Research Paper: Modeling the Social Sustainability in Rural Communities of Developing Countries (Case Study: Bilevar Plain; Kermanshah Province)

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ABSTRACT

Purpose: Understanding how rural communities meet their needs and enhance their well-being while promoting social cohesion, equitable access to resources and services, and fostering community resilience is of utmost importance when investigating the social sustainability of rural areas. Social dimensions often receive inadequate attention during the appraisal of rural development projects. Consequently, the main aim of this study is to create social sustainability indexes that can effectively support the evaluation of sustainable rural development.

Methods: To achieve this aim, a proposed methodology is presented, which utilizes Confirmatory Factor Analysis (CFA) to estimate the coefficients of indexes about rural social sustainability (RSS). This approach constructs a Structural Equation Model (SEM), offering insights into the potential of these indexes for driving long-term improvements in social sustainability within rural areas.

Results: The results of the CFA analysis show the variables of quality of life (QOL), social participation (SP), and social responsibility (SR) enhance the sustainability of rural, and the positive effect is more prominent among rural areas that had high social solidarity. Moreover, the construct validity of RSS-SEM model was (P = 0.166, Chisquare/df = 1.229IFI = 0.971, CFI = 0.969, NFI = 0.861, and RMSEA = 0.054).

Conclusion: The application of the SEM (Social-Economic-Environmental) model is recommended for assessing rural projects as it provides a comprehensive framework that complements environmental and economic sustainability assessments. By incorporating social factors into project evaluations, the SEM model enables a more holistic understanding of rural development's social, economic, and environmental dimensions, ultimately contributing to more effective and sustainable outcomes.

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1. Introduction

Sustainable development (SD) most prominently entered the global political arena in 1987 in the United Nations Commission on Environment and Development report, also known as the Brundtland Report. The report stated, "Humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs" (Silvestre & Tirca, 2019). Since the Brundtland Commission on Environment and Development, sustainability − being able to make a balance in an economically, ecologically, and socially sustainable manner − is now regarded as providing a broad goal for communities (Abadi & Khazand., 2022). However, the three pillars of development—economic, environmental, and social sustainability—are off balance, and achieving social sustainability in Iranian's rural is limited by unsustainable pastoral resources, a vulnerable agricultural environment, and social inequity (Vazin, 2021; Zinatizadeh et al., 2017). Iranian's urbanization growth has been at an unprecedented speed. One of the reasons for the population growth stems from the rural-urban migration. While Iran is running and maintaining its rapid agricultural growth mode, a variety of problems have arisen, drawing scientist's attention to sustaining the social aspect of living in rural communities, such as rural immigrants' rights (Dadashpoor & Nateghi, 2017), agricultural lands degradation (Kiani-Harchegani & Sadeghi, 2020), rural housing problems (Mohammadi et al., 2018), urban-rural inequality (Shafiei Sabet & Azharianfar, 2017), and excessive urban development and farmland loss (Moein et al., 2018). Social unsustainability generates concerns about Iranian rural communities.

First and foremost, the rural-urban migration has induced severe labor loss in the countryside. Rural outmigration is mainly driven by the desire for higher-paid jobs in cities compared to the unstable and low-paid employment in towns and villages. Second, the remaining population is another problem facing Iranian villages (Mianabadi et al., 2022). The people who stayed in the rural areas and those left behind could hardly manage or sustain agriculture and the countryside and the rural depopulation, which caused poverty and villages' self-managing capacity decline. Third, the rural hollowing problem also emerged in rural Iran when many peasants left their home villages, leaving most dwellings unoccupied and farmland abandoned (Abdullah et al., 2019). In short, Iranian's rural decline, which highly impairs its rural sustainability, has inevitably emerged as part of the national issue. Thus, the country's sustainability on the macro scale will be affected if villages can't develop sustainably. Understanding the urgency and importance of rural sustainability makes it necessary to rethink social sustainability strategies. Hence, this paper aims to investigate which social factors affect the sustainability of rural development. Rural social sustainability is the most critical factor influencing the promotion of social conditions in Kermanshah province. In other words, between the main pillars of sustainable development (social, economic, and environmental sustainability), maintaining the position of social sustainability is referred to as the central pillar of development in Kermanshah province.

2. Literature Review

Models rural social sustainability

Sustainability is about an economy based on increased social and environmental responsibility that balances economic, social, and environmental aspects of development. The primary sustainability model includes the triad model in which the ecological part is interwoven with the economic and social aspects. This three-pillar sustainability model has dramatically evolved in developing each part independently (Purvis et al., 2019). The environmental dimension means introducing a low-carbon green economy, which decouples economic growth from the consumption of natural resources and energy while reducing the pressure on the planet by lower the emission of CO2 and energy and resource efficiency (Kristensen & Mosgaard, 2020). The social dimension supports the idea of responsible consumption, social justice, and equality (both inter and intra-generational). The crucial role of the social aspect in sustainability made by many factors offers the path to improve the economy and support the environment to achieve a higher quality of life. These social facets must be considered in the short and long term (Missimer et al., 2017). Social sustainability research defines sustainable development in a way that emphasizes human livelihoods as integral to accomplishing ecological goals through economic growth that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (Missimer et al., 2017). While this definition foregrounds social equity and justice by referring to diverse needs, inclusion criteria, and opportunities, careful reading exposes a privilege of the physical environment and how community settings enable sustainable social outcomes (Purvis et al., 2019).

Eizenberg & Jabareen (2017) provided a conceptual framework of social sustainability as a construct of four interrelated concepts (urban forms, safety, equity, and eco-presumption) that integrates social sustainability's physical and non-physical aspects. Under this framework, they tried to propose a holistic way to ensure the well-being of people, and the planet, responsible production and consumption, and establish emotional connections among people. Broman & Robert (2017) suggested the framework of strategic sustainable development (FSSD) to create a unifying structure for strategic sustainability. The FSSD focuses on taking a broad systems perspective of the sustainability challenge and could develop a vision framed by social and ecological sustainability principles and assess the current situation concerning that vision (Broman & Robert, 2017). Another theoretical model of social sustainability is developed based on the Theory of Planned Behaviour (TPB) by Panda et al. (2020), which focuses on customer altruism, buying intention, loyalty, and customer evangelism. Integrated Management System for Sustainability Improvement model (LIMSSI) is another model to improve social sustainability by integrating quality, environmental, social responsibility, and occupational health and safety management systems. LIMSSI is based on the rational use of resources and energy while engaging and empowering people (Estevam-Souza & Alves, 2018). Multi-tier supply chain structure (MSCS) is a conceptual framework of social sustainability to link drivers, issues, barriers, tensions, practices, and performances. MSCS is paramount to ensure social sustainability in the entire supply chain, especially for higher-tier suppliers (Govindan et al., 2021). A few social issues in the literature of MSCS include violations of human rights and labor rights, child labor, forced labor, discrimination, forced overtime, low wages, poor health and safety, sexual harassment, and the protection of female workers.

Indexes extensions of the RSS model

The selection of social sustainability indicators frequently is not grounded in theory but rather in a practical understanding of plausibility and current political agendas (Gan et al., 2017). Asmelash & Kumar (2019) specified a comprehensive list that ensures social sustainability; inter- and intra-generational social justice; participation and local democracy; health, quality of life and well-being; social inclusion (including the eradication of social exclusion); social capital; community; safety; mixed tenure; fair distribution of income; social order; social cohesion; community cohesion (i.e., the cohesion of groups); social networks; social interaction; a sense of community and belonging; employment; residential stability; active community organizations; and cultural traditions. Asmelash & Kumar (2019) also highlighted the pride/sense of place attachment and community stability. Social criteria are related to the application contexts and the life cycle stages (Kuhnen & Hahn, 2017). Moreover, the identification of social criteria must be associated with the affected parties. Broadly, social sustainability addresses three points: the well-being of human beings, society, and the safety of consumers (Atanda, 2019). The human aspect is comprised of skill development (Govindan et al., 2021); alleviation of poverty and narrowing inequality (Haider et al., 2018); and respecting human rights, health and safety, welfare, non-discrimination and fair wages (Atanda, 2019). The society aspect deals with social values (Vazin, 2021); preserving culture (Gan et al., 2017); and local community engagement, philanthropy, charity, and hiring local people (Zinatizadeh et al., 2017). The fulcrum of social sustainability is people. Trust and the ordinary meaning of social sustainability are the links between employees and employers (Nunkoo, 2017). Karji et al. (2019) emphasized that housing and living conditions should be considered a concern.

RSS depends on the evaluation criteria that determine their state of development; however, the definition of the criteria that comprise social sustainability in rural projects is not delineated. Govindan et al. (2021) emphasize the consideration of the participation criteria and hold that rural farmer can improve their knowledge of the pastoral problems and the context to draw reasoned sustainability. The focus of Gan et al. (2107) study was on the essential aspects of the social system that need to be sustained for it to be possible for people to meet their needs. These fundamental aspects were found to be trust, common sense, diversity, learning capacity, and capacity for self-organization. Trust is generally considered the overriding aspect of a vital social system. Trust is crucial in social capital as a binding force that keeps a group or society cohesive. Resilience in social systems depends on diversity, encompassing a range of factors such as diverse personalities, age groups, gender representation, and skill sets.

Additionally, the capacity for learning and self-organization is an intrinsic motivator for resilience within these systems (Missimer et al., 2017). Moreover, some studies used several indexes (e.g., social interaction, happiness, future, accountability, community involvement, social disorder, social responsibility, and social dynamics) to measure social sustainability in rural areas (Shamsodini & Jamini, 2016; Ghadermarzi & Jamini, 2017). Therefore, solving the problems and challenges of the rural

community dependent on development all indexes related to the life affairs of rustic, which are summed up in the term of social sustainability (Safari Aliakbari & Jamini, 2017).

Key motivators of the RSS model

Since the emergence of social sustainability research, evaluating processes have been focused on social participation. Public participation in planning became the preferable approach and mostly generic response to several social challenges and vagaries, including sustainability. Some more progressive public participation mechanisms in rural planning have yielded positive results, such as improved social cohesion and social networks that allow people to discuss problems and solutions together and become acquainted (Riristuningsia et al., 2017). Equity is among the most known representatives of social aspects within the sustainability literature (Leach et al., 2018). Equity, or justice, inclusively addresses social, environmental, and economic justice and fairness issues in all developing and developed societies. In the social sustainability framework, the fundamental premise of equity and justice is that less inequality and greater justice reduce the alienation of people from their living spaces and, thus, heighten their concern with environmental issues (Leach et al., 2018). Therefore, equity emphasizes social and economic justice and fairness in pursuing sustainability policies and development while addressing climate change. Participatory justice is significant for developing human spaces that favorably reflect sustainability efforts. Following Royer et al. (2018), her concept of parity of participation, which assumes that "justice requires social arrangements that permit all (adult) members of society to interact with one another as peers," is crucial for achieving social sustainability.

Social responsibility (SR) has been studied in social sustainability research for some time, but a consensus is still missing concerning its definition and its constituent dimensions, constructs, and principles. There is significant variation in these CSR perceptions and definitions. Rodrigues and Mendes (2018) have argued that SR requires 'consideration of issues beyond the company's narrow economic, technical, and legal requirements. Notably, the EU Commission, as the highest legislative body in the EU, has also proposed a definition of SR. The Commission defines SR as 'actions by companies over and above their legal obligations towards society and the environment' (Galant & Cadez 2017). One common theme behind SR's writings is that rural managers should focus on multi-stakeholders welfare instead of concentrating only on maximizing the shareholders' wealth (Galant & Cadez, 2017). Following the recent literature on social sustainability, we conclude that the concept of quality of life, and participation, are central components of the social sustainability framework. This concept includes seven dimensions; social health, social security, social responsibility, social participation, social trust, social solidarity, and quality of life (Rukn-Eddin Eftekhari & Azimi Amoli, 2013).

3. Methodology

In the first step of this study, the components that influence the RSS were identified based on literature research. Then, a structured questionnaire was used to comprehend the social sustainability in rural regions. The questionnaire comprises questions on demographics and multiple items for each variable of RSS—finally, the relationship among variables developed following the Structural Equation Modeling (SEM) method. Four external variables include extrinsic (cropland, crop type, education, and social security) and seven intrinsic (social sustainability indexes) variables. The research model is shown in Figure 1, was estimated in SPSS and Amos software.

Study Area

Agriculture has become the primary factor influencing livelihood status and water scarcity in Kermanshah province. In response to the needs of the rural regions in the Bilevar and Miandarband Plain, the Gavshan dam was constructed to provide a reliable water supply. The primary objective behind the construction of the Gavshan dam was to meet the agricultural water requirements of the Bilevar and Miandarband plain, encompassing approximately 31,000 hectares of land. The development of social sustainability within the rural communities of the Gavshan watershed was an additional aim. Situated along the Gaveh River, which originates in the Badr Mountains and eventually joins the Sirvan River, the Gavshan watershed covers a substantial area of 7736 Km^2. The irrigation and drainage network of the Gavshan Dam caters to two plains, namely the Bilevar Plain and Miandarband Plain. The Gavshan basin comprises approximately 11 agricultural pumping stations that facilitate land irrigation. The irrigation and drainage network of the Gavshan dam serves around 25 villages in Bilevar Plain and 29 villages in Miandarband Plain. Over the past decade, the exploitation of the Gavshan irrigation network has significantly contributed to enhancing economic and social conditions, increasing annual agricultural income, generating employment opportuni-

ties, and curtailing the migration of villagers (Regional Water Company of Kermanshah, 2020).

Data collection and analysis

Methods used in this study include a literature review and a questionnaire survey among local farmers. The literature review investigated the RSS indexes (e.g., participation, trust, solidarity, quality of life, responsibility, health, and security). Information on the RSS indexes was collected using questionnaires. To collect data on the social sustainability criteria, a questionary survey was conducted with 80 farmers who were stockholders in the Gavshan irrigation network (N= 100) (Regional Water Company of Kermanshah, 2020). The sample size was determined at 80 farmers (S = 80) based on Krejcie and Morgan's Table (1970). A stratified random sampling technique was used to select stockholder farmers in the Gavshan irrigation network (see Table 1 for more details).

A closed questionnaire was developed based on Rukn-Eddin Eftekhari and Azimi Amoli (2013). A survey instrument was designed to measure the seven constructs in the RSS model. The instrument contained 32 statements measuring the constructs. They were: Social Participation (SP) (five items), Social Security (SSe) (five items), Quality of Life (QL) (five items), Social Responsibility (SR) (four items), Social solidarity (SSo) (four items), Social Health (SH) (six items), and Social Trust (ST) (three items). In the quality-of-life aspect, surveys were embedded with some questions on the Settlement of residential areas and villages around the dam, households' livelihood strategies, and future perspectives and solutions to settle the problems. Social responsibility questions included irrigation turns, water allocation strategies, and the maintenance of irrigation channels and equipment. Furthermore, the participation was embedded with some questions about participation in agricultural operations, such as the agricultural and horticultural cultivation and animal farm areas (see Table 2 for more details).

Table 1. Farmers in the Gavshan watershed and selected samples

Rural District	Farmers	
	Population	Sample
Batman	24	18
Cheshme Kaboud	11	9
Chegqbarale	10	8
Choubtashan	14	12
Khanom Abad	11	8
Dolatyar	12	10
Qale	18	15
Total	100	80

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Table 2. Social sustainability indexes and corresponding questionnaire statements used within the survey

Social sustainability indexes	Questionnaire items
Social participation	Participation in social activities related to the protection of the irrigation network Participation in water distribution organizations Participation in meetings designated by government organizations Participation in the activities determined by the village council in connection with dam affairs Participation in direct and indirect agricultural activities
Social security	The amount of change in the conflicts between the stockholders after the construction of the dam The amount of change in the conflicts between the stockholders and the neighboring villages after the construction of the dam The amount of change in theft after the construction of the dam The presence of government security police to control affairs The prevalence of murder or crime after the construction of the dam
Quality of life	The level of satisfaction with the quality and quantity of access to services The level of satisfaction with the sufficiency of income to meet needs The possibility of saving part of the income The level of hope for the future of oneself and children The feeling of happiness

Table 2. Social sustainability indexes and corresponding questionnaire statements used within the survey

Social sustainability indexes	Questionnaire items
Social responsibility	The level of responsibility of the villagers towards the problems and solving the problems of the village The degree of belief of the experts of government in handing over part of the responsibilities to the farmers The level of belief of the village councils in getting help from the residents and handing over part of the affairs to them The amount of responsibility of farmers in maintaining irrigation network equipment
Social solidarity	The level of empathy of people with each other (considering each other's condition during irrigation) The degree of solidarity and empathy of the people when there are incidents or problems in the village The degree of solidarity of people when they disagree with government plans The degree of solidarity between people during irrigation and adjusting the irrigation cycle
Social health	The rate of change in the consumption of grains such as rice after the construction of the dam The amount of change in meat consumption after the construction of the dam The amount of change in dairy consumption after the construction of the dam The rate of change in the consumption of legumes after the construction of the dam The rate of change in fruit and vegetable consumption after the construction of the dam The number of visits to medical centers to take care of health and hygiene
Social trust	Change in the level of trust toward government programs after the construction of the dam The amount of change in the civil and local trust after the construction of the dam The amount of change in the level of trust of the villagers towards solidarity or interpersonal trust

Source: findings of research

JSRD

The instrument's reliability was assessed by Cronbach's alpha reliability coefficient for seven parts of the questionnaire and was above the conventional level of 0.7, as shown in Table 3. A panel of experts from the Department of Agricultural Extension and Education at Razi University in Kermanshah Province validated the survey.

Following the completion of questionnaires, the cognitive model from the RSS was provided to obtain the relationships among variables (Figure 1).

Research Method

Confirmatory Factor Analysis (CFA) was applied to examine the instrument's internal structure (i.e., model fit). CFA relies on several statistical tests to determine the adequacy of model fit to the data. In this study, the model fit of the SEM model was evaluated by several tests: Root Mean Square Error of Approximation (RMSEA), chi-square significance test, Normed Fit Index (NFI), and Comparative Fit Index (CFI). The RMSEA and chi-square index measure how well the parameter estimates reproduce the observed covariance matrix. The chi-square test indicates the amount of difference between expected and observed covariance matrices. A chi-square value of zero indicates little difference between the expected and observed covariance matrices. In addition, the probability level must be greater than 0.05 when the chi-square is close to zero (Xia & Yang, 2019). CFI and NFI indicate the close fit of a given model compared to a null model, while the NFI adjusts for parsimony. The Comparative Fit Index (CFI) equals the discrepancy function adjusted for sample size (AB Rani et al., 2023). CFI ranges from 0 to 1, with a more significant value indicating a better model fit. Good model fit is characterized by a CFI value of 0.90 or greater (Hu & Bentler, 1999). RMSEA values range from 0 to 1, with a smaller RMSEA value indicating a better model fit. Acceptable model fit is characterized by an RMSEA value of 0.06 or less (Hu & Bentler, 1999).

4. Findings

Socio- demografic variables

The demographic characteristics of the farmers participating in this study are presented in Table 4. The average age of the farmers was found to be 51.45 years. All respondents in the study were male, indicating a male-dominated farming population. Among the farmers surveyed, 55.70% had completed less than a high school education, 35.44% held a high school diploma, and 8.86% had pursued higher education. On average, the farmers cultivated approximately 2.5 hectares of land. Furthermore, the average agricultural experience among the farmers was 28.60 years, indicating a sample consisting of experienced individuals in the field. The primary crops cultivated by the farmers included wheat, barley, canola, and maize, highlighting the prevalent agricultural practices in the region.

Table 3. Reliability of the parts of the questionnaire

Number	Related items	Number of questions	Cronbach's alpha
1	social participation (SP)	5	0.74
2	Social Security (SSE)	5	0.75
3	Quality of Life (QOL)	5	0.70
4	Social Responsibility (SR)	4	0.85
5	Social Solidarity (SSO)	4	0/82
6	Social health (SH)	6	0/70
7	Social trust (ST)	3	0/72
8	Education (E)	1	n/a
9	Crop type (CT)	1	n/b
10	Crop Land (CL)	1	n/c

Source: findings of research

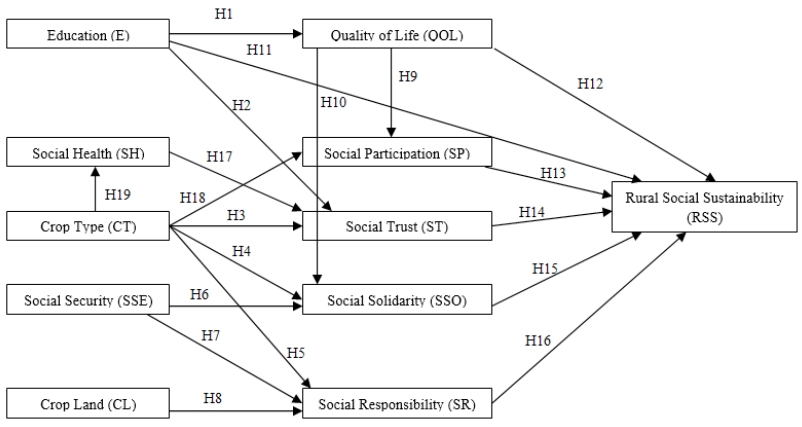

Figure 1. Research model. Source: findings of research

Table 4. Socio-demographic variables associated with farmers

Variable	Category		
Age (average)	Years 51.45		
Education (percentage)	8 years of education 55.70	12 years of education 35.44	Higher education 8.86
Cultivated area (average)	Ha 2.5		
Agricultural experience (years)	Years 28.60		
Main crop	Wheat Barley Canola Maize		

Source: findings of research

CFA analysis and SED model

Table 5 provides the estimated values of the coefficients from the resulting regression analysis. The regression analysis results indicate the structural model as a whole explained 60% of the variance in rural social sustainability. As shown in Table. 5, the explained beta coefficients in QOL (Quality of Life), CT (Crop Type), and SR (Social Responsibility) were 75%, 60%, and 58%, respectively.

Table 5. Estimates of regression weights in research hypotheses

Hypothesis Number	Relations Between Variables	Standardized Coefficients (Beta)	t	Sig.	Results
H1	E – QOL	0.19	2.87	0.003	Accept
H2	E – ST	0.06	1.9	0.15	Reject
H3	CT – ST	0.52	6.2	0.000	Accept
H4	CT – SSO	0.60	7.95	0.000	Accept
H5	CT – SR	0.52	6.05	0.000	Accept
H6	SSE – SSO	0.43	5.5	0.000	Accept
H7	SSE – SR	0.37	4.5	0.000	Accept
H8	CL – SR	-0.13	-1.93	0.07	Reject
H9	QOL – SP	0.28	2.95	0.006	Accept
H10	QOL – SSO	-0.10	-1.5	0.1	Reject
H11	E – RSS	0.42	2.23	0.01	Accept
H12	QOL – RSS	0.75	8.55	0.000	Accept
H13	SP – RSS	0.01	1.23	0.06	Reject
H14	ST – RSS	-0.19	-2.8	0.01	Accept
H15	SSO – RSS	0.57	6.1	0.000	Accept
H16	SR – RSS	0.58	6.34	0.000	Accept
H17	SH – ST	0.21	2.98	0.02	Accept
H18	CT – SP	0.52	5.91	0.000	Accept
H19	CT – SH	0.29	3.1	0.006	Accept

Source: findings of research

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The structural model of RSS is shown in Figure 2. Based on the results, the CT (crop type) significantly predicted SSO (Social solidarity) and had a direct positive effect on SP (Social Participation) and SH (Social Health). The SSE (Social Security) had a direct effect on SSO (Social Solidarity) and SR (Social Responsibility), while CL (Crop Land) was significantly and negatively related to SR (Social Responsibility). Although SSE (Social Solidarity) predicted RSS (Rural Social Sustainability) while SP (Social Participation) did not show statistical significance for RSS (Rural Social Sustainability). Moreover, ST (Social Trust) was significantly and negatively related to RSS (Rural Social Sustainability). Overall, there is sound evidence to support the RSS model for using all variables at the five percent level. These results are shown in Figure. 2.

RSS-SED model fit measures

Fit indices of the RSS model with a certain threshold are shown in Table 6. Since the Chi² value of the proposed model does not provide sufficient information to judge model fit, the P-value, norm fit index (NFI), Incremental Fit Index (IFI), and comparative fit index (CFI) are used as a yardstick. A model fits well if the difference between the correlation matrix implied by the model and the empirical correlation matrix is so small that it can be purely attributed to sampling error. In other words, the difference between the correlation matrix implied by the model and the empirical correlation matrix should be non-significant ($p > 0.05$). Otherwise, if the discrepancy is significant ($p < 0.05$), the model fit has not been established. Based on Table 6, the result of the P-Value had an acceptable fit to the data ($p = 0.166$). The closer the NFI, IFI, and CFI to 1, the better the fit. This study's NFI, IFI, and CFI values represent an acceptable fit. The more parameters in the model, the more significant (i.e., better) the NFI result. The Root Mean Square Error of Approximation (RMSEA) measures the mean absolute value of the covariance residuals. The RMSEA allows assessing the average magnitude of the discrepancies between observed and expected correlations as an absolute measure of the (model) fit criterion. A value less than 0.10 or 0.08 (in a more conservative version; see Hu and Bentler, 1999) is considered a good fit. Based on the result, the RMSEA was 0.054. The result of confirmatory factor analysis had an acceptable fit to the RSS-SED model, as shown in Table 6.

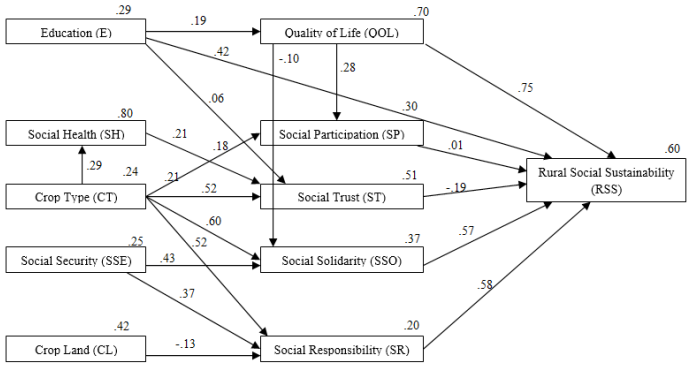

Figure 2. Path analysis of the Rural Social Sustainability (RSS). Source: findings of research

Table 6. RSS-SED model fit

Fit Index	Desirable Value	Observed Value
Chi-Square	Chi-Square Table Value	CMIN = 43 P-value = 0.166
Degrees of Freedom	-	35
CFI (comparative fit index)	≥ 0.90	0.969
IFI (Incremental Fit Index)	≥ 0.90	0.971
NFI (norm fit index)	≥ 0.90	0.861
RMSEA (root mean square error of approximation)	≥ 0.08	0.054
N = 80		

Source: findings of research

This study considers that water availability in rural regions has a more severe effect on the sustainability of rural communities. A lower level of education might potentially decrease the people's trust to government plans and the trust between communities. A lower social trust leads to reduced social sustainability with a wide range of conflicts of interest, such as unauthorized water withdrawal and failure to comply with irrigation regulations and the tax system. As Baghai & Becker (2018) stated, conflicts can occur when an individual makes or influences a decision and does so for some personal gain that may be unfair, unethical, or even illegal. Due to that, sustainable development of rural areas requires actions that would strengthen educational entities. CFA analysis supports the view that there are significant positive associations among the solidarity, quality of life, participation, and responsibility constructs. This result is consistent with the findings of Benlemlih & Bitar (2018) that high social responsibility communities enjoy low information asymmetry and high solidarity. Social responsibility factors directly related to farms' primary condition (e.g., crop type, and security in rural) are more relevant in increasing rural social sustainability than those related to participation factors.

Moreover, the result showed that crop type and social security increase social solidarity that strongly and significantly affects rural social sustainability. Esteves et al. (2021) found that social solidarity is an approach to the production, services, and knowledge that promises to address economic, social and environmental crises more effectively in contemporary communities. However, as with the more significant sustainability field, the social dimension of this framework is not sufficiently science-based and operational and, thus, in need of further development.

It should be noted that the world system's transition towards sustainable development depends on the real socio-opportunities for each country's development. Ensuring the balance of the socioeconomic and environmental system means overcoming income inequality and the effective use of resources, promoting economic growth in the population's interests. This study indicated that the SED model could identify RSS factors and improve social sustainability. However, in the larger

sustainability field, as with the country scale, the social dimension of this study is not sufficiently science-based and operational and, thus, needs further development. Hence, future research can determine the economic effects and ecological factors when using RSS-SEM. However, the study had several limitations that should be considered in future research:

1. The results show farmers' perception, but they could be subjected to field trials, which were physically and financially beyond the scope of the research.

2. This study considered the perspectives of men farmers. However, it is also critical to understand the views of rural women.

3. The study looked into the effect of water access on rural social sustainability. When assessing the views, future research could address social sustainability in water scarcity conditions.

5. Discussion

This study used a path diagram to show the theoretical and hypothesized relationships between social sustainability items to create a hypothetical model of RSS using the SED method. The study's findings indicate that crop type positively influences social solidarity, which in turn enhances social participation, social responsibility, and social trust, and social solidarity can bridge the public trust gap for rural social sustainability. Therefore, the rural social sustainability (RSS) model provides a useful means of identifying the conditions necessary for sustainable development. Developing the sustainability criteria is needed to help governments tackle long-term societal challenges such as aging populations and changing agricultural operations. Identifying RSS helps local rural managers to identify the social consequences of current decisions and integrate future decisions for achieving social sustainability in strategic decisions such as sustainable development. It is suggested that governments strengthen trust. Social trust nurtures participation in rural action, strengthens social cohesion, and builds institutional legitimacy in rural areas.

The results of this study showed that the SED model could provide an accurate picture of the complexity of social issues by identifying the components influencing social communities. Within this context, this study helps to develop the knowledge of social variables in social sustainability research. Yet, this study may have overlooked the role of other causes in predicting sustainability in rural areas. Thus, more research is required to identify other causes affecting rural communities. In addition, future social sustainability research can address the political-cultural dimensions and the short-term and long-term consequences of changes in rural governance.

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Conflict of Interest

The authors declared no conflicts of interest.

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