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Factors Influencing Participation of Rural Women Farmers in Agricultural Activities in Ranau, Sabah, Malaysia: An Exploratory Factor Analysis

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Abstract

Globally, rural women farmers benefited from only 5% of agricultural extension information, and also only 10% of the agricultural extension facilities, this affects their engagement in agricultural development resulting in an increased rate of poverty and lack of the necessary knowledge of agricultural practice. This study aimed to determine the internal and external factors influencing rural women farmers' participation in agricultural activities in rural areas of Malaysia. The study was conducted in Ranau, Sabah, Malaysia. A sample size of 248 rural women farmers was selected using simple random sampling. A five-point Likert scale questionnaire was used for data collection. Collected data were subjected to descriptive and factor analysis using Statistical Packages for Social Science (SPSS) version 26. The findings indicated that the factors affecting rural women's participation in agricultural activities in Ranau, Sabah, encompassed access to financial and agricultural inputs, social culture, land rights, access to land, technology adoption, participation in farm management decisions, limited scope of agricultural policy and access to resource and support for women in agriculture. The present study has provided insights into the factors contributing to women's participation in agriculture activities. The study suggests that a theoretical model should be proposed to test the relationship between these factors and women's participation in agriculture, along with research to identify solutions for reducing identified barriers.

Keywords: agriculture; factors; Malaysia; participation; rural women

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INTRODUCTION

Women in Malaysia constitute about 48.6% of the population (Ming, 2022), and their engagement in agriculture represents 6.13% in 2020 (Yee and Man, 2023). This indicates a wide gender gap in participation and access to productive resources. Studies indicate that the participation of women in the Malaysian agriculture sector continues to declined (Amran and Abdul Fatah, 2020). Meanwhile, among 13 Malaysian states, Sabah has the highest poverty rate. The economic divide between urban and rural communities in Sabah is widening (Thien Sang et al., 2022). In Sabah, the rural poverty rate (27.3%) is 4 times higher than the urban poverty rate (6.3%) (Huda et al., 2022), resulting in the state's sluggish development. Enhancing rural women's agro-related activities is one of the most effective ways to boost family income because

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empowering women through increased access to resources will activate rural economic activity (Lim et al., 2019). Realizing this, the Malaysian government has implemented several development programs like "*Inkubator Kemahiran Ibu Tunggal (I-KIT)*" and "*Inkubator Keusahawanan Wanita (I-KeuNita)*". Such programs aim to increase women's participation in contract farming and improve support for women's businesses. Institutional upgrading of implementation agencies and capacity building among rural women based on a specific master plan are essential to ensure the effectiveness and durability of program outcomes.

Women are the backbone of the household economy and play a significant role in agro-based activities in rural areas (Arumugam and Manida, 2023). Their contribution is essential for the financial stability of households and the overall well-being of communities. Women made up 43% of the global agricultural labor force (Menon et al., 2023), while Malaysian women contributed 5.4% to the agriculture, forestry, and fishing industry in 2021 (Department of Statistics Malaysia, 2022). Nowadays, women's role in agriculture is more important as they maintain the 4 pillars of food security: availability, accessibility, utilization, and stability (Buehren et al., 2019), especially as climate change and global warming have threatened food production in agriculture (Hadley et al., 2023). The United Nations (UN) recognized the importance of rural women as significant figures in economic and social transformation (Shahzad et al., 2022). The majority of rural women's contributions are in the agriculture and rural entrepreneurial sectors, which power local and global economies (Pan et al., 2024).

Their involvement in agriculture improves food security (Buehren et al., 2019). Their contribution is crucial in assisting communities to attain food and nutrition security, generate revenue, and improve rural livelihoods and overall well-being (Okwu and Umoru, 2009).

Rural women play a vital role in domestic and small-scale agricultural production. They participate in the enhancement of economic status of their communities and families (Jabeen et al., 2020). Therefore, empowering rural women in agro-related activities is one of the most effective ways to boost family income. In Malaysia, the government has recognized the contribution of women in many aspects including in the agriculture sector (Masdek, 2015). In Sabah, government agencies such as the Village Development Corporation (*Korporasi Pembangunan Desa/KPD*) and the Department of Agriculture (DOA) under the Ministry of Agriculture and Food Security (MAFS) have implemented several development programs like "*Program Pembangunan Industri Asas Tani*" and Women Economic Development and Agriculture (WEDA), for women to take part. Such programs aim to increase women's participation in contract farming, build capacity, and provide support for their agro-businesses. Unfortunately, rural women are disproportionately poor despite their importance, with limited access to financial assistance, education, health care, and other essential services. Information dissemination by extension services helps rural farmers make better decisions, and farmers in rural areas of developing countries have access to information through several channels, including the media and other local resources used by extension staff (Umar et al., 2021). Farmers in Malaysia, especially those in rural areas, rely on agricultural extension workers for technical advice and documentation (Masso et al., 2016). However, the extension program and services in Malaysia have some limitations, where emphases were mainly on cash crop production and the services provided by extension workers neglected rural women who are consistently being excluded from many agricultural trainings and programs. Moreover, in many developing countries, women have continued to face the challenges of not accessing agricultural information and research for development initiatives due to the perception that women are not farmers (Mishra et al., 2017).

Participation, in the context of rural development for women farmers, is a process where all stakeholders influence women to exercise control over agricultural development programs and absolute power over decision-making and resources (Shahbaz et al., 2022). Women's participation refers to several processes involving women in executing and implementing agricultural development practices.

Participation of women in agriculture is key to sustainable agriculture and increased productivity (Wulandari and Villano, 2021). Regrettably, women often face unequal access to resources such as education (Chakma et al., 2021) and economic opportunities (Mishra et al., 2017). In rural area, women are disproportionately poor despite their importance, with limited access to financial assistance, education, health care, and other essential services (Nuhu et al., 2014; Oduol et al., 2017; Chakma et al., 2021). As such,

agricultural extension plays an essential role in bridging the information gap by providing essential information to rural women, enabling them to make informed decisions. In developing countries, rural farmers have access to vital information through various channels, including media and local resources facilitated by extension workers (Umar et al., 2021). Previous studies that surveyed extension workers have identified family support, motivation (Jennings and Brush, 2013; Rembulan et al., 2016) and lack of skills (Boz et al., 2016; Muhammad et al., 2017) as factors that influence women's participation. Government policies on agriculture, limited access to finance, tradition, and culture also play a significant role in developing women's enterprises (Modarresi et al., 2016; Kalafatoglu and Mendoza, 2017; Muhammad et al., 2017; Wieland et al., 2019). This study differs from others in that it examines factors influencing rural women's participation from the perspectives of rural women themselves (Guzman and Kacperczyk, 2019). There are also other differences and uncertainties related to government policies and economic conditions that pose challenges for women (Rembulan et al., 2016; Plotnikov et al., 2019).

Therefore, it is high time that a study was conducted in the Malaysian context to determine influencing factors for policy-making and strategies toward improving productivity, as such studies have already been conducted in the context of other developed countries (Shamsul Hana and Norashidah, 2017; Neneh, 2018; Al-Zahrani et al., 2019). The present study provides an answer to the factors influencing rural women farmers' participation in agricultural activities as well as the most influential factors influencing rural women's participation in agricultural activities in Ranau, Sabah, Malaysia.

MATERIALS AND METHOD

Research location

The study was conducted in the Kundasang, District of Ranau, Sabah, Malaysia (Figure 1). Ranau is an administrative district in the Malaysian state of Sabah, part of the West Coast Division. The landlocked district borders the Sandakan division to the east until it meets the interior division border. Kundasang was chosen for its upland agriculture and tourism industries. Most of the land is suitable for farming and 80% of residents, mainly local women, are involved in this industry (DOA Ranau, 2021).

Study population and sampling

The design of the study was a perception-based evaluation of a program. The target population of the study was 690 small-scale women farmers, who were involved in any form of agricultural activities such as land preparation, planting, maintenance, harvesting, selling, and marketing, from Kundasang Town. They were mainly subsistence farmers in the study area. A sample size of 248 women farmers (respondents) was selected using simple random sampling.

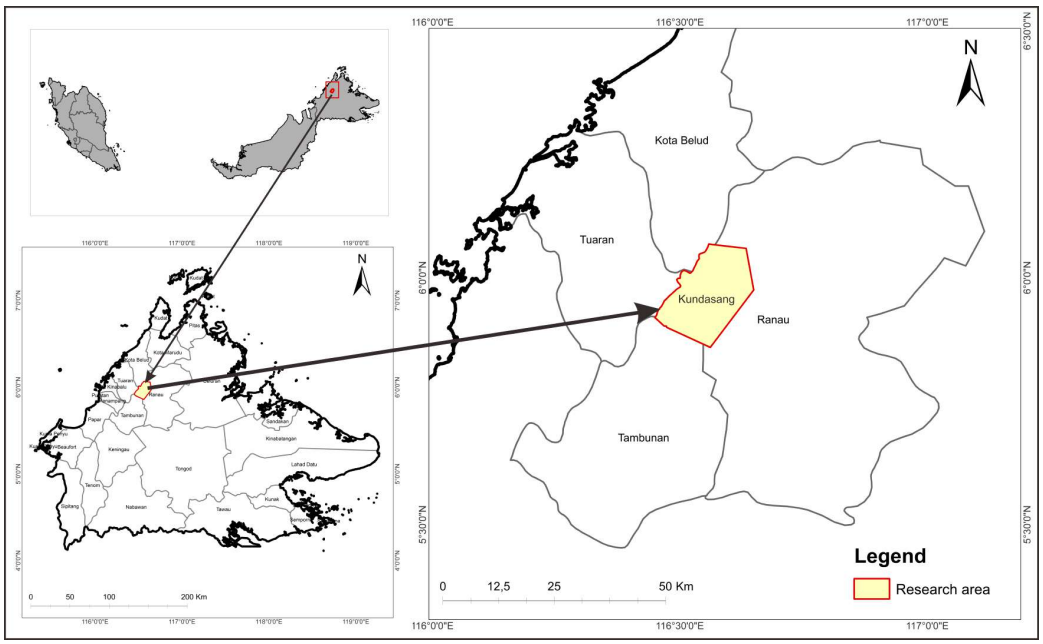

Figure 1. Map of research area

The sample size was determined using Krejcie and Morgan formula (1970). Equation 1 was the formula for determining a finite population.

$$S = \frac{X^2NP\ (1\text{-}P)}{d^2\ (N\text{-}1) + X^2P\ (1\text{-}P)} \quad (1)$$

Where S = sample size required, X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841), N = population size, P = population proportion (for attaining maximum sample size, it was assumed to be 0.50), d^2 = the degree of accuracy expressed as a proportion (0.05).

Study design and data collection

The study was descriptive, with a five-point Likert scale (strongly disagree, disagree, not sure, agree, and strongly agree), which was used to measure the opinion of women farmers on the factors influencing their participation in agricultural activities. The questionnaire was divided into 3 sections and it consisted of statements that addressed and measured the component of internal and external factors affecting rural women's participation in agriculture, as adopted from the previous research (Table 1). The data were collected during 2020. Due to the coronavirus disease 2019 (COVID-19), Movement Control Order (MCO) was enforced by the Malaysian government and encompassed restrictions on movement. Therefore, data collection was completed with the help of enumerators.

Data analysis

Descriptive statistics, reliability tests, and Exploratory Factor Analysis (EFA) were used to analyze the information gathered from the questionnaire using Statistical Package for the Social Sciences (SPSS) version 26. Descriptive analysis was used to describe the respondents' socio-demographic profile in this study. The reliability test was carried out to examine the internal consistency of a measurement instrument (Field, 2009). The instrument was proven to be reliable and, therefore, administered to the respondents. The reliability coefficient or Alpha value of 0.983 was obtained. EFA was used to determine the internal and external factors that affect participation in agricultural activities.

RESULTS AND DISCUSSION

Socio-demographic profile of the respondents

Table 2 displayed the socio-demographic profile of the respondents. Majority of the respondents (25.4%) were in age range of 46 to 55 years old and 83.9% were married. For education level, many of the respondents had completed secondary school (72.2%). For years of experience, majority (52%) had 5 to 10 years of experience in agriculture. However, the income level of the respondents indicated that, majority (98.7%) belong to B40 group (the bottom-tier households that have an income of below RM4,850) and only 0.4% of the respondents earned for each RM4,850 to 5,879 (M1), RM5,880 to 7,099 (M2) and RM8,700 to 10,959 (M4).

Table 1. Past studies on factors affecting rural women's participation in agriculture

Variables	References
Access to land	Zeller and Sharma (2000); Rigg (2006); Lipper and Zilberman (2018); Barooah et al. (2022)
Organization or farmer group goals	Nakazi et al. (2017); Abdu et al. (2022)
Social culture	FAO (2011); Saxena (2013)
Technology adoption	Robaa and Tolossa (2016); Aduwo et al. (2019)
Land rights	Rehman et al. (2019); Azumah et al. (2022)
Access to financial and agricultural input	Okwu and Umoru (2009); Behrman et al. (2012); Kimaro et al. (2015); Munonye and Esiobu (2017); Olorunfemi et al. (2020); Barooah et al. (2022)
Access to information and extension service	Antwi-Agyei and Stringer (2021); Barooah et al. (2022); Pealore (2022)
Gender division of labor	Ghimire et al. (2023)
Participation in farm management decision	Chayal et al. (2013); Carnegie et al. (2020); Balayar and Mazur (2021)
Limited scope of agricultural policy	Campbell et al. (2020)

Table 2. Socio-demographic profile of the respondents

Variables	Frequency	Percentage (%)
Age (years old)		
17-25	20	8.1
26-35	51	20.6
36-45	52	20.9
46-55	63	25.4
56-65	42	16.9
≥ 65	20	8.1
Races		
Malay	1	0.4
Chinese	1	0.4
Kadazandusun/Dusun	246	99.2
Marital status		
Single	23	9.3
Married	208	83.9
Divorce/Widow	17	6.8
Education level		
No school	7	2.8
Primary school	25	10.1
Secondary school	179	72.2
Diploma	16	6.5
Certificate in skill/STPM	14	5.6
Bachelor/Master/PhD	4	1.6
Others	3	1.2
Years of experience in agriculture (years)		
None	3	1.2
< 5	41	16.5
5-10	129	52.0
11-20	54	21.8
21-30	16	6.5
> 30	5	2.0
Monthly income (RM)		
< 2,500 (B1)	228	92.0
2,500-3,169 (B2)	9	3.6
3,170-3,969 (B3)	6	2.4
3,970-4,849 (B4)	2	0.8
4,850-5,879 (M1)	1	0.4
5,880-7,099 (M2)	1	0.4
7,110-8,699 (M3)	0	0.0
8,700-10,959 (M4)	1	0.4
Total	248	100.0

Source: Yee and Man (2023)

Exploratory factor analysis (EFA)

The results from factor analysis show that out of 50 statements, 49 statements indicate participation in agricultural activities (factor loading less than 0.3). However, Kaiser-Meyer-Olkin (KMO) Test was also conducted to determine the sampling adequacy. Meanwhile, Bartlett's Test of Sphericity was performed on all the statements to confirm the appropriateness of conducting factors analysis (Table 3).

Table 3. KMO and Bartlett's Test of Sphericity

KMO measure of sampling adequacy		0.671
Bartlett's Test of Sphericity	Approx. Chi-Square	19,340.757
	df	1,176
	Sig.	0.000

The varimax rotation and the factor loading from the principal component of 49 statements

were obtained. The factors were named based on the sub-variables which fall within each factor. The 8 latent factors which account for about 77.829% of the total variance are summarized as follow.

Access to financial and agricultural inputs

Access to financial and agricultural inputs was the 1st factor identified that affected the respondents' participation in agricultural activities (Refer to Table 4). This was determined using 9 sub-variables with a total variance of 56.334%. This is in line with the work of Okwu and Umoru (2009) reported that women often face unequal access to resources. Some studies even reported that only 5% of the agricultural extension facilities and services are channeled to women farmers around the world, and that is why women usually face problem in accessing agricultural information and resources (Ragasa, 2014; Munonye and Esiobu, 2017; Olorunfemi et al., 2020). This finding is similar to research of Kimaro et al. (2015) who also suggested that the availability of financial and agricultural inputs in rural areas has an influence on the participation of rural women in agricultural activities. Rural women's decisions to invest and to produce are closely related to access to financial and agricultural inputs. Rural women typically operate small-scale farms that the government overlooks compared to large-scale farms such as conventional farming (Behrman et al., 2012). Therefore, availability of access to financial and agricultural inputs is more likely to encourage their participation by increasing investment opportunities and providing them with more effective risk management tools. Availability and access to finance and agriculture inputs would women enable rural women succeed in their farm investment and balance farm activities and household needs.

Social culture

Referring to Table 5, the 2nd factor was social culture, with a total variance of 3.771% comprising 6 sub-variables. The result indicated that rural women are most likely to engage in agricultural activities related to their social culture because of their behavioral patterns, which are influenced by the knowledge or history and belief system derived from their own culture. This finding was supported by many scholars who's find out that rural women's participation in agricultural activities is associated with the social and cultural elements (Saxena, 2013). This is because some social and cultural variables like language and marital status determines their access to agricultural land and information (Lamontagne-Godwin et al., 2018). Rural women could be more active in farming activities if they were provided with reliable information, guidance, or advice without prejudice.

Land rights

The 3rd factor was land rights, with a total variance of 3.661% comprising 5 sub-variables (Table 6). The result indicated that rural women are most likely to participate in agricultural activities if equal land ownership and property rights are granted to hold, use, inherit, control, and own the land. Land rights are also crucial for rural women's economic empowerment, as secure land rights are associated with access to credit,

Table 4. Access to finance and agricultural input (n = 248)

Sub-variables	Factor loadings F1
I will be involved in agriculture:	
If it is easy to get capital assistance	0.903
If financial or capital contributions are physically given to run my farm	0.772
If it is easy to get financial resources from the bank to continue agricultural activities	0.712
If smallholders or farmers get more attention comparable to large-scale farms from the government	0.691
If I can make plans on my farm or orchard	0.542
If government policies in the field of agriculture focus on all types of crops	0.495
If I can pass on the land in my name to the next generation	0.489
If I can make appropriate and accurate decisions on farm matters	0.477
If I am paid a salary comparable to that of male workers	0.436
Eigenvalue	27.604
Total variance explained (%)	56.334
Cumulative variance (%)	56.334

Table 5. Social culture (n = 248)

Sub-variables	Factor loadings F2
I will be involved in agriculture:	
If I have land inherited from my family	0.771
If there is an organization or group of farmers who give guidance and directory on how to manage the farm	0.768
Even though my husband is able to provide for all the needs and wants of the family	0.643
If the information and advisory services provided by agricultural officers are useful for all types of crops	0.569
If I had land shared with my husband	0.473
If there is an organization or group of farmers who can teach me in managing the field of agriculture	0.470
Eigenvalue	1.848
Total variance explained (%)	3.771
Cumulative variance (%)	60.105

Table 6. Land rights (n = 248)

Sub-variables	Factor loadings F3
I will be involved in agriculture:	
If my name is listed as the owner on one of the land ownership grants	0.791
If I have knowledge related to advanced machinery and equipment	0.595
If there are machines and equipment on the farm that are useful to help do agricultural activities	0.576
If agricultural policies in Malaysia make it easier for me to get involved in agriculture	0.520
If the advice from the agricultural agency is not only given to male farmers but also to female farmers	0.460
Eigenvalue	1.794
Total variance explained (%)	3.661
Cumulative variance (%)	63.765

which enhances women's bargaining power and decision-making over consumption (Rehman et al., 2019). A secure land tenure and property rights could empower women in agriculture (USAID, 2016). In view of this, rural women should have easy access to financial assistance because they are capable of building trust with the bank. It subsequently allows them to adopt technologies on their farm that can boost agricultural productivity. Agriculture policies that legally recognize women's land rights would encourage rural women to participate in agricultural activities because it also means they are granted legal capacity and guaranteed economic rights.

Access to land

The 4th factor was access to land, with a total variance of 3.566% comprising 6 sub-variables (Table 7). The result indicated that access to land affects the participation of rural women in agricultural activities since secure access to land allows rural women to better execute their roles as food producers. Indeed, access to land could boost efficiencies in production and food security (Lipper and Zilberman, 2018). Women could also generate income to serve as collateral for credit and, most importantly, as a means of savings for the future (Zeller and Sharma, 2000). It also highlights the government's intervention role in land governance policy-making. Rural women would be more likely to participate in agricultural activities if policies related to land governance were instated, implemented, and enforced effectively. Gender equality can empower women even if they were poor, rural women would be actively involved in agricultural activities if they had access to land, the freedom to perform any activity on the land, and capital assistance from the government, despite having to cultivate on a small-scale farm (Sraboni et al., 2014).

Technology adoption

The 5th factor was technology adoption, with a total variance of 3.014%, comprising 5 sub-variables (Table 8). The result indicated that technology adoption affects the participation of rural women in agricultural activities. This can be seen with the introduction of labor-saving technologies which improves the well-being and participations of rural women because they will no longer have to deal with a heavy workload on the farm and be able to balance between farming activities and household responsibilities (Theis et al., 2018).

Participation in farm management decisions

The 6th factor was participation in farm management decisions (Table 9), with a total variance of 2.924%. The result indicated that, participation in farm management decision influence rural women involvement in agriculture. Rural women are more likely to participate in agricultural activities if they have more influence over farm decision-making (Robaa and Tolossa, 2016). Besides, when women actively engage in farm management decisions, they more likely to make long-term, sustainable choices for their agricultural practices which could contribute to overall resilience of the farm (Carnegie et al., 2020).

Limited scope of agricultural policy

The 7th factor was the limited scope of agricultural policy, which comprises 8 sub-variances with a total variance of 2.510% (Table 10). The result indicated that the limited scope of agricultural policies can also influence rural women's participation in agriculture. This is so because rural women are more likely to participate in agricultural activities when more coordinated, integrated, and coherent agriculture policies are put in place. Special considerations should include the recognition of women's dual and triple responsibilities in "productive and reproductive" work, their lack of education,

Table 7. Access to land (n = 248)

Sub-variables	Factor loadings F4
I will be involved in agriculture:	
If it is easy to buy land with a 3rd party.	1.103
Even though my husband, brother or father still controls most agricultural activities	0.733
If there is an organization or group of farmers who can help me get my farm resources and input	0.569
If smallholders or farmers are easy to get capital assistance with the government on par with large-scale farms	0.509
If I am free to do any activity on my land	0.459
If the information and advisory services provided by agricultural officers are appropriate for women farmers	0.444
Eigenvalue	1.747
Total variance explained (%)	3.566
Cumulative variance (%)	67.331

Table 8. Technology adoption (n = 248)

Sub-variables	Factor loadings F5
I will be involved in agriculture:	
If any organization or group of farmers gives me the opportunity to be involved in various agricultural activities	0.606
If I knew the latest agricultural technology	0.597
If I am easy to gain knowledge about a technology in agriculture	0.585
If I can use my smartphone to manage agricultural activities	0.487
I will still be involved in agriculture even though I am responsible for all household chores	0.443
Eigenvalue	1.477
Total variance explained (%)	3.014
Cumulative variance (%)	70.345

Table 9. Participation in farm management decision (n = 248)

Sub-variables	Factor loadings F6
I will be involved in agriculture:	
If I can make all the decisions on all farm matters	0.803
If I am given more opportunities to manage all farm or orchard management processes and not just take care of and monitor them	0.534
If women have the opportunity to venture and cultivate commercial crops	0.501
Eigenvalue	1.433
Total variance explained (%)	2.924
Cumulative variance (%)	73.269

Table 10. Limited scope of agricultural policy (n = 248)

Sub-variables	Factor loadings F7
I will be involved in agriculture:	
If I do not face discrimination while claiming land rights	0.610
If there is an agricultural officer who gives agricultural information in an easy-to-understand way	0.550
If the legal system in Malaysia makes it easier for me to defend my land rights	0.537
If I regularly get information and advice from agricultural officers	0.528
If I am interested in the goals and objectives of agricultural groups and other farm organizations	0.453
If I can also make all the decisions related to farm affairs like my husband or father, my brother did	0.403
If I have land in my name	0.389
Even though I am only involved in light work in agriculture	0.387
Eigenvalue	1.230
Total variance explained (%)	2.510
Cumulative variance (%)	75.779

Table 11. Access to information and extension services (n = 248)

Sub-variables	Factor loadings F8
I will be involved in agriculture:	
If I am always involved in the organized extension services development	0.736
If it is not difficult to get a loan from the bank, even if the borrower is from the inland and has a small land size	0.593
If I could go down to the farm or garden to take care of the crops compared to my husband, brother, or father	0.382
Eigenvalue	1.005
Total variance explained (%)	2.050
Cumulative variance (%)	77.829

mobility, and access to capital, as well as socio-cultural constraints imposed by social group, class, and religion (Campbell et al., 2020). Policies that address gender inequalities could help rural women in achieving equality.

Access to information and extension services

The 8th factor (refer to Table 11) was access to information and extension services, which comprises 3 sub-variances with a total variance of 2.050%. The findings indicate that access to information and extension service influence women farmers' participations in agriculture. This means that rural women are more likely to participate in agriculture with access to resource and support for women because offering valuable information, training, and support to women can help them overcome the challenges and obstacles they face on the farm (Antwi-Agyei and Stringer, 2021). Meanwhile, women from rural areas with smaller landholdings are more

likely to be involved in agriculture since they might face fewer barriers to entry, have stronger cultural and economic connections to farming. Moreover, when women have control over the day-to-day management of their farms or gardens, this could empower them to play an active role in agriculture activities and encourage them to participate in agriculture.

CONCLUSIONS

Factors affecting rural women's participation in agricultural activities in Ranau, Sabah, encompassed access to financial and agricultural inputs, social culture, land rights, access to land, technology adoption, participation in farm management decisions, limited scope of agricultural policy, and access to information and extension services for women in agriculture. It is therefore recommended to provide gender-sensitive extension services, advocate for the recognition of land rights, establish financial support programs, promote technology adoption, provide capacity-building initiatives for farm management decision-making, provide cultural sensitivity training, conduct thorough policy reviews, and conduct continuous research and monitoring to enhance rural women's participation in agricultural activities in Ranau, Sabah. The present study has provided insights to determine the factors of women's participation in agriculture activities based on past studies. Highlighted as a limitation is the participation patterns of rural women in agriculture might vary differently across the farming sector and regions. The research also suggested that a theoretical model should be proposed to test the relationship between these factors and women's participation in agriculture, along with research to identify solutions for reducing identified barriers.

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