the European Parliamentary Research Service in Davis (2015), the industrial revolution occurred four times.

Indonesia has entered the fourth industrial revolution. The fourth industrial era resulted in a paradigm shift, one of which was in the agricultural sector, namely agriculture as a culture to become business-based agriculture (Nyoman, 2017). The paradigm shift causes components in agriculture to start using high technology. Technology in agriculture is expected to support agricultural productivity in terms of quantity, quality, and continuity. According to Juliana and Dwi (2019), there are several potentials from the 4.0 industrial revolution, including smart greenhouses, smart irrigation systems, and automatic tractors. It requires continuity between farmers and technology. However, the reality in the field of Industry 4.0 has obstacles, including farmers who do not understand technology, infrastructure improvements that must be made, and the need for high costs.

The development of information and communication technology eases people to access information. People become smarter and know about the benefits and uses of an item, such as the presence of organic food. The results of the research by Shaharudin et al. (2010) showed that the consumption pattern of organic food has become popular due to the increasing public awareness of the importance of running a healthy lifestyle by consuming food without additives, preservatives, and dyes. One of the organic foods that the demand continues to increase is organic rice. Rice is one of the staple foods for the Indonesian people. Organic rice is claimed to have a better taste and is healthier even though the price is much more expensive than rice in general. Currently, the demand for food, especially organic rice, has shown an increase in the amount since 2000 by 20% in the world. According to BPS (2017), the number of organic rice exports to foreign countries is 771,981 tons.

Organic rice producers are found in several provinces in Indonesia, especially in West Java, the Simpatik Gapoktan. Simpatik Gapoktan has been certified and exporting organic rice since 2009. The market demand for domestic organic rice has made many farmers start changing their farming system to organic. However, the certified land area from year to year shows a decrease following fluctuating export activities. It illustrates the unpreparedness of farmers in producing organic rice. One of the causes of the fluctuating production and export of organic rice is the lack of awareness of farmers on the use of technology 4.0 in organic farming activities. Industry 4.0 in agricultural activities can be used from upstream to downstream. Starting from the irrigation system, land preparation, planting seeds, fertilization, pest and disease control, harvesting, and distribution systems. The existence of industry 4.0 can make agricultural activities much more effective, efficient, increasing productivity, quantity, and quality are more maintained. This is because industry 4.0 uses technology that is connected to the internet, sensors, and robotics which are easier to control agricultural activities.

Based on the reference, one of the administrators of the sympathetic Gapoktan suggested that they research the Simpatik Gapoktan in the eastern part of Manonjaya District with the consideration that productivity in Manonjaya District is relatively stable.

RESEARCH METHOD

Research Method

The design used in this research is quantitative research. According to Sugiyono

(2017), quantitative research is research used to examine a population or sample. Collecting data uses research instruments and quantitative data analysis has the aim of testing predetermined hypotheses. The research method used in this research was a survey. The survey method used a questionnaire (questionnaire), tests, and structured interviews as research tools.

Research Site

The location in this research was located in the East Simpatik Gapoktan farmer group, Manonjaya District, Tasikmalaya Regency. The location of this research was chosen by considering that the area is the main organic rice production center in Tasikmalaya Regency. It has been certified since 2009 and the eastern farmer group is the first to apply organic farming methods. The time of the study was carried out from September 2019 to October 2019.

Population and Sample

The population according to Sugiyono (2017) is an area consisting of objects and subjects with certain characteristics and qualities that have been determined by researchers then will then be studied and conclusions are drawn.

While the sample is part of the number and characteristics of the population. Sampling is conducted if the population is large and the researcher has limited funds, manpower, and time (Sugiyono, 2017).

The sample in this study was taken using the probability sampling method with a simple random sampling technique. To determine the number of samples from the population, the researcher uses the following Slovin formula:

$$n=\frac{N}{1+N(e)^2}$$

Information:

n = size/number of samples used

N = size/number of existing populations

e = percentage of allowance for accuracy of sampling error (error) that can still be tolerated; e = 0.1

In this research, the total number of samples for the Mutula & Brakel questionnaire was 51 that was divided into 3 farmer groups. Determination of sampling in each farmer group used the proportional allocation formula.

$$\frac{Total\ population\ of\ farmer\ groups}{Total\ population\ of\ farmer\ groups} x\ total\ number\ of\ samples$$

Table 1. Number of Samples in Research

Farmer Group	Member	Total sample
Jembar 2	41	20
Jembar Karya	22	11
Mekarkarya	41	20
TOTAL	**0**	**51**

Source: Results of data processing, 2020

Likert Scale

In this research, the Likert scale was used to determine the score on the answers given by farmers. Likert scale is used to measure a trait, opinion, and perception of a person or group related to social phenomena. By using a Likert scale, the variables to be measured are translated into variable indicators. Furthermore, the indicator is used as a starting point for compiling instrument items that can be in the form of statements or questions (Sugiyono, 2017).

In this research, the Likert scale was used to determine the score on the answers given by the workers. The score criteria given are:

SS	= Strongly Agree	Skor = 4
S	= Agree	Skor = 3
TS	= Disagree	Skor = 2
STS	= Strongly Diaagree	Skor = 1

Mutula & Barkel

In this research, the Mutula & Brakel model was used to measure the readiness for the implementation of industry 4.0. Assessment of the level of readiness of each indicator was carried out by calculating the total score of the questionnaire. furthermore, the value was categorized by calculating the range of scores as follows:

1. *Enterprise Readiness* was used to measure organizational readiness in implementing technology. In this segment, there were 29 assessment components, but the ones used in this study were 12 components because there were deemed components inappropriate to the situation. The range score can be seen as follows.

$$Score\ Range: \frac{Highest\ score - Lowest\ Score}{Total}$$
$$= \frac{5100-1275}{4} = 956$$

Table 2. Range Score Enterprise Readiness

Score	Information
1275 – 2231	Not ready at all
2232 – 3188	Not ready
3189 – 4145	Ready
4146 – 5102	Very ready

Table 3. Score Range of Human Resources Readiness

Score	Information
714 – 1249	Not ready at all
1250 – 1785	Not ready
1786 – 2321	Ready
2322 – 2857	Very ready

2. *Human Resource's Readiness* was used to measure the readiness of human resources in implementing technology. In this segment, there were 19 assessment components, but only 7 components were used in this research. The range score can be seen as follows

$$Score\ Range: \frac{Highest\ score - Lowest\ Score}{Total}$$
$$= \frac{5100-1275}{4} = 956$$

3. *Information Readiness* was used to measure the readiness of information in technology implementation. In this segment, there were 21 assessment components, but this research used 4 components because there were components considered to be inappropriate for the situation.

$$Range\ Score: \frac{Highest\ score - Lowest\ Score}{Total}$$
$$= \frac{5100-1275}{4} = 956$$

Table 4. Score Range Information Readiness

Score	Information
408 – 714	Not ready at all
715 – 1021	Not ready
1022 – 1328	Ready
1329 – 1635	Very ready

4. *ICT Readiness* was used to measure infrastructure readiness in technology implementation. In this segment, there were 22 assessment components, but this research only used 7 components because there were components considered to be inappropriate for the situation.

$$Score\ Range: \frac{Highest\ score - Lowest\ Score}{Total}$$
$$= \frac{285}{4} = 956$$

Table 5. Score Range of ICT Readiness

Score	Information
714 – 1249	Not ready at all
1250 – 1785	Not ready
1786 – 2321	Ready
2322 – 2857	Very ready

5. *External Readiness* was used to measure environmental readiness in technology implementation. In this segment, there were 21 assessment components, but this research was used 4 components because

some components were felt to be inappropriate for the situation

$$Score\ Range: \frac{Highest\ score - Lowest\ Score}{Total} = \frac{1632-408}{4} = 306$$

Table 6. Score Range of External Readiness

Score	Information
408 – 714	Not ready at all
715 – 1021	Not ready
1022 – 1328	Ready
1329 – 1635	Very ready

RESULT AND DISCUSSION

Enterprise Readiness

Enterprise Readiness is to implement technology related to industry 4.0. Organizational readiness to change refers to organizational members' commitment and confidence to implement organizational change. If the level of organizational readiness to change is higher, then organizational members will be more willing to implement changes (Weiner 2009).

Based on the results of the research, it can be seen that the total score on the Enterprise Readiness indicator question was 2585. It eas included in the unprepared category. In the results of the questionnaire distribution, it can be seen that the majority of farmers answered STS (Highly Unprepared), with an interpretation of 52%. Based on the results of processing the enterprise readiness questionnaire in Appendix 4, the highest score was found in the ER 13 question, while the lowest score was in the ER 12 question.

In question ER 12, farmers, in general, have not utilized technology in internet-based technology in all activities from upstream to downstream. In ER 13 questions, farmers generally have problems in using technology. Based on the scoring results, on the Enterprise Readiness indicator, the highest score was 63 while the lowest score was 39.

The unpreparedness of farmers can be due to various factors, including the area of land. The lowest value is found in respondents who had an area of 50 bricks or 0.07 Ha. While the respondents with the highest score had a land area of 0.21 Ha. Land area affects farmers' income and readiness in using technology. If the farmer had a small area of land. It was less likely to use technology. Some respondents revealed that farming activities were only used for their consumption, and many of the respondents used to labor. Respondents who used labor belonged to the age group >54 years.

The unpreparedness of farmers can be due to farmers aged >54 years, and small land ownership, so there was no need to use tools or technology. Readiness of the Enterprise Readiness component of farmers could affect the area of land ownership and farmers' income.

Table 7. Questionnaire Processing Results of Enterprise Readiness

Category	Score Range	Total	Percent (%)
STS	51 - 89,25	13	52%
TS	90,25 - 128,5	6	24%
S	129,5 – 167,75	4	16%
SS	168,75 – 207	2	8%
Total		**25**	**100%**
Total Score		**2585**	

Information:
Not ready at all (STS): 1275-2231 ; Not Ready (TS) 2232-3188 ; Ready (S) 3189-4145 ; Very Ready (SS) 14146-5102

Table 8. Results of Processing the Human Resources Readiness Questionnaire

Category	Score Range	Total	Percent (%)
STS	51 - 89,25	5	35,7%
TS	90,25 - 128,5	5	35,7%
S	129,5 – 167,75	3	21,4%
SS	168,75 – 207	1	7,1%
Total		**14**	**100%**
Total Score		**1581**	

information:
Not Ready at all (STS): 714-1249 ; Not Ready (TS) 1250-1785 ; Ready (S) 1786-2321 ; Very Ready (SS) 2322-2857

The Readiness of Human Resources

The readiness of Human Resources is the most important thing in technology implementation. This is because humans will use the implemented technology.

Eby et al (2002) said that individual readiness to change is readiness which refers to the individual's perception of the work environment.

Based on the results of the research, it showed that the readiness of Human Resources or human resources is not ready in the implementation of industry 4.0. The total score obtained from the Human Resources Readiness questionnaire was 1581 who were in the unprepared category. Based on Table 29, it can be seen that the majority of farmers answered STS (Not Ready at all) and (Not Ready). It can be seen in appendix 5, the highest question score was on HR 4 question, while the lowest score was on HR 10 question. In HR 4 question, the majority of farmers have difficulty in using industry 4.0 support applications. One of the applications in Industry 4.0 is the use of gadgets. This is reinforced by the HR 10 question where farmers have not received sufficient training on industry 4.0.

Based on the scoring results, the highest score was 41, while the lowest score was 24. Respondents who had the highest score had an area of 0.238 ha. While the respondent who has the lowest score has a land area of 0.21 Ha. In the Human Resources component, the unpreparedness of farmers can be due to the respondent's age, land ownership, and last education attended.

The unpreparedness of the owner of the lowest score was due to the respondent's age being >54 years old, having a larger land area of 0.028 H,a and the last education at Elementary School. Respondents who have the highest scores were 35-54 years old, which is more adaptive to technology. The last education of the respondent is junior high school that was easier to accept changes, even though they a smaller land area.

Information Readiness

Information Readiness is the readiness of farmers in the field of information. According to Mujiyati (2013), technological readiness can be in the form of a stable internet network, because the use of the system requires an adequate internet connection. The availability of good software and hardware facilities and facilities, and the main thing is human resources who understand the use of information technology.

Based on the results of the research, it can be seen that the total score on the Information Readiness Segment indicator question is 1111, which is included in the ready category. It can be seen in Table 32 that the majority of farmers answered S (Ready) and SS (Very Ready) in information readiness. Based on appendix 6, it can be seen that the highest score was in IR 1 question, while the lowest score was in IR 2 question.

In question IR 1, farmers agreed that communication tools eased to exchange of information, but this was in return for question IR 2.

Table 9. Information Readiness Questionnaire Processing Results

Category	Score Range	Total	Percent (%)
STS	51 - 89,25	1	12,5%
TS	90,25 - 128,5	1	12,5%
S	129,5 – 167,75	3	37,5%
SS	168,75 – 207	3	37,5%
Total		**8**	**100%**
Total Score		**1111**	

Information:
Not Ready at all (STS): 408-714 ; Not Ready (TS) 715-1021 ; Ready (S) 1022-1328 ; Very Ready (SS) 1329-1635

In this question, farmers do not have access to technology, in fact, farmers only have cellphones that are not smartphones, which could not be connected. with the internet. However, some farmers searched for information using the internet owned by their children. Internet connection in Manonjaya sub-district can be said good, it rarely had disturbances.

Based on the scoring results, the highest score was 29 and the lowest score was 17. The respondents who had the highest score had an area of 0.07 Ha, and the lowest score had a land area of 0.084 Ha. In this category, the lowest score and the highest score were included in the ready and very ready categories. In this component, the area of land did not affect the readiness of farmers. With a narrow farmer's land area, farmers are ready for information readiness. This can be because respondents have communication tools even though they are not smartphones, but respondents use mobile phones in their daily activities. Communication tools are used for information dissemination which does not require farmers to use smartphones.

Environmental Readiness (ICT Readiness)

ICT Readiness is the readiness of farmers assessed based on the environment. The environment can affect farmers' readiness for the implementation of Industry 4.0.

Based on the results of the research, it can be seen that the total score on the ICT Readiness indicator question is 1763, which is included in the unprepared category. In Appendix 7, it can be seen that the highest score was on the ICT 3 question, while the lowest score was on the ICT 9 question. In the ICT 3 question, the internet network was never blocked. Generally, these questions were answered by other farmers who had smartphones and they were answered by the children of the farmers. At the research site, the internet network can be said to be rarely disturbed.

Table 10. ICT Readiness Questionnaire Processing Results

Category	Score Range	Number	Percent (%)
STS	51 - 89,25	5	35,7%
TS	90,25 - 128,5	1	7,1%
S	129,5 – 167,75	5	35,7%
SS	168,75 – 207	3	21,4%
Total		**14**	**100%**
Total score		**1763**	

Information:
Not ready at all (STS): 714-1249 ; Not Ready (TS) 1250-1785 ; Ready (S) 1786-2321 ; Very Ready (SS) 2322-2957

This was because Manonjaya has a distance that is not too far from the center of the district capital, so internet network signals were still easy to obtain. In the ICT 9 question, the majority of farmers did not understand how to use online business, online finance, and so on. This was because farmers had a low interest in online financial online shopping, and so on.

Based on the results of the scoring, the highest score was 44 and the lowest was 27. Respondents had the highest score with land ownership of 0.35 ha. Respondents said that they had access to technology used to communicate and access information. In the respondent who had the lowest score with land ownership of 0.07 Ha, the respondent did not have a cellphone or access to technology.

This could be due to the respondent's income. The higher the land area, the higher the income, and vice versa. The narrower the area of land, the lower the income of farmers. Farmers who have a narrow land area tend not to sell their agricultural products, namely for their own consumption which is less likely to have a cellphone. The age of the respondents with the highest and lowest scores entered the group >54 years, which was less adaptive to changes. The last education of the respondents was elementary school.

External Readiness

External Readiness is the readiness of the external environment supporting the implementation of industry 4.0. External readiness can be in the form of the availability of internet networks, internet facilities, and security from internet-based transactions.

Based on the results of the research, it can be seen that the total score on the External Readiness indicator question was 1181. It was included in the ready category. In Appendix 8, it can be seen that the highest score was found in EXT 4 questions, while the lowest scores were in EXT 3 questions. In EXT 4 questions, the majority of farmers revealed that internet-based business transactions have not been of interest to farmers. The lack of internet-based transactions is due to the minimal knowledge of farmers about the internet, although most of the children of the farmers use internet-based transactions. This is also corroborated by the question in EXT 3, which is where the surrounding environment has not started to use business transactions.

Based on the scoring results, the highest score was 28 and the lowest score was 20. Respondents who had the lowest score had a land area of 0.35 Ha. The respondent who had the highest score had a land area of 0.14 Ha. The readiness of this component was because the internet network and credit facilities were easy to obtain. Internet-based business transactions had not been in demand by farmers, this was due to the lack of understanding of farmers in using it. However, some respondents had bought goods online with the help of their children.

Table 11. Results of External Readiness Questionnaire Processing

Category	Score Range	Number	Percent (%)
STS	51 - 89,25	2	25%
TS	90,25 - 128,5	-	0%
S	129,5 – 167,75	3	37,5%
SS	168,75 – 207	3	37,5%
Total		**8**	**100%**
Total Score		**1181**	

Information:
Not ready at all (STS): 408-714 ; Not Ready (TS) 715-1021 ; Ready (S) 1022-1328 ; Very Ready (SS) 1329-1635

Table 12. Total Readiness of Respondents on Each Factor

Indicator	Total S and SS (people)	Percentage
Enterprise Readiness	2	4%
Human Resources	12	24%
Information Readiness	33	65%
ICT Readiness	14	27%
External Readiness	50	98%
Mean	**22,2**	**0**

Respondents' misunderstanding could be due to the environment in which respondents were still minimal in using internet-based transactions, the age majority of farmers were >54 years old that were very unlikely to use technology.

Based on the results of questionnaires conducted to 51 respondents, indicators included in the ready category were external readiness with 50 respondents and 33 information readiness answering ready. Indicators included in the unprepared category were Enterprise Readiness, Human Resources, and ICT Readiness with the number of respondents who answered ready, respectively 2, 12, and 14 which can be seen in table 12.

CONCLUSION AND SUGGESTION

Conclusion

Organic rice farmers as members of the Eastern Simpatik Gapoktan, Manonjaya district are not ready to implement the 4.0 industrial revolution. This is because there are several factors in the unprepared category, including Enterprise Readiness, Human Resources Readiness, and ICT Readiness. Meanwhile, there are only 2 components included in the ready category; Information Readiness and External Readiness.

Suggestion

1. Sympathetic Gapoktan needs to improve strategies to implement industry 4.0.
2. Sympathetic Gapoktan needs to conduct counseling related to the use of industrial technology 4.0 to farmers.
3. Sympathetic Gapoktan needs to provide counseling in the use of online business, online finance, and others to make it easier for farmers to transact

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