



Toward Sustainable Food Crop Agriculture In Rural Area By Employing Social Entrepreneur And Penta Helix Approaches: Systematic Literature Review

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Abstract:

Ideally, tropical countries have great potential in agricultural resources; however, agriculture in most tropical countries, especially in rural areas, is often hindered in its development by various factors, including suboptimal governance systems and inadequate understanding of key problems. Basically, sustainable agriculture (SA) can be realized optimally if its dimensions—particularly the socio-economic and environmental ones—operate synergistically. Socio-economic functions supported by a conducive environment are key to achieving SA. In this study, we conducted a systematic literature review to analyze various problems and improve SA performance through synergy among these dimensions, particularly in food crop agriculture. We emphasize the phenomenon of social entrepreneurship (SE), which demands synergy among these key dimensions. Additionally, we reviewed literature on multi-helix implementations to enhance managerial systems involving multiple stakeholders. We found that literature describing multi-helix models (e.g., penta-helix) to support SA performance remains scarce. Indeed, our search yielded no reports specifically discussing the penta-helix (PH) model in the context of food crop agriculture. The results of this study are expected to guide academics and stakeholders in understanding the SE phenomenon more deeply and exploring the potential of PH implementation, particularly for food crop agriculture.

Keywords: sustainable development, social entrepreneurship, sustainable agriculture, food crop, rural area, social, economic, environment, technology, policy, collaboration, pentahelix

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INTRODUCTION

Sustainable agriculture (SA) refers to practices that aim to meet the needs of food production to ensure the long-term sustainability of agricultural systems that include economic profitability, financial management, use of technology and the creation of social justice (Jat et al., 2020; Khan et al., 2021; Kurdyś-Kujawska et al., 2021; Yi et al., 2021). In general, performance SA can be assessed from the level of social welfare, agricultural productivity, environmental stability, and political economic conduciveness of a region (Hu et al., 2022; Pretty et al., 2020; Valizadeh & Hayati, 2021). In rural areas, the performance of SA can be seen simply based on the SARD index (Sustainable Agriculture and Rural Development) which is characterized by the success rate in terms of productivity of agricultural products (Hu et al., 2022).

In addition, SARD can also be reviewed from the performance of social entrepreneurship (Social Entrepreneurship, SE) that is in it (Arafat et al., 2020; Drejeris et al., 2021; Sargani et al., 2020; Tinh et al., 2023). If the performance indicators show a positive value, then the success of the achievement can be considered quite effective. However, the reality is that the realization towards achieving effective performance, especially in rural areas, is not easy. This is due to

various systemic factors, where each element is interrelated with each other. Factors such as unemployment rates, economic growth, the pace of infrastructure development, and the capacity of human resources related to the tendency to engage in entrepreneurship must be taken into account proportionately (del Olmo-García et al., 2023). Therefore, strategic efforts are needed to realize the achievements of SA which is optimal, including by considering social entrepreneurship that is adjusted to the conditions and objects of the rural environment itself.

However, we need to realize that rural environments have their own economic and structural characteristics. This condition on the one hand offers opportunities for entrepreneurs to develop their skills that allow for regional transformation (Bavorová et al., 2021), while on the other hand there will be many challenges that will be faced. In rural areas, there is often a low level of economic activity, infrastructure development, access to essential services, and even a relatively high level of poverty. Nonetheless, rural areas still have the potential to encourage entrepreneurial projects through informal cooperation networks (Galvao et al., 2020).

In creating this network strength, rural entrepreneurs have a relatively different pattern of steps from other entrepreneurs in general, because they tend to only utilize local resources that they can access and then develop those resources until the local economy grows (Saghaian et al., 2022). Their business activities are usually limited by integrations that only interact based on their spatial location with reference to the principle of profit and are relatively dependent on global sales and supply stability conditions. Although it looks quite simple, this type of entrepreneurship is believed to be able to make a direct contribution to job creation in the local environment and is able to develop appropriate goods and services products so that it is very worthy of consideration to be more optimally empowered.

The main strength of rural social entrepreneurship is that the products and services produced usually have a distinctive identity. Locally-based products can have quite promising selling value because they have unique characteristics (specific). In the context of agriculture and food, rural products have advantages that may not be found elsewhere so they have their own attractions, for example certain types of food crops. Local entrepreneurial products from agriculture and food, based on their originality, can be divided into traditional and non-traditional product groups.

Traditional groups can be interpreted as all agricultural products that have certain characteristics, functions or benefits (Y. Zhang & Li, 2022) while non-traditional are all types of products that are not of local origin or have undergone modifications either in terms of their processing methods or formulations (Ayambila et al., 2023). The development of added value in local traditional products can be one of the keys to the success of social entrepreneurship at the regional level (Faqih et al., 2020), therefore improved performance ONE On this scale, it can be started by considering the added value potential of locally-based agricultural products.

In addition to efforts to increase value-added potential, efforts to improve the performance of agriculture-based rural SARD can also be carried out by reviving the function and role of social entrepreneurship (ONE). Here we need to affirm that Local SE or that covers rural areas relatively different from SE urban or those that encompass urban areas. Some experts view that the level of entrepreneurship in rural areas sometimes exceeds that of urban (Fortunato, 2014), this is due to the increasing number of rural communities who are turning

entrepreneurship into an economic growth strategy that offers a low-cost alternative to industrial recruitment in urban areas.

The development of local businesses can grow which has an impact on the provision of sustainable jobs and local sources of income. But local SE requires an innovative approach to enhance strategic capabilities and prospectivity (Calzada, 2019). This phenomenon is starting to gain recognition as a viable approach to improving the local economy. Then, despite the strengths and advantages that exist, rural SE also has its own challenges. The first challenge is the geographical conditions; some rural communities can be located relatively far from important business networks due to their geographical location.

This has an impact on limited access to human resources, the number of workers, a wide market, and institutional support. The second is the relatively low population density, which has an impact on limited local demand. When compared to urban areas, high population density undeniably often indicates greater productivity and income. The third is the type of monotonous industry, for example, only certain types of agricultural industries so that they are more susceptible to instability. And fourth, another challenge that is often faced is in terms of marketing (Kwil et al., 2020).

The marketing capabilities of business actors in rural areas often still need optimization (Ataei, Ghadermarzi, et al., 2020; Muñoz & Kimmitt, 2019), while the product cycle of goods and services will be hampered if marketing does not work optimally. To overcome some of these challenges, a collaborative strategy is needed that involves many elements so that mutual relationships can be created that strengthen each other, one of which is through the implementation of the concept multi-helix.

The concept of multi-helix is a framework which involves several elements that are synergistically integrated with each other. Multi-helix is a development of triple-helix (TH), a framework which contains the collaboration of three elements, namely academia, government, and industry (Leydesdorff, 2000; Leydesdorff & Etzkowitz, 1998). Over time, the TH model transformed into quadruple-helix (QH) (Cai & Lattu, 2022) then began to be popular models penta-helix (PH) (Capetillo et al., 2021) dan multi-helix (Borah et al., 2023). Framework Multi-helix is widely adopted by experts to create managerial conduciveness involving many parties (multi-stakeholder) such as the discourse of smart city governance (Borghys et al., 2020), world of tourism, environmental insights (Megawati et al., 2022), public health (Sjögren Forss et al., 2021), even countering terrorism (Subagyo, 2021). In addition, the concept multi-helix also have a contribution to the realization of the SDGs (Sustainable Development Goals) (König et al., 2021; Zhou & Etzkowitz, 2021).

In the context of performance SARD in the scope food crop farming that we studied, we emphasized on the PH model, which is a framework which consists of a collaboration of five elements including academia, government, industry, society, and media. The PH model is considered sufficient to facilitate improved performance SARD. Community and media elements in addition to the TH model are complementary to the development of the industrial element. In this case, the role of community elements is divided into two, namely as industry players themselves (i.e. agriculture & farmers) and as consumers, namely users of agricultural products.

Meanwhile, the media, especially mass media or social media, is an element that plays an important role in socialization to marketing. In today's technological era, the role of social media in the agricultural industry is very large, even agricultural actors began to adopt marketing via social media for their agricultural commodities since a few years ago (Han et al., 2022). The percentage of budget for marketing on social media has increased from 3.5% in 2009 to more than 13% in 2020 (Moorman, 2019). Thus, elements of society and media, especially social media, are very worthy of being considered after academic, government, and industry elements.

In this literature review study, we explored to find strong correlations between sustainable agriculture (SA) in rural areas, social entrepreneurship (SE), and the Penta-Helix (PH) framework. We conducted an analysis to measure the influence of SE and PH implementation on SA performance based on case studies that have been reported related to SE conceptualization, especially in supporting the success of SE in agriculture. In addition, we also reviewed various case studies related to the implementation of PH in building synergistic collaboration between elements even though they are not directly related to the world of agriculture. This is because studies that report the implementation of PH for the SE in the agricultural sector are very rare, even those that specifically discuss food crops so far.

RESEARCH METHOD

In this SLR study, the method we carried out was relatively simple which was divided into three stages of procedure, namely identification, screening, and including. Identification includes the process of identifying and collecting articles based on predetermined keywords, namely, sustainable development, social entrepreneurship, sustainable agriculture, food crop, rural area, social, economic, environment, technology, policy, collaboration, and pentahelix from several trusted sources such as Elsevier, Wiley, Springer, MDPI, Nature, and others. In selected articles, we grouped based on theme, explanation of the issue or problem discussed, proposed goals or solutions and reported contributions or findings.

In this case, we limited the scope of the research time to the period between 2016 to 2023. To analyze the metadata obtained from these articles, we used the PRISMA and Vos Viewer methods. Using relevant keywords in the literature search process, we managed to identify as many as 260 articles that met the criteria we set, resulting in 30 articles that met the criteria that had been set. The mechanism of the article selection process is described in Figure 1 as follows.

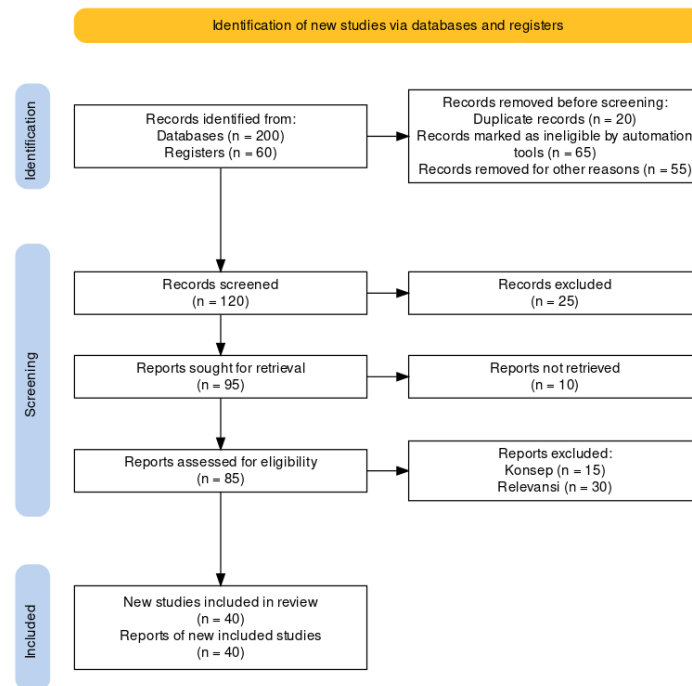


Figure 1. mechanism

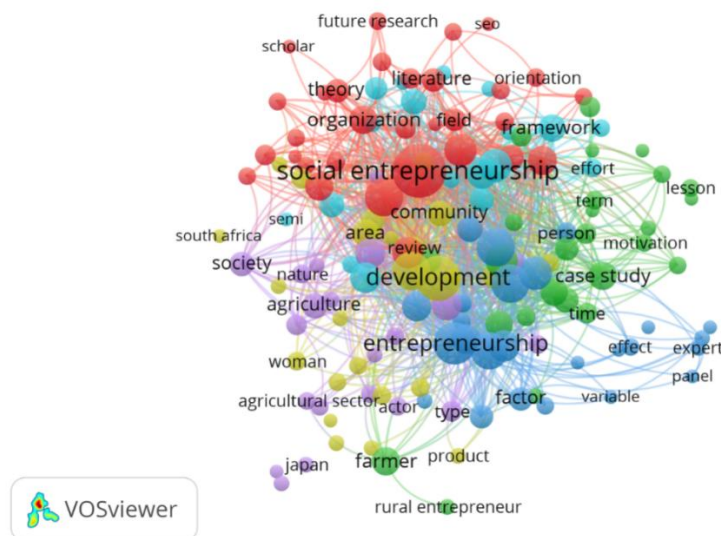


Figure 2. (a) Diagram of the article filtering process and (b) visualization of article mapping with the VOSviewer program.

The following is the tabulation of several articles that have been grouped based on year, issue, objective and contribution (presented in Table 1).

Table 1. List of literature on the results of the screening process in this SLR

No.	Writer	Heading	Publish er	Identities	Year	Article Type	Issue/problem	Objectives/solutions	Contribution
1	F.O. Garcia (del Olmo-García et al., 2023)	Determinant factors for the development of rural entrepreneurship	Elsevier	Technologica l Forecasting & Social Change 191, 122487	2023	Research	Promote rural entrepreneurship to provide solutions for depopulation and economic development.	To test the level of economic growth and human resources related to the tendency to do entrepreneurship in rural areas.	Knowledge of the factors that drive rural entrepreneurship.

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2	J.M.D. Sarachaga (Díaz-Sarachaga & Ariza-Montes, 2022)	The role of social entrepreneurship in the attainment of the sustainable development goals	Elsevier	Journal of Business Research 152, 242–250	2022	Research	Absence of a specific tool to assess the impact of social business on the fulfillment of the Sustainable Development Goals (SDGs)	Build a new assessment system based on the 2030 Agenda to be applied to different types of SEs.	Instrumentation system to rank and assess the contribution of organizations in efforts to meet the SDGs.
3	S. Agarwal (Agarwal et al., 2020)	A qualitative approach towards crucial factors for sustainable development of women social entrepreneurship: Indian cases	Elsevier	Journal of Cleaner Production 274, 123135	2020	Research	Explores the important factors for sustainable development from a holistic competency development conceptual framework that drives women's entrepreneurship.	To determine how effective women's efforts in responding to gender discrimination are to empower women directly.	Strategies to facilitate policymakers in conducting effective campaigns, encouragement and motivation in addition to policies that result in policy reform.
4	M.T.M. Picazo (Méndez-Picazo et al., 2021)	Effects of sociocultural and economic factors on social entrepreneurship and sustainable development	Elsevier	Journal of Innovation & Knowledge, 6(2), 69-77.	2021	Research	The relationship between social entrepreneurship and entrepreneurship with sustainable development goals	To analyze the behavior of the two groups towards entrepreneurship in general and social entrepreneurship.	Scientific explanations related to the greatest impact of sustainable development and the factors that drive entrepreneurial activities.
5	J. Horne (Horne et al., 2020)	Exploring entrepreneurship related to the sustainable development goals - mapping new venture activities with semi-automated content analysis	Elsevier	Journal of Cleaner Production, 242, 118052.	2020	Research	The role of entrepreneurship in achieving the SDGs in Germany.	To develop a structured and scalable approach that makes it possible to map new business activities in Germany.	A measurable and iterative approach to mapping new business activities related to the SDGs, and providing a detailed analysis of the entrepreneurial landscape.
6	P. Ataeia (Ataei, Karimi, et al., 2020)	A conceptual model of entrepreneurial competencies and their impacts on rural youth's intention to launch SMEs	Elsevier	Journal of Rural Studies 75, 185–195	2020	Research	Specification of entrepreneurial competencies to launch small and medium enterprises (SMEs) among rural youth.	to identify the various aspects of entrepreneurial competencies needed by rural youth and to explore their impact on the intention to launch SMEs	Motivation based on scientific studies for rural youth to have a set of competencies to prepare themselves to launch SMEs.
7	A.R. Galvao (Galvao et al., 2020)	Mentoring entrepreneurship in a rural territory – A qualitative exploration of an entrepreneurship program for rural areas	Elsevier	Journal of Rural Studies, 78, 314-324.	2020	Research	Lack of optimal types of economic activities in rural areas.	To instill an understanding of how important entrepreneurship programs are for rural areas.	Provide empirical evidence on the importance of rural entrepreneurship programs.
8	X. Zhang (X. Zhang et al., 2022)	Paths out of poverty: Social entrepreneurship and sustainable development	Frontiers	Frontiers in Psychology, 13, 1062669	2022	Research	Innovative ways to solve social problems (related to poverty) in rural areas.	to integrate farmers and companies into their value chains to develop and realize economic opportunities.	A conceptual framework for the sustainable development of social entrepreneurship and enriching research on the process of realizing economic opportunities.
9	L. Alinaghian (Alinaghian & Razmdoost, 2021)	How do social enterprises manage business relationships? A review of the literature and directions for future research	Elsevier	Journal of Business Research 136, 448–489	2021	Review	An investigation into the practices adopted by social entrepreneurs to manage their relationships with the business world.	to critically assess the status of current research on the practices used by entrepreneurs in managing business relationships in the future.	Identify four key practices, namely initiation, persuasion, conflict resolution, and value creation in social-business entrepreneurial relationships to provide a foundation and direction for future research.
10	N. Vercher (Vercher, 2022)	The Role of Actors in Social Innovation in Rural Areas	MDPI	Land, 11, 710.	2022	Research	Uncertainty about the roles of different types of actors involved in social innovation, especially in rural areas.	To examine which actors enable social innovation in rural areas, and the role they play in the process.	A scientific explanation of the role of the central party (government) in entrepreneurial processes at the local level.
11	B. Harsanto (Harsanto et al., 2022)	Open Innovation for Sustainability in the Social Enterprises: An Empirical Evidence	MDPI	J. Open Innov. Technol. Complex. 8, 160	2022	Research	Achieve social missions as well as financial sustainability.	To explore open innovation by involving external parties that are important for the sustainability of social enterprises.	An explanation of sustainability innovations carried out by social enterprises, for example, in the form of providing benefits.
12	L. Kiminami (Kiminami et al., 2020)	Social entrepreneurship and social business associated with multiple functions of urban	Springer	Asia-Pac J Reg Sci 4, 521–552	2020	Research	Increase social entrepreneurship to create businesses with urban agriculture functions.	To test the relationship between social entrepreneurship, social business (SB) and various functions of urban agriculture.	A policy model to promote social entrepreneurship to solve social problems through businesses related to the various functions of urban agriculture.

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13	W. Jiatong (Jiatong et al., 2021)	agriculture in Japan Impact of Social Entrepreneurial Factors on Sustainable Enterprise Development: Mediating Role of Social Network and Moderating Effect of Government Regulations	SAGE	Sage Open 11(3)	2021	Research	The role of mission and social innovation in sustainable business development	To identify the role of mission and social innovation in sustainable business development as well as the role of moderation of government regulations	A scientific explanation that explains the relationship between mission and social innovation to sustainable business development.
14	J. Feng (Feng et al., 2022)	Identifying the factors affecting strategic decision-making ability to boost the entrepreneurial performance: A hybrid structural equation modeling – artificial neural network approach	Frontiers	Frontiers in Psychology 13, 1038604.	2022	Research	Correlation of strategic decision-making with five factors (attention, memory, thoughts, emotions, and sentiment).	To establish a linear and nonlinear model between an aspect and strategic decision-making capabilities.	A conceptual model related to strategic decision-making capabilities that lead to entrepreneurial performance (EP) based on two-system decision-making theory.
15	M.G. Bublitz (Bublitz et al., 2022)	Stronger together: Developing research partnerships with social impact organizations	Wiley	Journal of Consumer Affairs, 56(3), 1028-1045	2022	Research	Not all academic and social organizations realize the best efforts required to succeed in the relationship between elements in the socio-economic sphere.	To offer a partnership framework related to relational engagement that can be deployed within the Transformative Consumer Research (TCR) community.	A conceptual review of relational engagement includes choosing partners, building mutually beneficial relationships.
16	P. Gupta (Gupta et al., 2020)	Social entrepreneurship research: A review and future research agenda	Elsevier	Journal of Business Research 113, 209-229	2020	Review	Comparative studies of social entrepreneurship in an industry in developed and developing countries are still limited.	Conduct a review of SE articles published during 2007-2018 by reviewing articles on social entrepreneurship.	Presents a systematic review of 188 <i>peer-reviewed</i> journal articles published in the last decade.
17	A. Klarin (Klarin & Suseno, 2023)	An Integrative Literature Review of Social Entrepreneurship Research: Mapping the Literature and Future Research Directions	SAGE	Business & Society 62(3) 565–611	2023	Review	The SE perspective is related to the exploration of macro-level issues such as socioeconomic drivers, economic, political contexts, and entrepreneurial ecosystems.	To demonstrate the strength of knowledge in a particular domain to identify potential gaps in future research directions.	Mapping existing research from 5,874 scientific publications on social entrepreneurship (SE) using scientometrics.
18	N. Hietschold (Hietschold et al., 2023)	Pathways to social value and social change: An integrative review of the social entrepreneurship literature	Wiley	Int J Manag Rev. 25,564–586.	2023	Review	Articulate a comprehensive framework that connects the various paths taken by social entrepreneurs.	To conceptually distinguish between social value and social change as a distinct outcome of social entrepreneurship.	A broader understanding of the positive impacts of social entrepreneurship and a systematic exploration of how to achieve it.
19	A.Kosa (Kosa & Dhliwayo, 2024)	Scientific mapping and thematic progression of digitalization of social entrepreneurship in developing countries	Elsevier	Sustainable Futures 7,100153	2024	Review	There is a lack of study on the convergence of social entrepreneurship with digital entrepreneurship.	To identify prospective research topics that link the digitalization of social entrepreneurship (DSE) with various parameters.	A review of social entrepreneurship intentions, sustainability of social enterprises and economic growth, economic and social impacts of DSE and sustainable development in developing countries.
20	A.K. Tiwari (Tiwari et al., 2023)	The role of structural social capital in driving social-oriented sustainable agricultural entrepreneurship	Elsevier	Energy Economics 124, 106855	2023	Research	The role of sustainable agriculture and structural social capital (SSC) in socioeconomic recovery and sustainable food supply chains.	Providing a new perspective on SE by making sustainable agricultural entrepreneurship (SAE) a research context.	Understand the relationship between aspects of sustainable agriculture and structural social capital and behavioral intentions in the context of SAE (sustainable agriculture entrepreneurship).
21	G.R. Sargani (Sargani et al., 2020)	Sustainable Entrepreneurship in the Agriculture Sector: The Nexus of the Triple Bottom Line Measurement Approach	MDPI	Sustainability 12(8), 3275	2020	Research	Sustainable development requires academic research to examine entrepreneurship by combining sustainability value-creation practices and current entrepreneurial efforts in the agricultural sector.	To explore the mechanisms underlying the intention to promote sustainable entrepreneurship in agriculture.	Provide an empirical basis for policy formulation to encourage agribusiness that increases the effectiveness of entrepreneurship education development programs.

No.	Writer	Heading	Publish er	Identities	Year	Article Type	Issue/problem	Objectives/solutions	Contribution
22	I. Calzada (Calzada, 2019)	Local entrepreneurship through a multistakeholders' tourism living lab in the postviolence/peripheral era in the Basque Country	Wiley	Reg Sci Policy Pract. 11, 451–466.	2019	Research	A case study of transformative tourism driven by local entrepreneurship in the coastal village and village of Zumaia in Spain.	To propose innovative methodologies through a <i>multi-stakeholder penta helix</i> framework in response to the trend of increasing visitors.	Uncovering the paradigm of transition to tourism placement through local entrepreneurship by avoiding the determinism contained in smart cities.
23	S. Megawati (Megawati et al., 2022)	Program Innovation through Penta Helix Approach	Hindawi	Education Research International, 7223314, 1–10	2022	Research	Information about Adiwiyata's role in developing the character of caring for the environment is still limited	The creation of the Adiwiyata program innovation in developing environmental care characters in elementary schools in Surabaya through the Penta Helix method	Scientific explanation related to the redesign of the Adiwiyata program in the city of Surabaya through the Penta Helix approach.
24	A. Capetillo (Capetillo et al., 2021)	Evolution from triple helix into penta helix: the case of Nuevo Leon 4.0 and the push for industry 4.0	Taylor & Francis	Int. J. on Interac. Design and Manuf. 15, 597–612	2021	Research	The latest technology that transforms the manufacturing process by implementing a multi-helix collaboration system.	To create an innovation ecosystem that is able to take advantage of the latest technological sophistication.	Penta Helix's Innovation Strategy Explanation which is aligned in one vision to create an innovation ecosystem.
25	K. Sudiana (Sudiana et al., 2020)	The development and validation of the penta helix construct	Vilnius Tech	Business: Theory and Practice 21 (1) 136–145	2020	Research	Research validating the construction of Penta Helix or Quintuple Helix measurements is still rare.	Develop construction and measurement instruments from Penta Helix that are validated in innovation-related research.	The construction of the Penta Helix variables in relation to innovation and knowledge-based economics, into five dimensions consisting of Academia, Business, Government, Community, and Media.
26	K.S. Forss (Sjögren Forss et al., 2021)	Collaborating in a penta-helix structure within a community based participatory research programme: 'Wrestling with hierarchies and getting caught in isolated downpipes:	Springer	Archives of Public Health, 79, 27	2021	Research	There is a social gap in the health sector.	To explore how penta-helix collaboration works from the perspective of all partners, including the community.	Scientific evidence of inflexibility in organizations with hierarchical structures that create barriers to citizen engagement in penta-helix collaboration.
27	A. To be answered (Subagyo, 2021)	The implementation of the pentahelix model for the terrorism deradicalization program in Indonesia	Taylor & Francis	Cogent Social Sciences 7: 1964720	2021	Research	Efforts to improve the performance of the terrorism deradicalization program carried out by the Indonesian government.	To analyze the implementation of the pentahelix model in the terrorism deradicalization program in Indonesia involving five parties.	A scientific explanation for the failure of the terrorism deradicalization program in Indonesia caused by the exclusion of the media by the National Counterterrorism Agency.
28	J. King (König et al., 2021)	Helix Models of Innovation and Sustainable Development Goals	Springer	Industry, Innovation and Infrastructure , 473–487	2021	Book Chapter	How a knowledge-based and innovation-based ecosystem has the potential to regulate and integrate society.	To explain the relationship between the Helix model and the Sustainable Development Goals (SDGs) in general.	Proposed Framework for Trans-disciplinary Analysis of Sustainable Development.
29	C. Zhou (Zhou & Etzkowitz, 2021)	Triple Helix Twins: A Framework for Achieving Innovation and UN Sustainable Development Goals	MDPI	Sustainability , 13, 6535.	2021	Research	Important issues in the reconciliation of innovative and sustainable development.	To propose a methodology to meet the Sustainable Development Goals (SDGs) through joint projects between countries.	The invention of the Triple Helix (university-government-public) for sustainable development as a complement to the Triple Helix (university-industry-government) for innovation.
30	D. Borah (Borah et al., 2023)	Teaching benefits of multi-helix university-industry research collaborations: Towards a holistic framework	Elsevier	Research Policy, 52, 104843	2023	Research	The impact of multi-helix teaching efforts on society and the economy remains unclear.	To explain the various conditions from the individual to the organizational level that allow for the involvement of actors in multi-helix teaching.	Strategies to develop a holistic framework to engage UIRC (<i>university-industry research collaborations</i>) actors in teaching at universities.

RESULTS AND DISCUSSION

The study collected 30 articles classified by issue, objectives and contributions (presented in Table 1.) These articles report various case studies, both research-based and review-based, by carrying out certain issues or problems accompanied by proposed solutions and their

contributions. In general, they highlight the factors that affect the performance of SA, especially those related to the two-dimensional pillars, namely socio-economic. The other dimension is basically a consequence of the dynamics caused by the two pillars. The focus of this literature review is directed at the SE phenomenon related to agriculture and the multi-helix or penta-helix collaboration model.

Based on the essence of the presented from the tabulated literature, we highlight several key points, namely the views of experts on sustainable agriculture (SA), social entrepreneurship (SE), penta-helix collaboration (PH), and the correlation between the three. In this case, the SA discussion highlighted the factors that determine the success of SA performance achievements, followed by the SE discussion which emphasized the importance of collaboration to improve performance and productivity and finally the PH discussion which provided an overview of alternative solutions in responding to the demands of more optimal agricultural productivity.

Sustainable agriculture (SA)

As is known, the development of SA in rural areas for sustainable development is influenced by many determining factors, including sociocultural, economic, support for access to resources, finance, infrastructure, and government policies. Sociocultural and economic influences play an important role in shaping social entrepreneurship where local cultural values, social norms, and economic conditions can have a significant impact on how a business (or business) operates and develops. Another factor is access to resources including information, knowledge, financial support and infrastructure, which is also decisive in the success of the achievement of SE in the agricultural sector in rural areas.

Studies reported by Picazo (Méndez-Picazo et al., 2021) And some field facts show that social members who have certain influences, positions, and power have greater access to resources and support than conventional social members. Their existence is a vital point that determines the development of sustainable business in the region.

In general, sustainable business development can refer to the SDGs points that have been formulated by the United Nations. Among the crucial SDGs points is collaboration, even 17 of them specifically emphasize the importance of establishing partnerships and cross-sector cooperation (Chauhan et al., 2022). In this regard, actors are encouraged to achieve the SDGs based on the principles of equitable sharing of benefits and risks, exchange of information and knowledge, product development, and effective coordination (Mehdikhani & Valmohammadi, 2019). This of course requires careful planning actions, where they must be able to align their business goals and activities in their strategic and operational aspects (Pohlmann et al., 2020).

One of the things that is quite simple, for example, companies must be able to interact well with suppliers and retailers if they want to achieve sustainable business. However, the relationship with them will greatly determine the supply chain and the conducive wheels of the economy. Another example is understanding consumer behavior related to the commodity supply chain, which is sometimes quite complex (Wang et al., 2020). Other complexities that have the potential to be a hindrance are bureaucracy in institutions, negotiations with suppliers, and various other processes (de Oliveira Souza et al., 2024; Schramm et al., 2020). Relationships

with institutions, especially the government, are important because they are related to policies and regulations so that they can affect entrepreneurial activities in general.

Social Entrepreneur (SE)

Social Entrepreneurship (*SE*) related to sustainable agriculture will not be separated from economic and social activities in it. Economic activities are oriented towards profitability while social activities are oriented towards interaction (including collaboration). The SE concept offers a promising way to promote sustainable agriculture within a rural scope. Social entrepreneurs are encouraged to be able to implement innovative business models, community-involved activities, and harmonious collaboration to address agricultural challenges. As discussed in the previous discussion related to SA, in the context of the sustainability of food crop agriculture, especially in rural areas, the main thing that deserves to be the main concern in the contemporary agricultural discourse is collaboration. Collaboration allows for simultaneous improvement of SA and SE performance so that it is very effective in fostering economic stimulation in the region.

Then, we look at the fact that there is a direct link between entrepreneurship and economic growth. To stimulate economic growth, political policymakers need to take into account the most appropriate proportionate measures to increase entrepreneurship, especially in rural agricultural areas where the impact can be long-term (Agarwal et al., 2020; Méndez-Picazo et al., 2021). This is given that rural agricultural areas are the main food barns for many other regions, so ensuring the long-term survival and resilience of agricultural practices is crucial.

Regarding this phenomenon, opinions of experts have begun to emerge who voice the contribution of social entrepreneurship as a new factor that needs to be considered in changing the goal of economic growth towards sustainable development. This aims to avoid complicated compromises against negative situations in the future.

Penta-helix collaboration

The multi-element collaboration model is a promising solution to meet the demands of agricultural productivity towards SA. Currently, the agricultural sector is required to be able to integrate intensive and integrated production systems with traditional production systems while simultaneously continuing to strive to achieve a competitive advantage in the global market. This work is indeed hard but that is the consequence of such rapid development in this era. The food agriculture system in this era requires the development of a concept of collaboration that is oriented towards the stability of the supply chain (both internal and external) to territorial relations.

There are several forms of collaboration that involve stakeholders of the food farming system at various levels. This collaboration aims to strengthen partnerships, increase contract strength, and market strength. In addition, this collaboration also aims to build a network of actors in agro-food districts, including cooperative bodies, to carry out economic and social interactions so that they can represent strength to encourage environmentally friendly and innovative local development in rural areas.

Based on the type of mechanism, collaboration has various forms, including 1) innovative collaboration, 2) knowledge sharing, and 3) advertising (Chauhan et al., 2022). Innovative collaborations between actors that focus on utilizing the exclusive capabilities of each company or actor in the company to be able to solve the problem of "green management" or friendly managerial together. The friendly system is expected to be able to shorten various administrative processes so that it can increase productivity. Such a relationship mechanism should exist at the inter-organizational, government-organizational, and institutional level that is expected to have a positive impact on sustainability performance. In the collaborative mode of sharing information and knowledge, reports found that there is a relationship between the influence of information sharing strategies on entrepreneurial sustainability (Mehdikhani & Valmohammadi, 2019).

This shows that successful knowledge transfer will increase the expected results even though various knowledge sources and modes of collaboration are the main doors of innovative marketing activities. Advertising cost collaboration can also increase economic productivity. Collaborative advertising between actors can generate higher profits at a lower cost. A mutual contract to regulate the distribution of promotional costs that can coordinate all the actors involved deserves to be developed appropriately. In the end, all modes of collaboration are ensured to involve multiple elements that require a concept to create synergy in the program that is implemented.

In the context of food crop farming, existing collaborations usually involve at least five elements. In this case, the PH concept can advocate for the active involvement of five key elements that include academia, government, industry, society, and the media in shaping an innovation ecosystem that drives the sustainable development agenda. By encouraging collaboration, knowledge exchange, and collective action, the PH model has great potential to catalyze transformative change in agricultural systems (especially food crops). This allows for the creation of relevant solutions in an inclusive and environmentally friendly manner.

CONCLUSION

This literature review reveals a strong correlation among sustainable agriculture (SA), social entrepreneurship (SE), and penta-helix (PH) collaboration, rooted in their synergistic roles for holistic, sustainable development. SA focuses on producing environmentally friendly, economically viable, and socially responsible food while ensuring long-term productivity and resource conservation. SE drives this by innovating solutions to social and economic challenges, empowering communities for prosperous livelihoods. The PH model, analyzed from collected literature, emphasizes collaboration among academia, business, government, community, and media—evolving from the traditional triple helix (TH) due to media's integral role in today's technology-driven society—to enhance performance. For future research, empirical case studies in tropical rural areas should test PH-enabled SE interventions to quantify impacts on SA outcomes, addressing the identified literature gap.

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