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FARMER'S ADOPTION OF SUSTAINABLE AGRICULTURAL PRACTICES: A REVIEW FROM THE PERSPECTIVE OF RURAL DEVELOPMENT

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Abstract:

Agriculture is an important contributor of rural development. The rural area will benefit economically, socially, and environmentally if the approach of sustainability in agricultural activities is put into practise. This, in turn, will help to make rural development more sustainable in the long run. In a similar light, rural development strategies are also variables that can make it easier for sustainable practises to be implemented in a cost-effective and timely manner. Therefore, this paper aims to examine the significance of dimensions of sustainable rural development as assisting elements in farmer's decision-making towards adopting Sustainable Agricultural Practices (SAP). Previous empirical studies were analysed for this purpose, and 50 studies conducted in various countries were evaluated in order to discover the main elements impacting the decisions to adopt SAP. The NVivo 12 software was used to code influencing factors gathered from previous studies into dimensions essential to sustainable development of rural area according to the Rural Web model. Findings of this research have found most of the influencing factors that affects farmer's decision to adopt SAP came from the dimension with institutional elements. Meanwhile, novelty aspect was found to have the least factors recorded in previous studies, which has drawn attention to a gap in previous research. The association between farmers who use innovative methods and their decisions to embrace SAP should be explored further in future studies.

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Keywords:

Adoption, Sustainable Agriculture, Rural Development, Rural Web

Introduction

Agriculture is important to many countries worldwide, serving as the backbone of their economies. Natural resources play an important role in supporting agriculture productivity, and the environmentally destructive use of such resources will only have negative consequences in the future. Conventional agriculture has already been associated with a multitude of environmental concerns, highlighting a need for the agricultural production to be practised in a sustainable manner. Sustainable agricultural practises (SAP) not only benefit the environment by reducing household poverty, but they also benefit the environment by increasing agricultural productivity (Nafeo Abdulai and Abdul-Rahaman, 2020). It is possible to contribute to the well-being of rural communities by cultivating crop production in a sustainable way, which can be used as a means of achieving a sustainably developed rural area.

Although the practice of sustainable agriculture has been around for a while, the amount of farmers adopting the practices globally is far from satisfactory thus far. It has been 30 years since the first findings on farmers' attitudes toward adoption were published in the 1980s that studies have progressed (Rahm and Huffman, 1984; Feder and Slade, 1984; Feder et al., 1985) in addition to the extensive literature that has provided a variety of frameworks to fully understand farmer adoption. Hence, fostering higher level of SAP requires critical understanding of the influencing factors.

This paper has its originality coming from the notion that dimensions for a sustainably developed rural region have essential parts towards delivering the external elements affecting the decision of adopting sustainable agriculture among farmers. Specifically, this paper seeks to examine the significance of these dimensions with farmer’s decision towards adopting sustainable practices.

Rural Development and Sustainable Agriculture

Agriculture is the major land use and a significant part of rural viability around the world. Agricultural production has an important role towards the economic state of rural and countryside regions in terms of employment and business opportunities, and environmental quality. Due to the proximity of rural areas with natural environment compared to the urban areas, it is necessary to protect existing ecosystems while at the same time ensuring the need for optimum farm productivity is fulfilled (Zinchuk et. al., 2018)

It is critical for rural development to address the environmental issues associated with intensive agriculture. Agricultural production and conservation must be integrated into rural planning to be effective. Sustainability in developing rural areas can be translated to the improvement of rural community's economic, social, and cultural well-being while at the same time, protecting the condition of natural resources and making sure that the wellbeing of people living in the rural area is being taken care of (Guinjoan et al., 2016). Agriculture has undergone modernization, that has contributed to degradation of the environment. As a result, there has been an increase in public awareness on the importance of environmental conservation when it comes to agricultural production. (Pugliese, 2001). A model that fits the notion would be the

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rural web model, as it explores the concept of a sustainably developed rural area being supported by six characteristics as its underlying resources grouped as sustainability, institutional, social capital, endogeneity, market governance, as well as novelty (van der Ploeg and Marsden, 2008).

Materials and method

This study adapted the PSALSAR approach from Mengist et al. (2020) to conduct a review of literature in six steps. PSALSAR is the abbreviation for steps of protocol, search, appraisal, synthesis, analysis, and reporting. The process starts with designing the range of the research to focus on, then the search for materials appropriate for the study was conducted in research databases. The third step was to define the criteria for including and excluding the previous empirical studies that will be used for review. The data from the research papers were then retrieved and categorised, and the last step of this procedure involves narrating the results and drawing conclusions from the data that was analysed. Studies for this review were obtained from Scopus with the keyword strings of "adoption" AND "farmer" AND "theory of planned behaviour" OR "theory of reasoned action" OR "diffusion of innovation" OR "decision-making" OR "behaviour" AND "sustainable agriculture" OR "sustainable practices" OR "best management practices" OR "conservation" OR "sustainable agricultural practices". Abstrackr was used to screen the abstracts. Abstrackr is a tool for screening research articles for review (Wallace et al., 2012). After screening the papers to ensure they fulfilled the criteria to be included in the review, Google Scholar was used to further track their citations.

Table 1: Empirical Studies Selected for Review

Statistical Model	Size of Sample	SAP	Source(s)
Logit	100	Sustainable practices	Agholor and Nkosi (2020)
	442	Conserve soil and water	Amare and Simane (2017)
	661	Rotation, irrigation, crop varieties	Arunrat et al. (2017)
	295	Organic farming	Badu-Gyan et al. (2018)
	110	Reduced tillage practices	Bavorová et al. (2020)
	290	Conserve soil	Canales et al. (2018)
	155	Compost and crop rotation	Debie (2021)
	250	Conserve soil and water	Dhehibi et al. (2018)
	230	Manage land sustainably	Etsay et al. (2019)
	385	Conservation tillage	Han et al. (2018)
	701	Conserve water	Jha et al. (2019)
	149	Conserve soil and water	Karidjo et al. (2018)
	269	Conserve soil and water	Mekuriaw et al. (2018)
	176	Manage land sustainably	Miheretu and Yimer (2017)
	291	Sustainable practices	Muchai et al. (2020)
	386	Climate-smart practices	Mujeyi et al. (2019)

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	351	Rainwater harvesting	Muriu-Ng'ang'a et al. (2017)
	160	Manage land sustainably	Ndagijimana et al. (2018)
	185	Conserving practices	Ntshangase et al. (2018)
	520	Compost	Paul et al. (2017)
	108	Organic farming	Suwanmaneepong et al. (2020)
	344	Conserving Practices	Tsige et al. (2020)
	202	Eco-friendly practices	Tu et al. (2018)
	924	Eco-friendly practices	Zhang et al. (2018)
Probit	500	Sustainable practices	Adusumilli and Wang (2018)
	1267	Climate-smart practices	Aryal et al. (2018)
	612	Sustainable Intensification	Jabbar et al. (2020)
	266	Conservation tillage	Ji et al. (2017)
	334	Sustainable practice for soil	Kanyenji et al. (2020)
	1284	Sustainable intensification	Kotu et al. (2017)
	440	Conserve soil and water	Kpadonou et al. (2017)
	685	Sustainable intensification	Kurgat et al. (2018)
	45	Manage land sustainably	Ng'ang'a et al. (2019)
	300	Manage land sustainably	Nigussie et al. (2017)
	408	Conserve soil and water	Sileshi et al. (2019)
	550	Sustainable farming technology	Zeng et al. (2019)
	350	Manage land sustainably	Zeweld et al. (2018)
Tobit	248	Manage soil and water sustainably	Mutua-Mutuku et al. (2017)
Structural equation model (SEM)	294	Good farming practices	Tinh et al. (2019)
	74	Green fertilizer	Adnan et al. (2020)
	538	Conserve water and soil	Faridi et al. (2020)
	442	Low-carbon agriculture	Hou and Hou (2019)
Endogenous switching regression	579	Climate-smart practices	Tran et al. (2019)
	300	Climate-smart practices	Zakaria et al. (2020)
Fractional regression	2218	Climate-smart practices	Branca and Perelli (2020)
Endogenous treatment effects	2800	Agri-environmental practices	Lawin and Tamini (2018)
Heterogeneous treatment effects	350	Conserving Practices	Olawuyi (2020)
Regression adjustment with inverse probability	1173	Climate-smart practices	Makate et al. (2019)

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weighting (IPWRA)			
Exploratory factor analysis (EFA) and linear regression	318	Organic farming	Nguyen and Nguyen (2020)
Factor analytic model	408	Crop rotation, cover crops	Abdulai et al. (2021)

Source: Gathered by author

As research materials for this study, a collective amount of 50 empirical research conducted in various countries from 2017 to 2021 were included. Figure 1 shows process of selecting the articles to be included in the study. Selected papers were reviewed for identification of key elements that influences decisions to adopt quite a number of different sustainable practices. Using the NVivo 12 software, these factors were coded into rural web dimensions which are sustainability, institutional, social capital, endogeneity, market governance, as well as novelty (van Der Ploeg and Marsden, 2008).

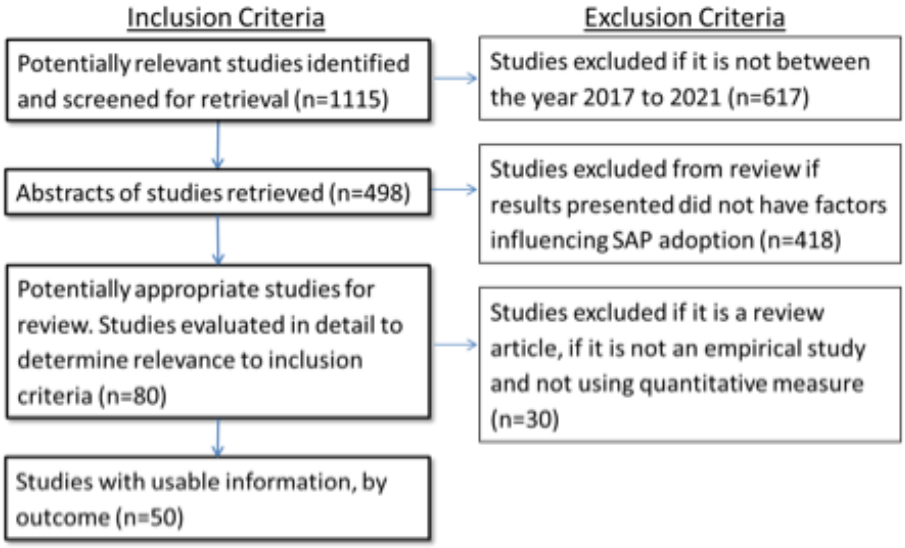

Figure 1: Criteria Used to Screen Articles

Source: Author

Factors Influencing Adoption of SAP

The factors that influence SAP adoption can be classified into many different dimensions, as the decision-making process is influenced by various external and internal elements. However, for the purpose of this study, the factors listed from the empirical studies were grouped into dimensions that supports a sustainable form of development in rural areas. The dimensions and influence they have on farmer's decision to adopt is shown in Figure 2. It was found that the dimensions with the most influencing factors towards the adoption of SAP were the institutional dimension, followed by the social capital dimension. Meanwhile, there were no factors associated with SAP adoption can be grouped under novelty dimension.

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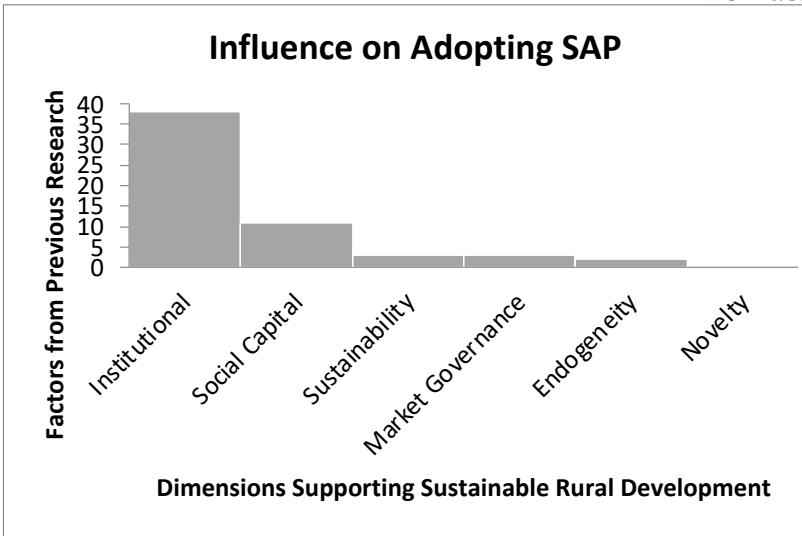

Figure 2: Dimensions and Influence on SAP Adoption

Source: Author

Dimensions with The Most Influencing Factors

Dimension with the most factors recorded from previous studies contains institutional aspects that relates to structures and formations which handle existing difficulties and foster collaboration between communities. This institutional dimension is a key contributor to enhance SAP adoption as it conveys the knowledge regarding SAP to farmers. Variables such as receiving help from offered schemes and courses, provision of financial help, high frequency of visits from extension agents, provision of training from local institutions, and being a member in agricultural groups has influence in adoption (Abdulai et al., 2021; Adusumilli and Wang, 2018; Agholor and Nikosi, 2020; Amare and Simane, 2017; Arunrat et al., 2017; Bavorova et al., 2020; Jha et al., 2019; Mutua-mutuku et al., 2017; Zakaria et al., 2020). These are significant to getting farmers to use sustainable practices because they help with knowledge sharing. Figure 3 shows factors being grouped into their related dimensions.

As for social capital, it can best be described as connections empowering people for actions that be done collaboratively towards a cause. It was found that when farmers are getting involved actively towards an action and having close relationships with each other, these aspects increase the decision to adopt sustainable practices. It is largely due to the links in social circles becomes knowledge for exposure towards new techniques (Jabbar et al., 2020; Jha et al., 2019; Tinh et al., 2019; Zeng et al., 2019). This is especially helpful in introducing farmers to new sustainable practises.

Dimensions with Less Influential Factors

Dimension of sustainability has much lesser influence as compared to dimensions with institutional aspects and social relations, as it relates to the agriculture's multifunctionality. It's a dimension specifically relating to diversification of income for a farmer alongside agriculture. Off-farm income and diversifying activities on farm were found to be important factors in farmers' adoption of SAP (Karidjo et al., 2018; Mekuriaw et al., 2018; Ng'ang'a et al., 2020). Meanwhile, the market governance dimension is referring towards capabilities in strengthening and bringing influence on current market. Factors like access to markets have been significantly relevant for the increase in adopting sustainable practices (Aryal et al., 2018; Kotu et al., 2017; Kurgat et al., 2018).

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Referring to the rural web conceptual model, endogeneity can be defined as a feature of the local environment that has an effect on rural economic activities. Farmers' adoption of SAP was found to be influenced by aspects like the distance of farms from their homes as well as the state of their farm. One of the significant impacts on adoption of sustainable agricultural practices is the condition of their farmland. Climatic conditions of their farm has a role in affecting the level of adoption (Branca and Perelli, 2020). Dimension that was recorded with no factors to be associated with is novelty, which can be described as the act of repurposing available resources while establishing links that strengthen the local environment. Elements of novelty were not found to be included as factors in any of the empirical research that were analysed in this study. This highlights the importance of finding a link between the act of novelty in resource use with the adoption of sustainable practices to be studied in future research.

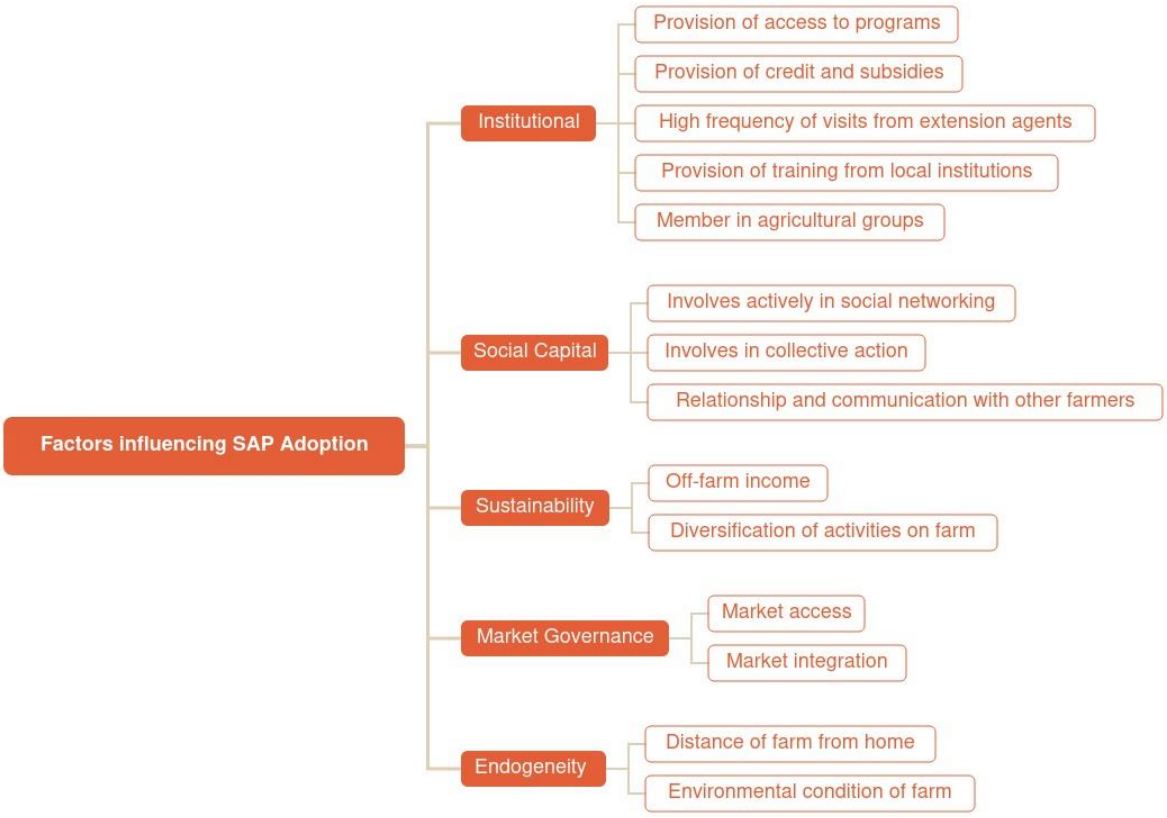

Figure 3: Factors Influencing SAP Adoption

Source: Author

Conclusion

Following the findings of this paper, it has been demonstrated that factors relating to adoption of sustainable agricultural practises from previous empirical literature are able to get grouped and classified towards rural web dimensions. Elements that involve multifunctionality of agriculture, governing markets, and local relations were found to have lesser factors influencing adoption compared to the institutional dimension which contains the most factors. There were no insights from the articles reviewed that included factors relating to the novelty dimension. As a result of the research conducted, it was discovered that there is gap in the robust previously recorded research on variables that influence decision of adopting SAP. It

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will be necessary to examine relationships between these dimensions and the decision of farmers to adopt sustainable farming practises in order to obtain a comprehensive picture of the overall picture of the situation. It should be considered for future research to investigate the relationship between practices of novelty with adoption of SAP.

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