Information Needs and Behaviour for Sustainable Farming Among Millennial and Progressive farmers

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Abstract. Continuous innovation towards a more sustainable agriculture is an important trend in today’s modern era. Farmers are consistently required to apply essential technologies in enhancing crucial farming practices, regardless of age. The purpose of this qualitative research, therefore, was to carefully examine the information needs and search behaviours of two major farm groups, termed millennial and progressive, using a multi-case study approach. Data were collected by conducting semi-structured interviews with selected participants, comprised of 10 millennial and 5 progressive farmers. Consequently, various trends in information needs and search behaviours in both cases, were discovered, by employing explanation technique. The results showed the millennial generation farmers were more inclined to source for materials on technology access and marketing partnership from diverse communities. Meanwhile, the progressives were known to explore data regarding technology and efforts to improve on farm product quality from the Agriculture Department as well as market insights from close network.

1. Introduction
Agriculture remains one of the major sectors for economic development in Indonesia, despite contributing barely 14.43% to the gross domestic product (GDP) [1]. This low input is due to certain factors, including labour issues, environmental degradation, poor productivity and inadequate product competitiveness. In terms of productivity and competitiveness, the current massive dependence on conventional technology (labour intensive) and the reliance of innovation on natural resources, are among existing problems faced by Indonesia’s agricultural domain. Also, gradual development of technology and innovation are also influencing factors [2]. In terms of employment, the interest by younger people to pursue careers or opportunities in agriculture has significantly declined, but showed a great increase in non-agricultural fields. These conditions are probably due to high poverty levels and poor mentality among certain farmers, stakeholders and interest groups. The prevailing trend also poses
a threat to sustainable agro-systems. Based on [3] a study on pro-poverty agriculture in Asia, rural economic diversification offers a potential solution in overcoming poverty and performance deficiencies. However, to achieve the objectives, transformation from a high dependence on outdated farming practices to current industry standards and services is most required. In addition, to create a viable market, economic systems are appropriately modified, as the behavioural shift from conventional structures to a modern application becomes absolutely necessary.

Indonesian government, in the past 5 years, had embarked on several strategies, including the acceleration towards agriculture 4.0 and the adoption of millennial farming initiatives, all in an effort to overcome issues of labour decline, product competitiveness, and poverty. Agriculture 4.0 refers to a modern approach to attract young people’s engagement. This framework, also called smart farming, is a technology and innovation based agricultural management, using high level machineries, equipment and digital technology to increase productivity, add value, promote competitiveness and benefits in a sustainable order [4].

The movements have instigated the emergence of millennial farmers and according to the Agricultural Human Resources Development and Extension Agency, these individuals ranged between 19-39 years. However, others above the limit, but exhibit a very energetic millennial spirit and are adept to digital technology, agricultural machinery, and own land [5], are commonly referred as progressive farmers. Another concept believed the millennials are known to demonstrate certain characteristics, including the ability to utilize digital technology, capital-intensive farm management using technology or innovation, and innovation-based agro-industrial processing for increased competitiveness, added value and benefits, as well as efficient marketing implementation [2].

In promoting sustainability, millennial and progressive farmers are susceptible to several challenges, particularly in present industrial era. This period is characterized by specific obstacles and uncertainties, where the term VUCA was eventually coined, indicating volatility, uncertainty, complexity, and ambiguity. Volatility refers to an unpredictable situation, and is prone to changes. Uncertainty is enclosed with surprises, without any specific time of occurrence. Complexity relates to difficult circumstances, while ambiguity is a floating state full of confusion or unclear directions [6].

These above-mentioned conditions are known to instigate speedy access to relevant insights, despite the rapidly changing provisions. Therefore, farmers are required to act very promptly in mapping information needs and sources, in terms of farming practices. Overall, this research aimed at determining the information needs and search behaviours of two farm groups, termed millennial and progressive, in a bid to ensure sustainability, particularly in agriculture 4.0 era.

2. Method
This research employed a qualitative approach, using a multiple case study to map information needs and sources for sustainable agriculture. Two separate farm groups were identified, termed millennial and progressive. The first case occurred in the age of the millennial generation, while the second referred to farmers without digital skills. Furthermore, the investigation was conducted in selected locations, where millennial farmers have emerged and possibly adopted agriculture 4.0. These six regencies include, Sukoharjo, Wonogiri, Karanganyar, Magelang, Boyolali in Central Java, and Sleman in Yogyakarta province.

Two informants’ groups also exist with adopted agriculture 4.0, where the first are millennial farmers ranged between 19-39 years, while the second are simply described as progressive farmers, without practical knowledge of technology and the use of agricultural machinery. Subsequently, the information needs and search behaviour were comprehensively evaluated, using maximum variation sampling method, where selected participants comprised of 10 millennial and 5 progressive farmers, served as the research informants. However, the heterogeneity of the samples was aimed at obtaining a detailed comprehension of the research objectives by considering the entire aspects (topography, geography, farming type, education, and land area). Moreover, out of 10 millennial farmers, 8 specialized in horticulture, while 2 are into rice cultivation. The progressive farmers consist of 3 horticulturists, 1 rice farmer and 1 integrated or mixed farmer (rice-vegetable-livestock-fish). Data were collected through semi-structured interviews with the support of adequate guidelines.
The analysis process incorporated explanation building technique, to analyse the data of two separate categories by describing the case in question, in terms of the reason/method for searching information as well as the factor influencing the choice of selecting sources. However, to produce a statement compiled in a multi-case study, series of analytical phases were performed. Furthermore, the 5 stages of analysis in qualitative research, include compiling, dis-assembling, re-assembling, interpretation, and conclusion [8].

3. Result and Discussion
Information need refers to a situation of inadequate knowledge, an anomalous state of knowledge (ASK), or a position where someone is compelled to search for information, in order to resolve the 'inability', and is probably manifested as gaps, shortcomings, uncertainties, or incoherences [9]. Information seeking is described as a process aimed at accomplishing specific goals [10]. Therefore, farmers' information needs are the result of insufficient comprehension on a particular topic, and in this case, refers to sustainable farming. In other words, the farmers are considered to already demonstrate ability in achieving farming objectives, but often feel incompetent.

The necessity to achieve certain goals occurs as the need for sustainable farming encourages farmers to acquire skills. Information seeking behavior is conceptualized as the activity performed in an attempt to identify information need, search methods, and the use or transfer of the generated information [10]. In this research, farmers' information seeking behavior was approached by tracing the sources employed by farmers.

3.1 Information needs and seeking behaviour of Millennial Farmers
Majority of millennial farmers aim to improve effectiveness and added value, in order to increase profit margins. Based on the search analysis results, the efficiencies are possibly achieved, with the adoption of relevant technology and enhanced product quality. However, to obtain added value, millennial farmers are expected to transform the farming practice into a business with wider market and competitive products. Table 1 represents the interview results of the information needs of millennial farmers.

| Information needs | Information Sources | Informant |
|-------------------|---------------------|-----------|
| Agricultural machine technology and tools (hydroponics, drones, smart irrigation) | • Academician  
• Agricultural tool company  
• Agriculture department  
• Online community | AH, AW, ITN, BD, EM, ZR |
| Quality seeds | • Research center  
• Seed farmers  
• Academician | DTK, AW, BD |
| Capital partnership | • Website crop founding  
• CSR programs  
• Facebook | AH, DTK, BD, ITN |
| Product sale prices /market information | • Online community | DS, WK |
| Product downstream distribution | • Academician  
• Entrepreneurs | DS, BD, WK |
| Digital marketing | • Online community  
• Entrepreneurial incubator from banking and college business incubator | AH, AW, WK |
| Marketing (marketing partnership) | • Online community | AH, AW, BD, WK, EM |
| Branding | • Books, online community, facebook | DTK, BD, WK |

Source: Primary Data Analysis, 2020
Table 1 also shows technology as the main information required by most informants. Particular technologies required for farming include hydroponic technology, as needed by informant AH, and is used to develop hydroponic vegetables. This information is accessed by conducting searches from universities. Meanwhile, informant AW needs information on drone technology for the purposes of fertilizing a fairly large potato field, although AW also works with agricultural equipment companies. Specific informants search for materials related to smart or modern irrigation and most tend to acquire this information from online communities, including Sinau bareng (learn together), Komunitas Petani Merbabu (Farmer Community of Mount Merbabu), hydroponic farmers and other millennial agro-based communities. One of the reasons millennial farmers prefer technology is due to the ability to work faster and perform other activities, with minimal labor.

The next most significant necessity for millennial farmers involves marketing, particularly in strategic partnerships. This process is very significant, due to the high-value product commodities, including potatoes, organic vegetables, organic fruits and non-organic fruits, hydroponic vegetables, and coffee. Majority of these farmers access related market information through online communities, as the results are faster, up to date and very easy to obtain.

The needs and information behavior of millennial farmers indicate an obvious interest in technology and commodities with high value and profitability. This portrays the importance of technology towards improving efficiency and product value. Silva [11] emphasized the significance of effective and profitable cultivation methods, in order to attract the millennial and were obtained through technology, innovation and entrepreneurship. In addition, technology aids effective performance in other job, due to perceived multi-tasker ability.

In terms of communication behavior, millennial farmers are known to prioritize speed in acquiring information, and therefore, are known to rely more on information from close networks or online communities. This generation is accustomed to prompt acquisition of information, as well as generate satisfaction through accessing a network of different internet sites, simultaneously, therefore, performing parallel processing and multi-tasking [12].

3.2 Information needs and seeking behaviour of Progressive Farmers

In contrast to millennial farmers, the progressives, also called baby boomers, prioritize sustainable agriculture by improving the crop quality to meet desired needs amid market uncertainties and invasions of imported commodities. Based on the interview results, the following information needs and sources of progressive farmers were discovered.

| Information needs | Information Sources | Informant |
|-------------------|---------------------|-----------|
| Agricultural machinery and technology (tractors, harvesters, transplants, modern irrigation) | • Academician <br> • Farming tool company <br> • Agriculture department <br> • Youtube <br> • Successful Farmers | HS, PM, AG, SR |
| Quality seed | • Agriculture department <br> • Farmer network | SY, PM, HS |
| Cultivation techniques | • Farmer network <br> • Agriculture department <br> • Youtube | HS, PM, AG, SY, SR |
| Product sale prices /market information | • Farmer network <br> • Trader network | HS, PM, AG, SY, SR |
| Marketing partnership | • Online community <br> • Farmer group | SR, SY, AG |

Sources: Primary Data Analysis, 2020

Based on Table 2 above, information on cultivation techniques and market, especially product selling prices, is most needed by progressive farmers. The informant HS, argued the farmer is obliged to obtain
a comprehensive knowledge of the prospective market and the quality to achieve. Apart from cultivation techniques and markets, information about technology is also important. Progressive farmers tend to rely on the Department of Agriculture, believed to provide agricultural extension agents and long-established farmers’ networks. These two categories are connected to each other through face-to-face communication or using mobile phone in private conversation, and not necessarily in online communities or social media groups.

Progressive farmers tend to depend sufficiently on interpersonal communication mediated by cellular telephones for several reasons, including: (a) this approach is more focused on the conversation objective, in contrast to social media patterns (b) there is an element of closeness to encourage more openness in sharing information, and (c) the urgency of interaction are well accommodated. Most of the informants explained interpersonal conversations are usually followed by visits or direct learning activities, particularly for information needs on cultivation techniques, as the methods are easier to understand by direct learning. The farmers also discover new information absent in online conversation. This shows a high preference for one-on-one interaction. Furthermore, the baby boomer generation communicates mostly using the above approach and telephone conversations. Also, individual relations are more preferred as body language and non-verbal cues are important considerations [13].

4. Conclusion
Based on the results and discussions, certain variations were observed in the information needs and search behavior relating to the selected sources. These disparities are due to farming objectives and the characteristics of the two cases of millennial farmers. The millennials are more focused on increasing agricultural efficiency and turnovers. There is also the tendency to require more information on technology and marketing, through online communities, heavily dependent on digital communication. Meanwhile, progressive farmers are centered on sustainable farming by improving agricultural product quality, in addition to the need for additional insights related to cultivation techniques, market information or selling prices, and technology. Furthermore, progressive farmers rely more on government sources through field agricultural extension and farmers’ networks, highly dependent on one-on-one communication. Therefore, providing the necessary information, using specified channels or media and based on the characteristics of each farmer group, is essential for sustainable farming and for accelerating the transition to agriculture 4.0.

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