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Agroecological Business Model: A Pillar Stone for Women's Entrepreneurship in Agroecology and Sustainable Food Systems

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ABSTRACT: The current challenges facing agriculture and food systems demand innovations in system design that potentially empower the weakest component in social, economic, and environmental contexts. Recognizing women's importance in agriculture and food systems, the agroecological business model is one solution for women to gain access to resources (land, finance, credit, etc.), empower their capacity, become entrepreneurs, and improve organic agriculture production and market. This paper focuses on agroecological business models and women's entrepreneurship in agroecology and sustainable food systems through a scoping review through Google Scholar, Science Direct, and the FAO website. The findings highlight how the co-creation of knowledge between organic producers and female entrepreneurs can increase the efficiency of organic agriculture production. However, women's entrepreneurship in eco-efficient organic production reinforces participatory guarantee systems, which are crucial for agroecology and sustainable food systems. The conceptual model shows the interdependence between women's entrepreneurship, organic agriculture production, and food systems through an agroecological business model, which is a key driver for women's access to resources and guarantees a resilient market for organic agricultural crops. This is a challenging entry point that provides opportunities for co-learning in sustainable food systems that can be shaped for significant positive change. Addressing co-learning food systems through women's entrepreneurship is an opportunity for all stakeholders to achieve sustainability in food systems. This is critical for those involved in the agroecological transition and the achievement of sustainable development goals.

KEYWORDS: Agroecology, Agroecological business model, Food systems, Organic production, Women's entrepreneurship.

INTRODUCTION

The current food system (production, transport, processing, packaging, storage, retail, consumption, loss, and waste) is fraught with insecurity, which is worsened by increasing temperatures, changing precipitation patterns, and the greater frequency of extreme events. The global food system is facing serious challenges, but many powerful actors are working hard to address the issue without causing too much disruption [1]. Food systems across the world have caused habitat and biodiversity loss, land and water degradation, and greenhouse gas emissions [2]. There are many other severe impacts on the food system, which include supply chain disruptions, dangerous conditions for food and farm workers, and critical food security risks for hundreds of millions of people [3]. Women play a central role in all stages of the food system, from agricultural production to ensuring household food and nutrition security [4]. Agriculture is basically the set of practices through which people produce food [5]. Many countries still face high rates of food insecurity and rural poverty [6], and agriculture is widely recognized as being key for addressing both [7]. Agriculture provides livelihoods for over a billion people, and there are approximately 500 million family farms worldwide, many of which operate on a small scale [8, 9]. Agriculture is the prime economic activity that is directly related to the supply of food [10]. Although 70% of women are engaged in agriculture, less than 20% control the outputs and proceeds from their efforts [11]. Agriculture, as a concept, is also evolving, with increasing awareness that agriculture is multifunctional [12, 13], and that agricultural production cannot be separated from the other aspects of food systems, such as food supply chains, the food environment, and consumption [14, 15]. Food systems have changed rapidly in recent decades, with food supply chains generally becoming longer and increasing the distance between producers and consumers as food systems and agricultural supply chains become more globalized [16]. The livelihoods of many food producers and workers across all parts of the food system, many of whom are vulnerable, are highly precarious due to uneven power relationships in food systems [17]. Therefore, agroecological approaches are presented as promising avenues to achieve food security and nutrition since they do not consider productivity

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alone and suggest addressing social inequalities and power asymmetries [18, 19, 15], including gender and ethnic minority inequalities [20, 21]. Agroecological approaches explicitly aim at transforming food and agriculture systems, addressing the root causes of problems, and providing holistic and long-term solutions [22] that consider the complexity of farming systems within their social, economic, and ecological contexts [23]. Agroecology is a dynamic concept that has gained prominence in scientific, agricultural, and political discourse in recent years. Agroecology is a pillar of food sovereignty that focuses on local autonomy, local markets, and community action for access and control of land, water, agrobiodiversity, etc., which are of central importance for communities to be able to produce food locally [24]. Women are actively involved in food systems in several fundamental functions: growing and managing crops, livestock, agribusinesses, and food retailing, and additionally, preparing food for their families [2]. Women's entrepreneurship is widely acknowledged as a precondition for sustainable economic growth and development in any country [25]. However, very little is known about women's entrepreneurial activities and the key drivers for transitioning to a green economy as enabling factors for including their business subsistence and growth strategies [26]. Women entrepreneurs are significantly contributing to environmental resource protection [27, 28]. Although women's business levels are growing, there is still little research on women entrepreneurs, especially in developing countries [29, 30, 31, 32], and it is noteworthy that major research universities around the world have little to no research capacity in the science of agroecology [33]. Therefore, this paper aims to explore the connections between the concepts of women's entrepreneurship, participatory guarantee system, agroecology, and food systems to depict the conceptual model for the agroecological business model that facilitates women's access to productive resources and guarantees a market for organic agricultural products.

METHODOLOGY

This paper uses a scoping review [34, 35] to assess the current evidence on women's entrepreneurship issues in agroecology and food systems. Given the broad range of key topics related to women's entrepreneurship issues in agroecology and food systems, topically relevant and published systematic reviews were purposively sampled to provide a baseline state of the evidence. Three databases (Google Scholar, ScienceDirect, and FAO) were used to gather and collect relevant articles and reports using keyword searches aligned terms cross-referenced with the terms: Agroecology, women entrepreneurship, and sustainable food system (table 1). We used the Pearson correlation coefficient r as a measure of the significant relationship between Google Scholar, ScienceDirect, and FAO (table 2). The results show that there is a very high significant positive correlation between the databases Google Scholar and ScienceDirect ($r = +0.998$, $p<0.01$), a very high significant positive correlation between databases Google Scholar and FAO ($r = +0.947$, $p<0.01$), and between databases ScienceDirect and FAO ($r = +0.939$, $p<0.01$).

Table 1: Literature search strings.

Search string	Google Scholar	Science direct	FAO	Last updated
Women entrepreneurship	94200	8074	15100	24/10/2022
Agroecology	158000	6858	130000	24/10/2022
Sustainable food systems	3170000	435740	340000	24/10/2022
Women entrepreneurship and agroecology	10200	42	7590	24/10/2022
Women entrepreneurship and sustainable food systems	237000	2461	40000	24/10/2022
Women entrepreneurship, agroecology, and sustainable food systems	16200	0	11400	24/10/2022

Table 2: correlation test

	Google Scholar	ScienceDirect	FAO
Google Scholar	1		
ScienceDirect	0.998**	1	
FAO	0.947**	0.939**	1

**. Correlation is significant at the 0.01 level (2-tailed).

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RESULTS AND DISCUSSION

1- Conceptual model for women's entrepreneurship in agroecology and food systems

We conceptualize women's entrepreneurship as an important lever for progress across all aspects of agroecology and food systems (Figure 1) and draw upon key terms like organic agriculture, Participatory Guarantee System (PGS), women's entrepreneurship, and consumers. To operationalize agroecology, FAO presented 10 elements as a guide for policymakers, practitioners, and stakeholders in planning, managing, and evaluating agroecological systems. In guiding countries to transform their food and agricultural systems, to mainstream sustainable agriculture on a large scale, and to achieve zero Hunger and multiple other Sustainable Development Goals (SDGs), the following 10 elements emanated from the FAO regional seminars on Agroecology [22, 36]:

- Diversity; synergies; efficiency; resilience; recycling; co-creation and sharing of knowledge (describing common characteristics of agroecological systems, foundational practices, and innovation approaches)
- Human and social values; culture and food traditions (context features)
- Responsible governance; circular and solidarity economies (enabling environment)

This conceptualization of women's entrepreneurship in agroecology and food systems recognizes and highlights the linkages and interconnectedness across these components of organic production, participatory guarantee systems, agricultural producers, women entrepreneurs, and consumers. Prominent themes from presentations delivered during the First International Symposium on Agroecology for Food Security and Nutrition [37] provided an initial coherent structure: recycling, efficiency, diversity, resilience, and synergies as central ecological features of agroecology [38]. Thus, to implement agroecology in organic agricultural practices, agricultural producers must (1) be diverse in their crop, tree, and practice selection; (2) have synergies between crops, livestock, and agroforestry; (3) integrate the recycling of biomass, water, breeds, and nutrients; (4) develop resilience (income/production stability and the ability to recover from perturbations); and (5) be efficient in soil fertility and land management. However, for the visibility and reliability of organic agriculture, the producers must participate in Participatory Guarantee Systems (PGSs). PGS is an institutional arrangement that ensures the integrity of organic production through the active participation of stakeholders (farmers, experts, state officials, consumers, etc.) in the creation and enforcement of locally based agreements on organic standards [39, 40]. According to Sanusi (2012), women are founding businesses more rapidly than men, and are making major contributions to job creation and economic development [41]. Therefore, PGSs can establish an agroecological business model with women entrepreneurs to guarantee a local market for agricultural organic crops. Through agroecological business models, women can access productive resources and empower their capacity for entrepreneurship and business. Empowering and valuing women in their societies increases their capacity to improve food security under climate change and make substantial contributions to their well-being, to that of their families and their communities [42, 43]. Thus, empowering women through entrepreneurship engenders the eco-efficiency of organic agricultural production. The World Business Council for Sustainable Development (1992) defines eco-efficiency as "the delivery of competitively priced goods and services that satisfy human needs and improve quality of life, while progressively reducing ecological impact and resource intensity throughout the life cycle, to a level at least in line with the Earth's estimated carrying capacity" [44]. By implementing agroecological elements, women entrepreneurs and agricultural producers co-create knowledge, share culture and food traditions, and ultimately attain human and social value. However, the organic products' resilient market is warranted by women's entrepreneurship through business models with consumers (retailers, vendors, traders, restaurants). Sustainable food production requires a responsible and effective governance mechanism. Responsible political governance can define organic crop trade policies that regulate ecosystem services and promote healthy and local consumption for the population.

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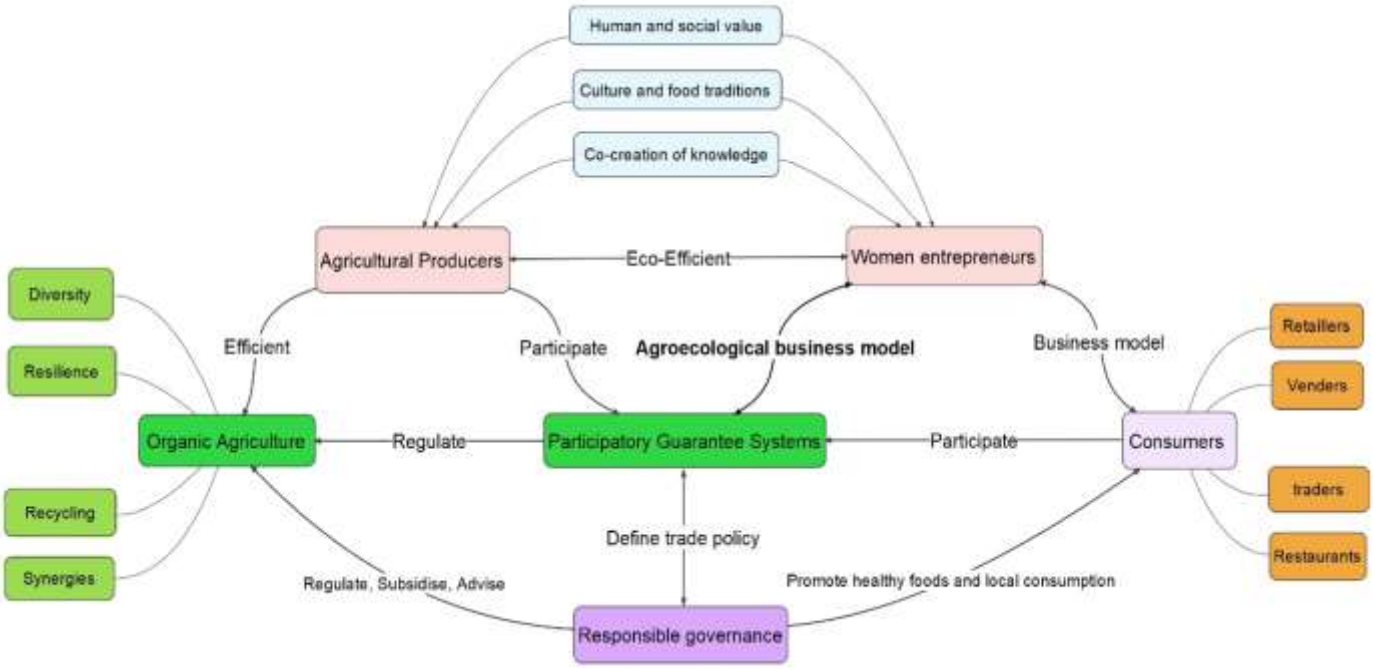

Figure 1: Conceptual model for women's entrepreneurship in agroecology and food systems
Source: Designed by authors.

2- Organic agriculture and agroecology

In the words of the World Health Organization ((FAO/WHO) and the Food and Agriculture Organization of the United Nations): "Organic agriculture is a holistic production management system which promotes and enhances agroecosystem health, including biodiversity, biological cycles, and soil biological activity [45]. This is accomplished by using, where possible, cultural, biological, and mechanical methods". Beyond the crop production level, organic agriculture aims to achieve environmental goals (e.g. soil and water conservation, protection of biodiversity and animal welfare), social goals (e.g. fair distribution of benefits, food security, and sovereignty), and economic goals (e.g. improved income opportunities, market access, and ability to save). Organic agriculture occurs in the absence of external farm inputs, such as mineral fertilizers, synthetic pesticides, and herbicides. There is a growing debate about the similarities, differences, and convergence of organic agriculture and agroecology [46]. Organic agriculture is the first agriculture practiced by ancestral agricultural producers before industrialization and is pursued by indigenous family farms that don't have access to external farm inputs (chemical fertilizer, herbicides, pesticides) and often qualify as traditional agriculture. Faced with the challenges of biodiversity loss and climate change, traditional agriculture has been affected by systems change. Organic agriculture through traditional agricultural systems, which are the result of the co-evolution of ecosystems and human communities across many generations [47], must integrate some practices to face these challenges. Thus, Traditional organic agriculture includes traditional agroforestry, incorporation of organic material into soils, mixed cropping systems with livestock, and the use of a wide variety of edible crops, which form the basis of agroecology. Agroecology, as a set of practices, aims at designing complex and resilient agroecosystems that, by "assembling crops, animals, trees, soils, and other factors in spatially and temporally diversified schemes, favor natural processes and biological interactions that optimize synergies so that diversified farms can sponsor their soil fertility, crop protection, and productivity" [48]. Agroecological farming methods incorporate a range of key principles designed to improve resource efficiency (such as recycling and input reduction), strengthen the resilience of ecosystems (such as building soil and animal health, enhancing biodiversity, fostering positive synergies and economic diversification) and build social equity (such as co-creation of knowledge, incorporating social values into food systems and strengthening participation and governance) [49].

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3- Agroecological business model

There are numerous efforts to recognize PGS as an important quality assurance tool in developing local organic markets [50]. However, the agroecological business model is the sustainable business model which aims to assist individuals and organizations in seeking competitive sustainability-oriented change creatively and holistically as a way to address the challenges facing agriculture today. Geissdoerfer et al., "define a sustainable business model as a simplified representation of the elements, the interrelation between these elements, and the interactions with its stakeholders that an organizational unit uses to create, deliver, capture, and exchange sustainable value for, and in collaboration with, a broad range of stakeholders [51]". Sustainable business models might have the additional benefit of higher risk mitigation and resilience [52] and yield additional diversification and value co-creation opportunities [53, 54], [55]. To realize these advantages, organizations have become increasingly interested in implementing sustainable solutions [56]. Evans et al. describe sustainable business models with five propositions: "1- sustainable value incorporates economic, social, and environmental benefits conceptualized as value forms; 2 - sustainable business models require a system of sustainable value flows among multiple stakeholders, including the natural environment and society as primary stakeholders; 3 - sustainable business models require a value network with a new purpose, design, and governance; 4 - sustainable business models require a systemic consideration of stakeholder interests and responsibilities for mutual value creation; 5-the agroecological business model clearly defines the relationship that can help women access productive resources, develop their businesses, and access markets for organic crops [57] . The agroecological business model provides measurable ecological and social value in congruence with economic value, which permits female entrepreneurs to be eco-efficient in organic agricultural production.

4- Co-learning in sustainable foods systems

There are debates around the role and contribution of indigenous and local food producers in knowledge generation and the significance of cultural context for shaping this knowledge, including the role of women, elders, ceremonies, community organizations, and opportunities for interaction with scientists [13, 58, 59, 60, 61]. Knowledge generation starts with co-learning. The co-learning processes are context-dependent, being strongly linked to the specificities of the contexts where understandings develop and evolve, to the features of the related relational environments, but also to the general culture and the systems of knowledge and values where actors and practices are embedded and by which they are conditioned [62]. Women play pivotal roles in cultivating and providing food and nutrition; preparing, processing, distributing, and marketing food; and holding knowledge about seeds, agricultural biodiversity, and agroecology technologies, innovations, and practices [63]. Therefore, women are at the core of the co-learning processes. Furthermore, the roles of women are very important for productive, healthy, and sustainable food systems [64, 65]. Activities of gathering women are simple ways for women entrepreneurs to exchange knowledge and contribute to the application of knowledge [66, 67]. The interaction between food producers, women entrepreneurs, and consumers is a strong co-learning process that goes to embed science and social movements. The conceptual model shows the co-learning from the interaction between social movements and problem-focused transdisciplinary science (figure 2). Supporting local innovation [49], can contribute to the reformulation of what needs to be addressed, to the shaping and dissemination of knowledge, and to the wide-scale spread of sustainable agricultural practices and other food system innovations through wide-scale adoption [49]. However, the public sector operates through a range of policy instruments, incentives, regulations, standards, and attempts to correct market failures, such as moves towards true pricing, whereas the private sector intervenes in value chains through participation in certification, value-chain upgrading, innovative business models and impact investment.

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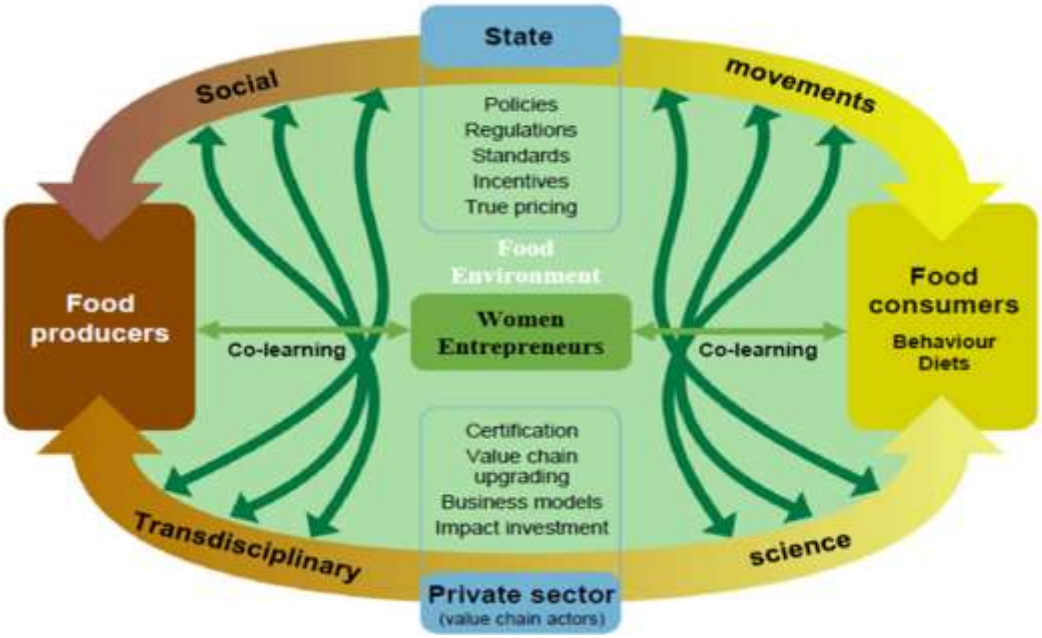

Figure 2: Conceptual model for women entrepreneurship in sustainable food systems
Source: Designed by authors

CONCLUSION

This review paper scrutinized the literature on women's entrepreneurship, agroecology, and sustainable food systems in order to develop a conceptual model that emphasizes agroecological business models. This conceptual model shows the 8 elements of agroecology (diversity; synergies; efficiency; resilience; recycling; co-creation, sharing of knowledge, human and social values, and responsible governance) are the foundation of women entrepreneurs' entry points into agroecology and sustainable food systems. The interdependence between organic agriculture, a participatory guarantee system, and women's entrepreneurship is cemented by agroecology business models like a pillar stone. Women entrepreneurs' eco-efficient organic agricultural production warrants a sustainable system for the organic value chain and a resilient market for organic agricultural crops. However, the agroecological business model bridged the gaps in women's access to productive resources, which limited women's potentiality in organic agribusiness. Therefore, women's entrepreneurship becomes the center of co-learning in sustainable food systems. Through this paper, we invite all stakeholders involved in the agroecological transition to focus on women's entrepreneurship in order to achieve zero hunger, responsible consumption and production, and multiple other sustainable development goals mainly in African countries.

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