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# Application of the Rural Web Framework within the Context of Sustainable Development: A Systematic Literature Review

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**Abstract:** In recent years, sustainability concerns have gained increasing attention among countries and stakeholders worldwide. Towards the transition to sustainable rural development, the rural web framework (RWF) has become a consistent tool. Indicators from the RWF have been used to explore sustainable rural development for decision-making tasks, which improves the social, economic, and environmental performance of rural regions. However, the application of the RWF in studies is on the decline. Furthermore, there is a lack of literature reviews on the importance of the RWF and its relationship with different facets of sustainable development. We conducted a systematic literature review (SLR) (a) to explore how studies have used the RWF in the context of sustainable development and (b) to identify areas for further research. This study found that the RWF has mostly been used in developed countries, with fewer applications in developing countries. We suggest that there should be increased application of the RWF, particularly in developing countries, to broaden the rural web–sustainable development discourse and its relevance. This paper presents several areas where the indicators of the RWF can be applied to illustrate their relevance for policy decisions towards the achievement of the sustainable development goals (SDGs).

**Keywords:** institutional arrangements; social capital; rural web; agri-food systems; sustainable development; indigenous knowledge

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## 1. Introduction

Over the last several decades, sustainability concerns have increasingly gained attention in both practice and academia [1–4]. Concerns about the planet's sustainability have been growing since 1972, when the United Nations Conference on the Human Environment (also called the Stockholm Conference) was held. This conference introduced the concept of sustainable development as a means of improving the quality of life of future generations. However, sustainability encompasses a wider range of factors, including the viability of localities and communities that are crucial to maintaining the environment and supporting economic activity. In today's world, most regions seek to achieve sustainable development that emphasises social, economic, and environmental considerations. The rural web framework (RWF) is an important criterion for assessing rural development performance [5]. This framework is useful for sustainable development because it relates environmental impacts directly to economic performance [6]. Rural web indicators have emerged to effectively monitor the interactions among individuals, resources, activities, and processes within a rural setting. These indicators are designed to analyse rural development by measuring

socioeconomic activity in terms of consumption and production and its impact on the environment. [6] assessed these indicators as an addition to the traditional technical and economic evaluation of sustainable rural development.

In measuring the sustainability of communities within a country, rural web indicators can be used to identify potential areas for enhancing sustainable rural development efforts. As evidenced by several studies [5,7], rural web indicators have been evaluated in terms of their impact on the economic and environmental performance of rural communities to achieve sustainable development. It is therefore essential to conduct a comprehensive review of the published scientific articles about rural web indicators and sustainable development.

However, studies exploring the synergies between rural web indicators and sustainability performance are in their infancy [6,8]. Additionally, this promising field needs clearer and structured research conceptualisation, resulting in difficulty in advancing it. The purpose of this paper is to carry out a systematic literature review (SLR) to a) explore how studies have applied the RWF within the context of sustainable development and b) identify areas for further research. This research contributes to the scientific community because it provides a representative selection of international studies related to the theme studied in an interdisciplinary area.

The rest of this paper is structured as follows. Section 2 explains the indicators of RWF, and Section 3 highlights the RWF and sustainable rural development. Section 4 explains the methodology for conducting SLR. Section 5 presents the findings from studies application of the RWF, and Section 6 gives implications. Section 7 gives the conclusion, and Section 8 discusses areas for further research.

## 2. Indicators of the Rural Web Framework

The definitions of the rural web indicators according to [5] are given below.

### *2.1. Endogeneity*

Endogeneity within the context of the RWF delineates the degree to which rural economies are (a) built upon local resources, (b) organised according to local models of resource mobilisation, and (c) strengthened through the distribution and reinvestment of produced wealth within the local or regional constellation. Endogeneity revolves primarily around the production of local foods influenced by the ambition to generate economic and social benefits for a rural population.

### *2.2. Novelty Production*

Novelty production refers to new insights, practices, artefacts, or combinations (of resources, technological procedures, and bodies of knowledge) that carry the promise that specific constellations function better. It also refers to the capacity to add value to resources, which involves the combinations of technology, accumulated skills, and practices to advance the process of production.

### *2.3. Social Capital*

Social capital involves the norms and networks that enable people to act collectively and build social relations for a common purpose and benefit. It is the capacity of individuals or groups of people to engage in networks and use social relations characterised by high levels of mutual trust in the exchange of goods and services. These networks and social relations are developed through a favourable atmosphere of interactions, connectedness, and values among individuals, groups, and institutions. Social capital contributes to sustainable rural development by increasing the capacity to retain relations in rural areas [9].

### *2.4. Governance of Markets*

Controlling and strengthening existing markets or constructing new ones involves activities that promote supply chains, market participation, and trading. Existing markets

are explained as the improvement and marketing of existing products for those markets, involving activities that sustain the production of local foods and the ability of rural households to participate directly in those markets. The construction of new markets involves the production and marketing of local foods for new markets, which involves activities that encourage rural households to identify new groups of consumers or buyers for their products.

### *2.5. Institutional Arrangements*

Institutional arrangements refer to groups, organisations, or institutions that solve coordination problems and support cooperation. Institutional arrangements play a major role in rural development by empowering local people to gain control over their resources [10].

### *2.6. Sustainability*

Sustainability is explained as territorially based development that redefines nature by re-emphasising food production and agro-ecology and that reasserts the socio-environmental role of agriculture as a major agent in sustaining rural economies and cultures. Sustainability from the perspective of the rural web framework revolves around agriculture and the environment.

## 3. Rural Web Framework and Sustainable Rural Development

Rural development is an evolving concept and process interconnected with numerous complexities, demanding regular assessment. The complexity of rural development is connected to a collection of resources available in rural areas and various diversified uses. According to [5], the specificity and definition of resource usage describe rural territories' identity. These authors explained that resources are associated with social and political concepts, involving stakeholders at the local, regional, and national levels, and thus, there is no exclusive pathway to achieving sustainable rural development.

Since World War II, rural development has been underpinned mainly by two theoretical paradigms: modernisation and territorial development [6,11]. According to advocates of the modernisation paradigm, the objectives of rural development can be achieved when there is a change from its technologically limited state to a technologically advanced state. This implies that rural development entails an exogenous component where modernity needs to be introduced into agriculture. With this, urban areas become the centre for growth and development, and rural areas become production sources.

However, the modernisation paradigm has been criticised because agricultural modernisation and industrialisation have had major socioeconomic impacts. The modernisation paradigm therefore failed to promote sustainable rural development, particularly in peripheral regions, resulting in the concept of territorial development, also known as the new paradigm [12].

According to [13], the territorial development paradigm is anchored on the (i) use of available territorial resources, (ii) local control of development processes, and (iii) the retention of profit within the local area. These three attributes make the new paradigm of rural development endogenous; however, later, external factors have been acknowledged as complementary to endogenous rural development. Over the past decades, several theoretical frameworks have emerged under rural development, with few considering rural development from a holistic perspective. These few frameworks have contributed in diverse ways to the discourse of the rural development debate; however, many have not exhaustively been examined and developed to deal with the nature, dynamics, and heterogeneity of rural areas [14–17]. The rural web model is identified as one of these frameworks [6,18].

The rural web is a new theoretical framework that consolidates the traditional rural development models to explore the diversity of interactions in rural areas. It is anchored on the web and is described as interactions among six indicators: endogeneity, novelty production, social capital, the governance of markets, institutional arrangements, and

sustainability. Interactions among these indicators determine the economic, social, and environmental development of rural areas.

Studies have shown that the RWF helps to identify the potentials and limitations of rural development initiatives, which support rural development policies and planning [6,19,20]. These indicators provide an in-depth description of the synergies and interrelationships within and between rural areas to comprehend a holistic view of sustainable rural development [9,17]. Recently, study applications of the RWF have been declining, which has triggered the need to conduct a systematic literature review to explore the value of the frameworks of sustainable rural development in contemporary times and to propose areas for further research.

## 4. Methodology

A systematic literature review (SLR) approach was used to source relevant research papers. We used the following steps in conducting the SLR proposed in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [21]. PRISMA has been used in several studies because it provides a highly structured procedure for SLRs [1,3]. It offers three main contributions to SLRs. First, the PRISMA helps to cover a wide range of literature. Second, it identifies inclusion and exclusion criteria for the selection of literature materials. Third, it helps to define the scope of the topic for the SLR. The Supplementary Materials show the following steps of the SLR.

### *4.1. Scope of the Review*

The first step was to determine the scope of the review, which involved identifying studies from 2008 to 2023. We chose the starting year to be 2008 because that was when the RWF was introduced.

### *4.2. Identification of Research Papers*

As shown in Figure 1, 37 keywords were used to search research papers in the Scopus and Web of Science (WoS) databases. These databases were used because they are dependable and host an index of high-quality journals connected to a significant number of publishers [22]. The keywords were derived from the six indicators proposed by the RWF. The indicators are endogeneity, sustainability, novelty production, social capital, institutional arrangements, and governance of markets. For instance, keywords such as "norms", "networks" "unfolding webs", "social interactions", "social relations", or "webs" were formulated based on the definition of social capital. The same approach was applied to the rest of the indicators, as shown in Figure 1. The reference lists of the selected articles were checked to ensure that a wide range of research materials was covered. Unpublished conference presentations, dissertations, and manual books were not included to ensure a quality literature search.


**Figure 1.** Keywords used in searching research papers for the systematic literature review.

*4.3. Screening*

As shown in Figure 2, using the 37 keywords, the search identified 1360 research materials which comprised 1338 peer-reviewed journal articles, 12 book chapters, and 10 reports.

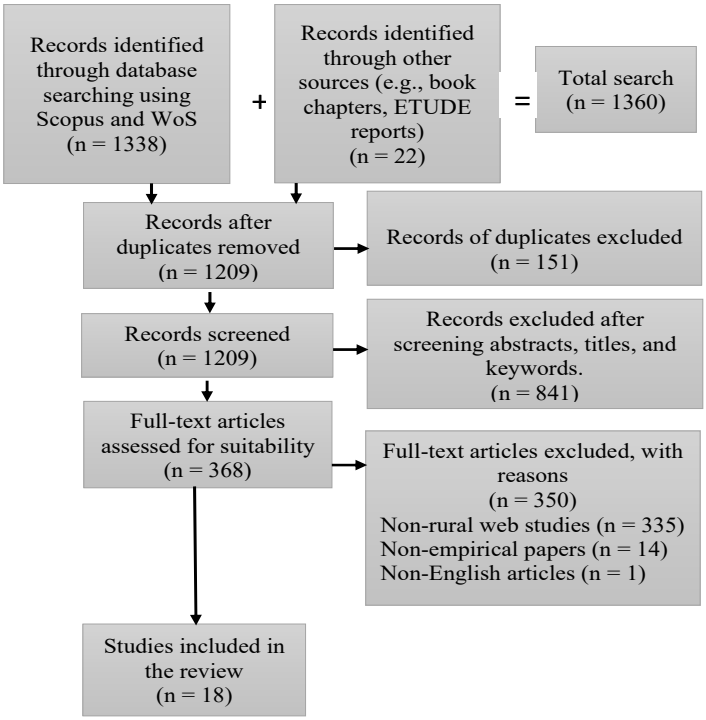


**Figure 2.** Flowchart of the selection procedure.

Of the 1360 research materials, we used EndNote to identify 151 duplicates. The titles, abstracts, and keywords of the remaining 1209 articles were screened to identify potentially eligible articles for inclusion in the review.

Two reviewers carried out the screening process, which is considered the best approach to increase the reliability of the article selections [23]. The outcome of the screening was validated by the remaining research team members. During the screening process, 37 keywords (shown in Figure 1) were used. Articles that did not include any of the

37 keywords in the titles, keywords, or abstracts were excluded from this review. The screening resulted in the exclusion of 841 papers from this review.

Another layer of inclusion and exclusion criteria was applied to the remaining 368 research papers in the full assessment process. We used four exclusion criteria in the full assessment: (a) papers that did not used the RWF, (b) papers that did not focus on any of the indicators of the RWF, (c) papers that were non-empirical, and (d) papers that were not written in the English language. The review focused on publications written in English to avoid difficulty in translation. After applying these four criteria to the 368 literature materials, 350 papers were not included in this review. We found that 335 of the 368 papers did not use the RWF or focus on any of the indicators of the RWF in the context of sustainable rural development, 14 studies were not empirical research, and 1 study was not written in the English language (Figure 2).

### *4.4. Inclusion of Records*

We finally arrived at 18 studies that were eligible for inclusion in this review, comprising 10 journal articles, 6 book chapters, and 2 international reports. The reports were published from the enlarging the theoretical understanding of rural development (ETUDE) projects. As shown in Table 1, of the 18 research papers included in the final review, 13 were conducted in Europe, 2 were conducted in Asia, 1 was conducted in Africa, 1 was conducted in Australia, and 1 was conducted in North America. A total of 9 of the papers used the RWF on ecological economy and sustainable agri-food systems, followed by 4 papers on agricultural landscapes and diversification. A total of 3 papers also used the RWF on agricultural landscapes and diversification, and 2 used the RWF on innovations and indigenous knowledge.

**Table 1.** Research publications on the rural web framework.

| Thematic Areas | Author(s) | Dimension Focus | Study Method | Design | Emphasis on External Interactions | Study Design | Study Area |
|---|---|---|---|---|---|---|---|
| Ecological economy and sustainable agri-food systems | [24] | Endogeneity | Interview | Case study | No | Qualitative | United Kingdom (UK) |
| | [25] | All dimensions | Interview | Case study | No | Qualitative | UK |
| | [26] | All dimensions | Interview | Case study | No | Qualitative | China |
| | [27] | All dimensions | Interview | Case study | No | Qualitative | UK, Germany, The Netherlands, Italy, Latvia, and Finland |
| | [28] | All dimensions | Interview | Case study | No | Qualitative | UK |
| | [29] | Endogeneity and institutional arrangements | Interview | Case study | No | Qualitative | UK and Scotland |
| | [19] | All dimensions | Questionnaire and Interview | Case study and action research | No | Qualitative | Mexico |
| | [30] | All dimensions | Questionnaire and Interview | Case study and action research | No | Quantitative | Ghana |
| | [7] | All dimensions | Interview | Case study | No | Qualitative | Malaysia |

**Table 1.** *Cont.*

| Thematic Areas | Author(s) | Dimension Focus | Study Method | Design | Emphasis on External Interactions | Study Design | Study Area |
|---|---|---|---|---|---|---|---|
| Agricultural landscapes and diversification | [9] | All dimensions | Interview | Case study | Yes | Qualitative | Central Italy |
| | [31] | Endogeneity | Interview | Case study | No | Qualitative | Netherland UK, Germany, |
| | [32] | All dimensions | Interview | Case study | No | Qualitative | The Netherlands, Italy, Latvia, and Finland. |
| Stakeholders and institutional roles | [33] | Institutional framework | Interview | Case study | Yes | Qualitative | Finland |
| | [34] | Social capital | Interview | Case study | Yes | Qualitative | Latvia |
| | [16] | All dimensions | Interview | Action research | No | Qualitative | Belgium |
| | [35] | All dimensions | Interview | Case study | No | Qualitative | Scotland |
| Innovations and indigenous knowledge | [10] | Novelty production | Questionnaire and Interview | Case study and action research | No | Qualitative | Bulgaria, France, Australia, Slovenia, Germany, Switzerland, Poland, Italy, and Spain |
| | [36] | All dimensions | Interview | Case study | No | Qualitative | Germany |

Figure 3 shows that 8 of the 18 research papers were published in 2010, which dropped to 1 in 2011. Since 2011, publications on the RWF have significantly reduced. The review identified that 17 of the studies employed qualitative methods in analysing the indicators of the RWF, whereas only 1 adopted a quantitative method.

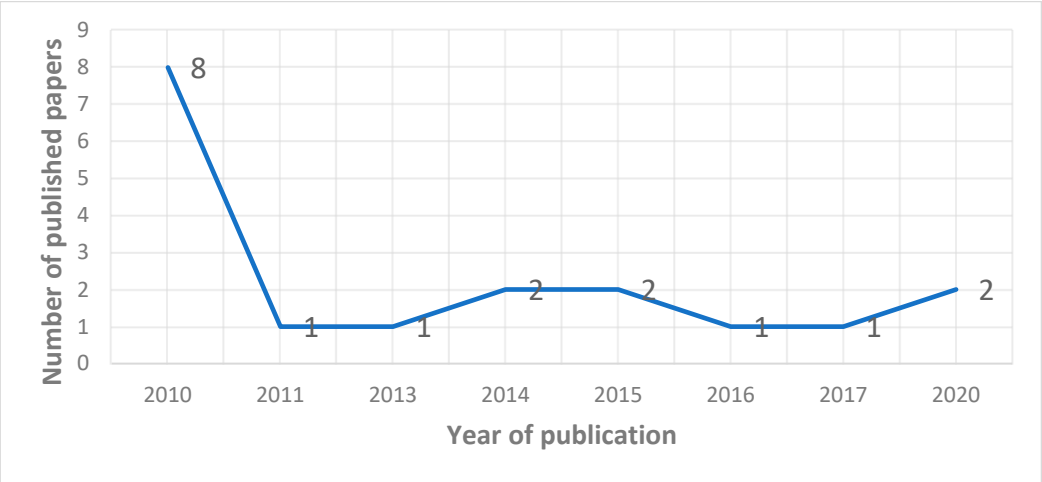


**Figure 3.** Year of research publications.

## 5. Findings

### *5.1. Ecological Economy and Sustainable Agri-Food Systems*

An ecological economy involves the sustainable use of environmental resources to create production and consumption chains and networks [37]. What is less understood is how the chains and networks are interconnected, which is necessary to understand agri-food systems. Ecological economies and agri-food systems are geared towards a more place-based approach, demonstrating the relevance of the RWF [27].

Ref. [24] used the RWF to explore how rural development interventions create interactions and exchanges in the Devon region, United Kingdom (UK). According to these authors, rural development processes in the UK are strongly connected to organic food production and improved food supply chains, which emphasise the sustainable use of local resources. Refs. [25,28] used the RWF to explore pathways and drivers of ecological economic initiatives in the Devon region and Shetland region in the UK. These authors found that food supply chains contributed immensely to rural development but commented that output from agricultural activities was shifted towards the production of value-added products. Moreover, they claimed that food supply chains play important roles in eco-economic development, which create several socioeconomic activities.

Ref. [26] used the RWF to examine food supply chains in China and found that production and consumption constituted eco-economic development. Ref. [27] analysed 62 rural projects in rural regions in European countries such as Finland, The Netherlands, UK, Latvia, Germany, and Italy and found that rural regions have experienced a shift from solely agricultural interventions to non-agricultural policies, thereby promoting diversification. Ref. [19] used the RWF and found that, in Mexico, candelilla wax production is the main component of the agri-food supply chain, which generates multiple interactions between the rural population and several other institutions. Ref. [30] applied the RWF on the agri-food local supply chain in Ghana and found that shea butter production contributes substantially to sustainable development. Finally, ref. [7] found that seafood and paddy constitute the main economic activity that attracts investment and contribute to the economic performance of villages in Johor (Malaysia). The economic performance was seen in areas such as the improved profitability of farmers, the adoption of technology, and standards of living.

The above studies concluded that endogeneity, sustainability, and novelty production constitute the main indicators serving as initiators of sustainable development. Endogeneity reinforces the emergence of organic food networks, value-added products, and sustainable tourism [27,28]. These resources imply endogeneity because organic and value-added products and sustainable tourism depend directly on effectively mobilising the ecological resources within the regions. Sustainability, in the form of renewable energy [38] and the use of technology in the production of shea butter [30], also depends on the nature of the territory's natural and environmental endowments, demonstrating the importance of endogeneity.

Institutional arrangements and social capital are the facilitators, and the governance of markets is the outcome. Institutional arrangements and social capital facilitated the successful implementation of collective projects to deliver eco-economic benefits in rural regions in Mexico [19] and China [26]. Institutional arrangements played a facilitator role in rural areas in Ghana that contributed to the production and marketing of shea butter [30]. The bond between families and community commitments led to the implementation of agri-food initiatives in the UK, such as the Devon organic producers' renaissance of Atlantic food authenticity, economic link projects, and the Shetland livestock-marketing association [24]. Village associations support large-scale production by sharing high costs associated with labour, marketing, and machinery [39,40].

The governance of markets is the outcome of the initiators and facilitators of the ecological economy and agri-food systems. Rural regions in the UK and Scotland, for example, faced limited urban markets for the sale and purchase of goods and services, thereby relying on urban markets [29]. Many studies [41–43] have mentioned that there

is an increasing demand for high-quality agricultural products in urban markets, which promotes value addition to agricultural products and knowledge sharing in rural areas, as producers tend to meet those expectations, thereby strengthening agri-food networks. Devon organic producers and the Shetland livestock-marketing association also created markets networks and branding strategies, which positioned these regions as attractive places and sources of quality products in Europe. Branding strategies add value to a territory's resources and uniqueness by creatively marketing local products [28].

### *5.2. Agricultural Landscapes and Diversification*

The future of agriculture and land use has received attention globally because of the increasing demand for environmental quality and the pressure emanating from competition in international markets. Development interventions have therefore aimed at sustainable agriculture, landscape management, and diversification [44–46].

Several studies have explored the nature of rural landscapes and diversification using the RWF. For instance, refs. [9,31,36] used the RWF and found that agriculture and farm diversification form an integrated component of nature and landscape management in Europe. Likewise, in the Upper Tiber Valley in Central Italy, there was a shift from tobacco production to tourism and sports [9]. These authors argued that the proximity of rural areas to the city promotes agricultural diversification and increases socioeconomic activities. Agricultural diversified activities contribute to a territory's competitiveness, sustainable livelihood, and quality of life [47,48].

The above studies discovered that novelty production and endogeneity are initiators of an agricultural landscape. The production of wood chips, dairy, and sheep farming constituted an important feature of endogeneity in Odenwald (Germany) and the Laag Holland regions in the Netherlands, and tourism, mining, and culture enriched the endogeneity dimension in the Kittila region (Finland) [32]. Regarding novelty production, bioenergy technologies were predominant in Odenwald. The Upper Tiber Valley in Latvia and Laag Holland also implemented tobacco, timber, and cheese production technologies, respectively.

Institutional arrangements and social capital were identified as the facilitators of agricultural landscapes and diversification, but the governance of markets plays a lesser role. Institutional arrangements in the form of territory-based organisations in Laag Holland [31] and social capital generated by family-run enterprises in the Upper Tiber Valley [9] encouraged farmers to diversify their crops. Social capital and institutional arrangements influence intentions to diversify agricultural businesses [49].

### *5.3. Evaluation of Stakeholder and Institutional Roles*

In recent years, the preference and demand for the preservation of cultural landscapes, high environmental quality, and regional food supply have been increasing in rural areas. As a result, it has become necessary to redefine sustainable development within the framework of coordinating stakeholders involved in rural development processes and changes [50,51].

Studies have therefore used the RWF to examine the extent to which stakeholders at the local and regional levels participate in rural development processes. For instance, it was demonstrated by [33] that associations in rural regions in Finland constitute major institutional arrangements that have led to socioeconomic development in those regions. Likewise, local institutions such as the formation of groups and sport associations have promoted socioeconomic development in rural regions in Latvia [34]. Ref. [16] also found that stakeholders such as researchers and project coordinators from a local council were actively involved in collaboration and communications with rural actors in Flanders (Belgium) and Speyside (Scotland), which promote the sharing of ideas and knowledge about the socioeconomic progress in those areas [35].

The above authors identified institutional arrangements as the initiators of sustainable rural development, triggered by social capital (strong family and communal relations),

as the facilitator. Social capital increases dialogue between rural and regional stakeholders and encourages stakeholders to initiate sustainable innovation projects [16]. Cooperation between local associations and government institutions results in strong social capital that leads to the creation of new businesses, increased community patriotism, and participation [34].

The outcomes of institutional structures and social capital are endogeneity, sustainability, the governance of markets, and novelty production. Sustainable innovation projects implemented through collaborations with local institutions provide enormous benefits to rural regions, such as improved profitability and quality of life. Active involvement and collaborations among stakeholders in rural development increases the practices of sustainable agriculture and value addition and strengthens supply chain systems [16,33–35].

### *5.4. Innovations and Indigenous Knowledge*

Innovation is a dominant factor for sustainable rural development. Innovation involves the development of new techniques to suit local conditions. Indigenous knowledge supports innovation practices [52]. Studies have used the RWF to examine innovation projects and local knowledge networks in rural regions in six countries in Europe. Ref. [10] found that innovation projects have enabled rural regions in Europe and Australia to improve agricultural output through knowledge sharing and establishing solid connections between regions and external stakeholders. Ref. [36] found that rural entrepreneurs in the Odenwald region in Germany demonstrated valuable learning and innovative ideas, which increased the adoption of technologies in renewable energy usage.

Refs. [10,36] identified novelty as the initiator of innovations and indigenous knowledge networks. Social capital and institutional arrangements were the facilitators, and the outcomes constituted endogeneity and sustainability. Novelty was seen through innovation projects in Bulgaria (eco fruct project), France (alpEnergy wood project), Germany (3N project), Poland (organic food valley), and Spain (eco farm La Peira and CEAMA projects) [10]. Innovation projects increase the capacity for sustainable production through knowledge sharing, strong social relationships, and participation in local associations [53,54].

## 6. Implications

In Europe, several studies have used the RWF to understand many facets of sustainable rural development. Depending on the socioeconomic characteristics of the area and the objectives of rural development policies, a dimension of the RWF can play a role either as an initiator or a lubricant as shown in Figure 4. A dimension is identified as an initiator when its role drives sustainable development initiatives. A dimension becomes a lubricant when it facilitates the attainment of rural development objectives. In sub-Saharan Africa, where government policies focus mainly on agriculture in rural areas, ref. [55], it is expected that endogeneity functions as a driving force of economic development.

The evaluation of a dimension as an initiator or a lubricant is not indicative of the overall development of a territory, but of the interactions between the other dimensions. The dimensions connect in a complex system of interactions to identify the strengths and limitations of sustainable development interventions [36]. Therefore, each dimension has considerable potential to contribute to sustainable rural development and must be considered as such.

The governance of markets is the primary objective of many rural development initiatives [56]. It aims to increase food supply chains, employment, and sustainable development [7,30,56]. It is also the immediate positive outcome of sustainable development initiatives [16,19]. However, there is little evidence of the interrelations between the governance of markets, specifically food supply chains and branding on the one hand (Figure 4), and the remaining dimensions of the RWF.

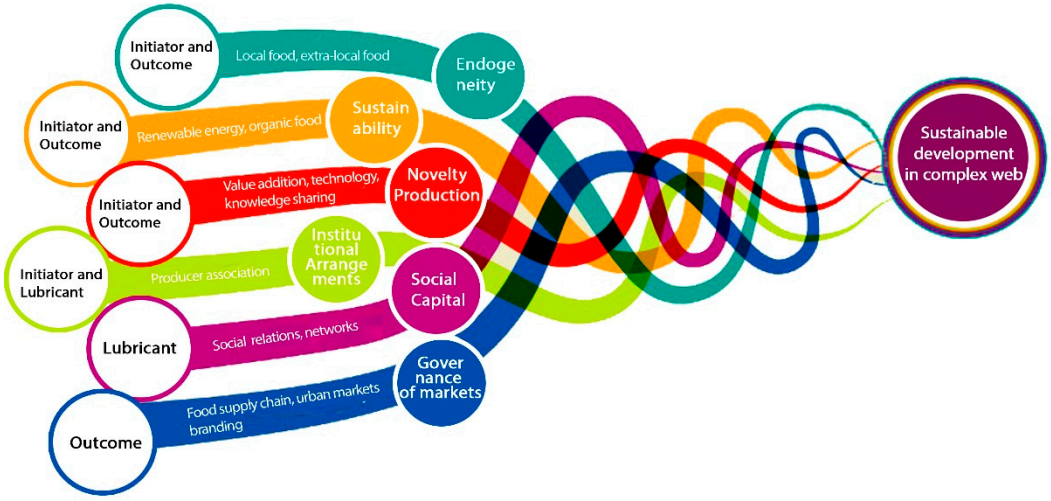


**Figure 4.** Model of sustainable development within the context of the rural web framework.

Given that rural areas are both production and consumption entities, they have generated increasing economic networks and exchanges of goods and services. The networks and exchanges create economic activities that strengthen rural–urban interactions and generate employment for the rural population [9,57]. This brings to the fore the search for new pathways for sustainable development. The role of eco-economy strategies is central to the search, which restructure rural and urban interactions and enable rural areas to assume an important role in increasing sustainability and agri-food systems and improving living conditions [27,58]. The sustainable use of resources in creating several economic activities produces positive market interactions, encouraging production and trading in value-added agricultural products [32,56,59]. We therefore suggest that studies adapt the RWF to examine the governance of markets in connection with novelty production, institutional arrangements, and social capital to bring out a holistic understanding of the relationship among economic development, local resources, and sustainable development. Understanding the relationships between economic development and local resources can help develop ecologically sustainable policies that ensure the fair distribution of resources.

We found that the RWF is not adequately used in developing countries, which implies that the findings of the past studies cannot be generalised to a global scale, as they exclude important areas that could inform sustainable development policies and programs. For instance, ref. [56] mentioned that there is limited evidence on the interrelations and interconnections of essential elements underlying sustainable development in rural areas in sub-Saharan Africa. Furthermore, it was argued that an effective tool for assessing sustainable rural development should identify key indicators and how they should interrelate to inform policy direction [15]. We suggest that studies apply the RWF in developing countries to complement the findings of other studies. The RWF can be determined in these countries by analysing its dimensions in relation to natural resources and agricultural policies and programs in rural regions. The application of the RWF in different geographical areas is important for unravelling the complexity of its theoretical implications. We also suggest that applying the RWF in developing countries can contribute to policies that aim to achieve the sustainable development goals [55,60].

In applying the RWF, emphasis should be placed on analysing external interactions and the effects on sustainable rural development, as this is lacking in previous studies. Studies have hypothesised that external interactions affect sustainable rural development and determine the strengths and limits of development interventions [57,58]. Rural sustainable development must be acknowledged as rebuilding the connections between urban and rural areas [6,31]. Linking sustainable rural development to external opportunities creates new relationships [17,31,32]. By responding to and capitalising on the increasing urban demand for rural products [42,61,62], the incorporation of rural and urban interactions

in the application of the RWF could help to understand the complex supply chain, rural competitiveness, and quality of life in rural areas.

## 7. Conclusions

We conducted an SLR to explore how studies have used the RWF on sustainable rural development. This study found that studies have used the RWF to explore sustainable development in four thematic areas: eco-economy and agri-food systems, agricultural landscapes and diversification, innovations and local networks of knowledge, and stakeholders and institutional roles. Endogeneity, sustainability, and novelty production were identified as initiators, implying that these dimensions are driving forces of sustainable development policies. Social capital and institutional arrangements were identified as lubricants, indicating that they facilitate the implementation of rural development policies.

These findings imply that the indicators of the RWF play diverse roles depending on the socioeconomic characteristics of the area, regarding whether the area is declining in agriculture or becoming highly specialised in it. The role of the indicators also depends on the objectives of rural development policies. In sub-Saharan Africa, for example, where agriculture is the main economic activity in most villages [55], it is expected that endogeneity will function as the driving force of economic development, facilitated by social capital, institutional arrangements, and the governance of markets. For instance, institutional arrangements such as government policies on increasing agricultural production in most sub-Saharan Africa has influenced agricultural activities in many rural areas to the extent that food crops such as cereals have been the major production.

We found that, although the RWF plays an important role in sustainable rural development, its application is lacking in developing countries. This paper suggests that studies should use the RWF in developing countries to complement the findings of previous studies. We suggest that applying the RWF in developing countries such as those in Africa would contribute to policies that aim to achieve the sustainable development goals.

## 8. Limitations and Future Research

This research identifies several areas that the application of the RWF has not covered, which are considered its limitations. The limitations, however, provide pathways for future research. Firstly, the SLR identifies that studies have not used the RWF extensively on innovations and indigenous knowledge and regarding how they influence sustainable rural development. These are important areas in determining sustainable development [10], which need to be addressed by current studies in the application of the RWF.

Secondly, demography and socioeconomic factors should be factored into the application of the RWF, as these factors have been predicted to influence sustainable development initiatives. In the context of developing countries, such as Ghana, for example, the participation of rural stakeholders in the development and transformation of territories has been influenced by several factors, including politics, power dominance, education, technology, and migration [63,64]. These factors need to be analysed within the RWF to understand how they affect sustainable development. By doing so, this will help in formulating policies on how education, capital, and technology can be financed to improve the standards of living in rural areas [65,66].

Thirdly, the application of the RWF should cover the impact of external interactions or activities on sustainable development in rural areas. Fourthly, in applying the rural web, it is important to highlight the research methods and designs employed in analysing its dimensions. Previous studies have analysed the indicators of the RWF using qualitative data. A more quantitative analysis is needed to predict the indicators of the RWF and broaden its scope and understanding. A quantitative approach can help to determine specific transition paths in rural areas for policy implications [6].

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