

Cooperativism as an Institutional Alternative to the Ecological Limits of Economic Growth

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Abstract

This article examines cooperativism as an institutional alternative for addressing the ecological limits of the contemporary economic growth model. Based on ecological economics, particularly the contributions of Nicholas Georgescu-Roegen, it assumes that every productive process involves irreversible transformations of energy and matter, increasing entropy and imposing biophysical limits on economic expansion. In dialogue with the framework of Karl Polanyi, the study discusses the need to reorganize institutional forms of production in order to re-embed the economy within social and ecological relations. The research adopts a qualitative and exploratory approach, based on a systematized literature review focused on ecological economics, economic sociology, territorial development and agroecology. The analysis demonstrates that the dominant economic model, driven by continuous expansion of production and consumption, intensifies pressure on natural resources and deepens socio-environmental tensions. In this context, cooperativism emerges as an institutional form capable of articulating economic, social and territorial dimensions through democratic governance and the pursuit of collective interests. The article concludes that cooperativism represents a relevant alternative for reorganizing the relationships between economy, society and nature under ecological constraints.

Keywords: cooperativism, ecological economics, agroecology, entropy, sustainable development, territorial development

1. Introduction

The contemporary model of economic development has been structured around the continuous expansion of production and profit maximization, guided by a rationality that often disregards the ecological and social limits of economic activity. The intensification of productive processes, combined with the increasing complexity of global value chains, has intensified the exploitation of natural resources and deepened social and territorial tensions.

Ecological economics introduces a fundamental critique by demonstrating that economic activity cannot be understood independently from natural systems (Georgescu-Roegen, 1971). From this perspective, every productive process involves irreversible transformations of energy and matter, implying an increase in entropy and, consequently, physical limits to economic expansion. This approach shifts the economic debate beyond productive efficiency, requiring consideration of the biophysical conditions that sustain life.

At the same time, economic sociology—particularly through the work of Karl Polanyi—shows that modern market economies tend to become disembedded from social structures, subordinating social life to market logic (Polanyi, 2000). This separation between economy, society and nature highlights the need for institutional mechanisms capable of re-embedding economic activity within social and ecological relations.

In this context, cooperativism emerges as a relevant institutional alternative. By organizing economic activity through the association of individuals, democratic governance and collective participation in outcomes, cooperatives introduce a distinct economic rationality that is not exclusively oriented toward profit maximization. Furthermore, their territorially embedded nature, as emphasized by Milton Santos (2006), allows cooperativism to be understood as an organizational form capable of articulating economic, social and territorial dimensions.

The convergence between cooperativism and agroecology further strengthens this analysis by highlighting the possibility of building productive systems that integrate environmental sustainability, social inclusion and economic viability. By valuing cooperation, local knowledge and collective resource management, these approaches point toward alternative pathways for reorganizing productive practices in accordance with ecological limits.

Recent studies have expanded discussions on ecological economics by emphasizing the importance of institutional arrangements capable of promoting sustainable development, territorial resilience and democratic governance (Costanza, R., et al., 2021; Levin, & Xepapadeas, 2021). Likewise, research on cooperative organizations has increasingly highlighted their contribution to social inclusion, local development and sustainable production systems (Camargo Benavides, & Ehrenhard, 2021). Nevertheless, studies integrating ecological economics and cooperative studies within a common analytical framework remain comparatively limited, particularly regarding the institutional role of cooperativism in addressing the ecological limits of economic growth. By bringing these perspectives together, this article seeks to contribute to this emerging field of research.

Given this context, this article aims to analyze cooperativism as an institutional form capable of contributing to the reorganization of relationships between economy, society and nature, particularly in light of the limits to economic growth. It seeks to understand how the principles of ecological economics, economic sociology and agroecology enable the interpretation of cooperativism as an alternative to the limitations of the dominant economic model.

2. Theoretical Framework

This study is grounded in the articulation of three complementary theoretical fields: ecological economics, economic sociology and cooperativism as an institutional form of organizing productive activity.

Within ecological economics, the contributions of Nicholas Georgescu-Roegen are particularly significant, as his analysis incorporates the principles of thermodynamics into economic processes. According to the author, all productive activity involves irreversible transformations of energy and matter, implying an increase in entropy and the consequent degradation of natural resources (Georgescu-Roegen, 1971). This perspective challenges conventional economic approaches that treat production as a circular and self-sustaining process, instead emphasizing the material and energetic limits of economic activity.

Herman Daly further develops this argument by stressing the need to consider the scale of economic activity in relation to the carrying capacity of ecosystems. He advocates the construction of a steady-state economy, in which economic processes operate within ecological limits rather than pursuing continuous expansion (Daly, 1996).

In the field of economic sociology, the contributions of Karl Polanyi are fundamental for understanding the institutional transformations associated with the rise of market economies. Polanyi argues that modern economies tend to become disembedded from social relations, leading to the subordination of social life to market dynamics (Polanyi, 2000). In this context, associative forms such as cooperatives can be understood as mechanisms for re-embedding the economy within social structures.

The territorial dimension is further developed through the contributions of Milton Santos, who conceives territory not merely as physical space, but as a lived space where economic, social and institutional relations are articulated (Santos, 2006). This approach allows cooperativism to be understood as a territorially embedded organizational form, capable of generating differentiated economic and social outcomes compared to traditional firms.

In the field of agroecology, the contributions of Miguel Altieri are central, particularly in emphasizing the integration of ecological processes with productive systems and the valorization of local knowledge. This perspective directly aligns with cooperativism, as both are grounded in cooperation, collective organization and the sustainability of production systems (Altieri, 2012).

Taken together, this theoretical framework enables an understanding of cooperativism not merely as an alternative organizational model, but as an institutional form capable of articulating economic, social and ecological dimensions, offering responses to the limits of contemporary economic growth.

Recent contributions to sustainability studies increasingly emphasize that ecological transitions depend not only on technological innovation but also on institutional arrangements capable of coordinating collective action and promoting long-term governance (Bennich, Weitz, & Carlsen, 2020; Folke, Polasky, Rockström, et al., 2021). From this perspective, the integration of ecological economics, economic sociology and cooperative studies provides a consistent analytical framework for examining how institutional forms of economic organization may contribute to sustainable development under ecological constraints (Bauwens, Huybrechts, & Dufays, 2020).

3. Methodology

This study adopts a qualitative and exploratory approach based on a systematized literature review. This methodological approach is consistent with qualitative research designs that seek to develop theoretical

interpretations through the critical integration of existing knowledge (Snyder, 2019; Xiao, & Watson, 2019). The methodological strategy was selected because the objective of the study is to develop a theoretical and interdisciplinary interpretation of cooperativism as an institutional alternative to the ecological limits of economic growth.

The selection of bibliographic material was guided by the theoretical relevance of the works and their contribution to understanding the relationships between economic growth, ecological limits and institutional forms of production organization. Specifically, the literature review was based on three complementary criteria: (i) theoretical relevance to the research problem; (ii) scientific recognition of the selected works within their respective fields; and (iii) their contribution to understanding the relationships between ecological limits, institutional organization and cooperativism. Both classical and contemporary works were analyzed, with particular emphasis on the contributions of Georgescu-Roegen, Polanyi, Daly, Santos, Altieri and Leff, among others.

The inclusion of both classical and contemporary studies seeks to combine the theoretical foundations of ecological economics and economic sociology with recent discussions on sustainability transitions, institutional governance and territorial development.

Selected empirical studies were also incorporated as illustrative evidence to examine how the institutional mechanisms identified in the theoretical framework operate in concrete cooperative experiences.

The analytical method adopted is deductive, aiming to examine how the theoretical principles advanced by these authors can support the interpretation of cooperativism as an institutional alternative to the limitations of the dominant economic model.

In addition, the study develops an interpretative analysis of key analytical categories—entropy, sustainability, territory, cooperation and agroecology—establishing connections between different fields of knowledge in order to construct an interdisciplinary understanding of the research problem.

Rather than seeking empirical generalization, the study develops an interpretative analytical framework that integrates different theoretical traditions in order to explain the institutional contribution of cooperativism to sustainable development under ecological constraints.

4. Foundations of Cooperativism

The historical foundations of cooperativism can be traced back to the experience of the Rochdale Pioneers (1844) in England. From this initial experience, a set of organizational principles emerged and later consolidated through the International Co-operative Alliance. The Statement on the Cooperative Identity, periodically reaffirmed by the International Co-operative Alliance – ICA (2015), continues to provide the internationally recognized framework that guides cooperative organizations across different sectors and countries.

Among the core principles that continue to guide the cooperative movement are voluntary and open membership, democratic member control, economic participation of members, autonomy and independence, education and training, inter-cooperation, and concern for the community. These principles distinguish cooperatives from conventional firms by emphasizing collective participation and social responsibility.

Cooperativism is primarily oriented toward meeting the collective needs of its members and the communities in which it operates. In contrast, conventional business enterprises are typically driven by the objective of profit maximization. Therefore, although cooperatives also engage in economic activities, they should be understood as institutions of considerable social, territorial and productive relevance, as they articulate economic and collective interests through distinct organizational arrangements, aligning with the concept of solidarity economy developed by Singer (2002).

Recent studies continue to recognize cooperative organizations as institutions capable of simultaneously generating economic value, strengthening social capital, and promoting territorial development, reinforcing their relevance in contemporary debates on sustainable development and institutional resilience (Bijman, & Iliopoulos, 2014; Mozas-Moral, Bernal-Jurado, Medina-Viruel, & Fernández-Uclés, 2022).

As noted by Singer (2002), cooperatives represent a form of economic organization in which participants are simultaneously users and owners, enabling a more balanced distribution of the benefits generated by productive activity.

This characteristic becomes particularly significant in rural contexts, where producers face structural challenges related to production scale, market access and the concentration of economic power in agro-industrial chains. Through collective organization, cooperatives provide mechanisms to overcome these constraints.

By promoting democratic governance and collective participation, cooperatives strengthen community ties and contribute to more inclusive development processes. Cooperativism should therefore not be viewed merely as an

alternative business structure, but as a social institution capable of articulating economic interests, democratic participation and local development under the cooperative principles established by the ICA.

5. Cooperativism as an Alternative Economy

Modern economic organization is predominantly structured around the principles of the capitalist system, whose central logic is guided by productive efficiency, capital accumulation and profit maximization. Within this framework, firms are conceived primarily as instruments for the valorization of invested capital, establishing a separation between ownership, control and participation in the productive process.

According to Polanyi (2000), modern market economies tend to organize production and the circulation of goods through self-regulating mechanisms, progressively subordinating social life to market imperatives. This process leads to the disembedding of the economy from social structures, transforming society itself into a functional support for market dynamics.

While this model has enabled a significant expansion of production and technological advancement, it has also generated social and territorial tensions associated with wealth concentration, inequality and the weakening of community ties. In response, alternative institutional arrangements have emerged, seeking to reorganize economic activity based on different principles.

Recent international studies have reinforced the relevance of alternative organizational arrangements that combine economic efficiency with social responsibility and democratic governance. Within this debate, cooperative organizations have increasingly been recognized as institutional mechanisms capable of promoting more inclusive and resilient models of economic development.

Cooperativism is part of this set of alternatives, proposing a form of economic organization based on the association of individuals, democratic governance and collective participation in the outcomes of productive activity. As highlighted by Birchall (1997), cooperatives are collectively owned organizations in which users or workers exercise direct control over the institution and share in its economic results.

This configuration challenges the logic of traditional firms by reducing the separation between ownership and use, thereby bringing economic activity closer to the concrete needs of participants. The International Co-operative Alliance (ICA) (2015) defines a cooperative as an autonomous association of persons who voluntarily unite to meet common economic, social and cultural needs through a jointly owned and democratically controlled enterprise.

From this perspective, cooperativism represents a distinct economic rationality, in which production is not exclusively oriented toward profit maximization, but toward the satisfaction of collective needs and the generation of social benefits. This institutional perspective has gained increasing attention in contemporary discussions on sustainable development because it recognizes that long-term economic resilience depends not only on market performance but also on governance structures capable of integrating social, economic and environmental objectives. As emphasized by Singer (2002), cooperatives and other forms of solidarity economy seek to reconcile economic efficiency with social justice by organizing production and the distribution of wealth based on cooperation and self-management.

From the perspective proposed by Polanyi, cooperativism can be understood as an institutional mechanism for re-embedding the economy within social relations, as it reconnects economic activity with community ties and territorial dynamics. By strengthening collective forms of production organization, cooperatives contribute to the construction of economic arrangements in which economic interests are more directly aligned with social needs.

This dimension makes cooperativism particularly relevant in contemporary debates on alternatives to the dominant economic model. By combining entrepreneurial activity with principles of solidarity, democratic participation and community commitment, cooperatives introduce institutional mechanisms capable of balancing productive objectives with social purposes.

Furthermore, the articulation between cooperativism and ecological economics reinforces this analysis by demonstrating that economic activity cannot be dissociated from the biophysical limits of the planet. In this sense, cooperativism not only reconfigures the social relations of production, but also opens up possibilities for the development of productive practices more compatible with environmental sustainability.

This discussion becomes even more relevant in the context of the contemporary digital economy, in which, as analyzed by Srnicek (2017), digital platforms have come to occupy a central position in the organization of economic activity, intensifying power concentration and reinforcing value extraction dynamics in digital economies. This transformation also reinforces the importance of examining whether cooperative organizational models may offer institutional alternatives capable of balancing technological innovation with democratic governance and collective ownership in digital environments.

6. Contemporary Socio-environmental Challenges and the Role of Cooperativism

The economic and technological transformations that have shaped contemporary societies have significantly expanded productive capacity and access to goods and services. However, this process has also intensified environmental and social impacts associated with the exploitation of natural resources, the continuous expansion of production and the increasing dependence on globalized production chains (Leff, 2006). Recent international research has increasingly emphasized that contemporary socio-environmental challenges cannot be addressed exclusively through technological innovation or environmental regulation. Sustainable transitions also require institutional arrangements capable of strengthening collective action, territorial governance and long-term ecological resilience.

Ecological economics highlights that the dominant economic model is structured around continuous growth that frequently disregards the biophysical limits of natural systems. From this perspective, Georgescu-Roegen demonstrates that every productive process involves irreversible transformations of energy and matter, resulting in increased entropy and the consequent degradation of natural resources (Georgescu-Roegen, 1971). This approach reveals that unlimited economic expansion encounters physical constraints imposed by the laws of nature, thereby questioning the sustainability of the prevailing growth model.

Additionally, Enrique Leff argues that dominant economic rationality tends to reduce nature to a mere factor of production, neglecting the complexity of ecosystems and the interdependence between society and the environment (Leff, 2006). This reduction undermines the capacity of economic institutions to adequately respond to contemporary environmental challenges, particularly those related to environmental degradation, climate change and biodiversity loss.

In this context, the debate on sustainable development emerges as an attempt to integrate economic, social and environmental dimensions. The Brundtland Report (Brundtland Commission (CMMAD), 1991) introduced the notion that development should meet the needs of the present without compromising the ability of future generations to meet their own needs. Nevertheless, the operationalization of this concept remains constrained by the persistence of a growth-oriented economic model.

This limitation has stimulated growing interest in institutional approaches that seek to reconcile economic activity with ecological sustainability through alternative forms of production and governance. Within this context, cooperative organizations have attracted increasing attention because of their capacity to combine economic performance with collective decision-making and territorial commitment.

Within this framework of structural tensions, cooperativism gains relevance as an institutional form capable of contributing to the reorganization of productive practices. By structuring economic activity around the association of individuals and the democratic management of resources, cooperatives tend to strengthen territorial ties and foster greater commitment among members to the sustainability of productive activities.

The articulation between cooperativism and agroecology further enhances this transformative potential. As emphasized by Altieri (2012), agroecology promotes the integration of ecological principles into productive systems, encouraging agricultural practices based on diversity, resilience and reduced dependence on external inputs. Such practices often rely on cooperation among producers, knowledge exchange and collective organization of production, all of which resonate with the foundational principles of cooperativism. This convergence reinforces the understanding that ecological sustainability depends not only on environmentally appropriate production techniques but also on institutional environments capable of promoting cooperation, knowledge sharing and long-term community engagement.

Moreover, cooperatives can contribute to the development of territorially embedded economic circuits, reducing dependence on highly concentrated and globalized production chains. This characteristic supports the construction of more resilient productive arrangements that are capable of addressing the environmental and social specificities of each territory.

Thus, in the face of contemporary socio-environmental challenges, cooperativism presents itself as an institutional mechanism capable of articulating economic production, environmental sustainability and social inclusion. Its convergence with agroecological practices points to viable pathways for the construction of development models that recognize ecological limits while valuing the territorial dimension of economic activity. This perspective reinforces the relevance of cooperativism within current debates on sustainable development and institutional responses to the ecological limits of economic growth.

7. Cooperativism in the Economic Process and Entropy

The discussion of the limits of economic growth becomes central when ecological economics principles are incorporated into the analysis of productive processes. Conventional economic approaches, which often treat production as a circular system, tend to overlook the structural dependence of economic activity on flows of energy

and matter derived from nature.

From this perspective, Georgescu-Roegen introduces a fundamental shift by demonstrating that every economic process involves irreversible transformations of energy and matter, leading to increased entropy and the degradation of natural resources (Georgescu-Roegen, 1971). The economy, therefore, cannot be understood as a closed and self-sufficient system, but rather as a subsystem embedded within a broader ecological system upon which it continuously depends.

This perspective highlights that economic expansion encounters physical limits imposed by natural constraints, particularly the finiteness of natural resources and the limited capacity of ecosystems to absorb waste. As emphasized by Daly (1996) the scale of economic activity must be compatible with the carrying capacity of ecosystems, otherwise, the sustainability of productive systems will be compromised.

Recent discussions in ecological economics increasingly recognize that respecting ecological limits depends not only on improvements in productive efficiency but also on institutional arrangements capable of influencing production, consumption and collective decision-making. This perspective broadens the analysis of entropy by highlighting the importance of governance structures in promoting long-term sustainability.

The incorporation of the concept of entropy into economic analysis thus reveals that unlimited growth is physically unsustainable, requiring a reconfiguration of both productive models and institutional forms of economic organization. In this context, the focus shifts from quantitative expansion to the qualitative dimensions of economic organization and its compatibility with ecological limits.

At this point, cooperativism can be understood as a relevant institutional alternative, not because cooperative organization reduces entropy in the thermodynamic sense, but because it may influence how production and consumption decisions are collectively organized. The physical constraints identified by Georgescu-Roegen remain unchanged: every productive process irreversibly transforms energy and matter. The institutional contribution of cooperativism lies instead in its capacity to shape the intensity, scale and organization of resource use.

Collective ownership and democratic governance may favor productive choices based on longer product lifecycles, shared infrastructure, material recovery, reduced dependence on external inputs and production practices more closely adapted to local ecological conditions. Member participation may also facilitate the incorporation of environmental criteria into investment and resource-allocation decisions. In this respect, Ostrom (1990) demonstrates how institutions based on collective resource management can develop governance mechanisms for the sustainable use of common resources.

These mechanisms do not eliminate entropy, but may reduce material and energy throughput and slow the conversion of natural resources into waste by reorganizing production around durability, resource efficiency, reuse and territorial needs rather than continuous expansion. Cooperativism should therefore be understood as an institutional arrangement capable of influencing the social and economic decisions through which ecological pressures are intensified or mitigated.

This institutional perspective also connects entropy with contemporary consumption patterns. When economic stability depends on continuously renewed demand and accelerated product replacement, material and energy throughput intensifies accordingly. Planned obsolescence therefore provides a concrete expression of how institutional choices concerning production and consumption may aggravate ecological pressures, a relationship examined in the following section.

8. Planned Obsolescence and Consumerism

The development of industrial economies throughout the twentieth century consolidated a productive model strongly dependent on the continuous expansion of consumer demand. The intensification of production processes, combined with technological advances and large-scale industrial organization, has required not only the increasing manufacture of goods, but also the constant renewal of demand that sustains these economic cycles.

Recent sustainability research has increasingly questioned production and consumption models based on accelerated product replacement and intensive resource use. These discussions reinforce the need to reconsider consumption patterns in light of ecological limits and long-term environmental resilience.

In this context, consumption is no longer understood merely as a response to material needs, but plays a structural role within economic dynamics. As noted by Bauman (2008), in contemporary societies consumption becomes a central organizing element of social life, playing a key role in the construction of identities and in the reproduction of economic relations.

This perspective also highlights that consumption is shaped by institutional and cultural factors, indicating that changes toward sustainability require not only technological innovation but also alternative forms of economic organization capable of influencing production and consumption practices.

In contrast to this logic, Benkler (2006) highlights the emergence of forms of production based on commons-based peer production and networked collaboration, pointing to possibilities of economic organization that are not exclusively grounded in market logic and continuous consumption expansion.

Within this framework, the phenomenon of planned obsolescence emerges as a strategy aimed at deliberately reducing the lifespan of products in order to stimulate their replacement at increasingly shorter intervals. As emphasized by Latouche (2009), this practice constitutes a structural mechanism of growth-oriented economies, artificially accelerating the production–consumption–disposal cycle that sustains economic expansion.

Consequently, the debate on planned obsolescence extends beyond product durability and raises broader questions concerning the institutional organization of contemporary economies and their compatibility with ecological sustainability.

Planned obsolescence is not limited to the technical dimension of product durability; it also manifests in symbolic and cultural forms. The constant introduction of new models, combined with marketing strategies and the social valorization of novelty, contributes to the replacement of goods that remain functionally adequate, reinforcing consumption patterns based on disposability.

This dynamic has significant environmental implications. The acceleration of production cycles intensifies the extraction of natural resources and increases waste generation, thereby aggravating the ecological impacts associated with economic activity. As argued by Jackson (2009), contemporary economies are structurally dependent on high levels of consumption, creating a paradox whereby economic stability relies on the continuation of environmentally unsustainable practices.

From the perspective of ecological economics, this dynamic reveals a structural tension between economic growth and environmental sustainability. If every productive process involves irreversible transformations of energy and matter, as demonstrated by Georgescu-Roegen, then the intensification of consumption cycles directly contributes to increased entropy within the economic system, accelerating the degradation of natural resources.

In this scenario, the critique of planned obsolescence extends beyond specific industrial practices and addresses the underlying logic of the dominant economic model. The continuous need for demand renewal exposes the structural dependence of the system on constant consumption, thereby highlighting the limits of this form of economic organization.

Within this context, cooperativism can offer relevant contributions. By promoting economic organization based on cooperation, democratic governance and orientation toward collective needs, cooperatives tend to reduce the centrality of consumption as the sole driver of economic activity.

By encouraging democratic participation and collective decision-making, cooperative organizations may also foster production and consumption practices that prioritize durability, resource efficiency and community well-being over accelerated replacement cycles.

Moreover, by strengthening territorial ties and local production circuits, cooperativism can support the development of production and consumption patterns more closely aligned with the real needs of communities, reducing dependence on production chains structured around obsolescence and accelerated consumption.

Thus, cooperativism can be understood as an institutional mechanism capable of challenging the logic of consumerism and introducing economic alternatives that prioritize durability, sustainability and the rational use of natural resources.

These characteristics reinforce the relevance of cooperativism within current debates on sustainable consumption and institutional alternatives capable of reducing the environmental pressures associated with contemporary consumerism.

9. Cooperativism as a Political and Territorial Actor

The analysis of cooperativism cannot be limited to its economic or organizational dimensions. Throughout its historical trajectory, cooperatives play a significant role in shaping social, political and territorial dynamics, establishing themselves as institutional actors within processes of local and regional development.

Recent studies on territorial development increasingly recognize that local institutions play a decisive role in promoting social cohesion, strengthening governance networks and enhancing the resilience of regional economies. Within this perspective, cooperative organizations have gained renewed attention as institutional actors capable of articulating economic development with community participation and territorial sustainability.

Understanding this dimension requires consideration of the relationship between economy and territory. As argued by Santos (2006), territory should be understood not merely as physical space, but as lived space in which economic, social and institutional relations are articulated. Within this framework, territory becomes the locus where economic practices materialize and where forms of social organization are expressed.

Within this context, cooperatives tend to develop strong connections with the territories in which they operate, as their organizational structure is based on the association of individuals and the democratic management of economic resources. Unlike large corporations, often guided by global expansion strategies and profit maximization, cooperatives primarily operate within local or regional dynamics, establishing closer relationships with communities and with the socio-economic conditions of the territory.

This territorial embeddedness strengthens the capacity of cooperative organizations to respond to local challenges through collective action, reinforcing institutional trust and encouraging long-term development strategies adapted to the specific characteristics of each region.

This characteristic gives cooperativism an important political dimension. By promoting member participation in economic decision-making, cooperatives enhance the capacity of communities to influence the direction of productive activities, contributing to the development of forms of territorial governance based on cooperation and collective participation.

From the perspective of economic sociology, this role can be interpreted as a mechanism for re-embedding the economy within social relations, as proposed by Polanyi (2000). By articulating economic and social interests at the territorial level, cooperatives contribute to reducing the separation between market and society that characterizes modern capitalist economies.

In addition, literature on territorial development emphasizes the role of collective organizations in building alternatives to dominant development models. As argued by Escobar (2014), contemporary processes of territorial organization increasingly seek to valorize local knowledge, strengthen collective resource management and promote forms of economy embedded within specific territories.

In this sense, cooperativism can be understood as an intermediary institution capable of articulating economic, social and territorial dimensions. By strengthening local productive structures, promoting the circulation of wealth within territories and encouraging social participation, cooperatives contribute to more inclusive and sustainable development dynamics.

In this sense, cooperativism contributes not only to local economic development but also to the strengthening of institutional capacity, democratic governance and territorial resilience, dimensions that have become increasingly relevant within contemporary sustainability debates.

Furthermore, the territorial action of cooperatives has broader political implications, as it fosters spaces for participation and collective organization that extend beyond strictly economic dimensions. This reinforces the role of cooperativism as a relevant political actor in shaping territorial development strategies.

Thus, when understood as a political and territorial actor, cooperativism expands its relevance as an institutional alternative to contemporary challenges, particularly when articulated with sustainable practices and forms of economic organization based on cooperation.

These characteristics reinforce the role of cooperative organizations as institutional actors capable of connecting economic activity, territorial development and ecological sustainability within integrated development strategies.

10. Collective Organization and Agroecology

Agroecology has emerged as both a scientific and practical framework aimed at reorganizing agricultural production through the integration of ecological, social and productive processes. Unlike intensive agricultural models—characterized by high dependence on external inputs and simplified production systems—agroecology promotes the development of diversified, resilient and locally adapted agroecosystems.

Within agroecology, the contributions of Altieri (2012) are particularly relevant, as he emphasizes that the sustainability of agricultural production depends not only on technical efficiency, but also on the extent to which production systems incorporate ecological principles such as biodiversity, natural cycles and reduced reliance on chemical inputs.

In the Brazilian context, Khatounian (2001) likewise argues that the ecological reconstruction of agriculture requires production systems capable of integrating environmental conservation, productive efficiency and social organization. This perspective complements agroecological approaches by emphasizing that sustainable agriculture depends not only on ecological principles but also on institutional arrangements that strengthen cooperation among producers and the responsible management of natural resources.

Contemporary agroecological research also highlights that ecological resilience is strengthened when production systems are supported by institutions that facilitate collective learning, knowledge exchange and participatory decision-making among producers.

However, agroecology is not limited to a set of technical practices; it also constitutes a social process of collective knowledge construction. As argued by Toledo and Barrera-Bassols (2009), traditional agricultural systems

incorporate ecological knowledge accumulated across generations, and the valorization of this knowledge is essential for the development of sustainable production practices.

This social dimension highlights the central role of collective organization in the diffusion and consolidation of agroecology. The transition toward sustainable agricultural systems requires not only technical changes, but also institutional transformations that strengthen cooperation among producers, knowledge exchange and shared management of productive resources.

At this point, cooperativism becomes particularly relevant. As a form of organization based on the association of producers and democratic management of economic activities, cooperatives provide institutional spaces conducive to the articulation of agroecological practices.

Agricultural cooperatives enable coordination across different stages of the production process, including input acquisition, processing, commercialization and dissemination of appropriate technologies. They also foster the development of cooperation networks among producers, enhancing adaptability to environmental conditions and market demands.

Beyond improving productive coordination, cooperative organizations strengthen institutional capacity within rural territories by facilitating collective planning, shared investments and long-term cooperation among producers.

Empirical studies of Brazilian agricultural cooperatives illustrate how these mechanisms can operate in practice. Research on Ecocitrus, a cooperative of ecological citrus producers in southern Brazil, shows that its collective composting facility transforms organic residues into fertilizer distributed to member farms, replacing agrochemical inputs and supporting organic production (Ribeiro, Bertoldo, Dalla Valle, & Dorr, 2025). Similarly, research on family farmers associated with COAGROSOL in São Paulo identified agroecological practices involving productive diversification, agrobiodiversity and material recycling, as well as changes in attitudes toward the use of natural resources (Almeida, & Abreu, 2009). These experiences illustrate how cooperative organization can provide institutional conditions for translating ecological principles into concrete productive practices.

From a territorial perspective, the articulation between cooperativism and agroecology contributes to the development of production systems rooted in local specificities. By valuing natural resources and traditional knowledge, this integration promotes agricultural practices better aligned with the ecological and cultural conditions of each territory.

This territorial perspective reinforces the capacity of cooperative organizations to integrate environmental conservation, economic viability and social inclusion within locally adapted development strategies.

Furthermore, this convergence supports the construction of rural development models that reconcile productivity, environmental sustainability and social inclusion. By integrating cooperation, democratic governance and ecological principles, agroecological cooperativism emerges as an institutional alternative capable of promoting more balanced and resilient production systems.

Thus, the relationship between collective organization and agroecology highlights the potential of cooperative forms of economic organization to contribute to the development of sustainable, socially integrated and territorially embedded production systems.

11. Discussion

The analysis developed throughout this study demonstrates that the debate on the limits of economic growth cannot be understood solely in quantitative terms, but must also consider the institutional forms that organize productive activity. The incorporation of ecological economics reveals that continuous expansion of production is constrained by the biophysical limits of the planet, thereby challenging the sustainability of the dominant economic model.

The present analysis suggests that the contribution of cooperativism extends beyond its organizational characteristics. When examined through the combined perspectives of ecological economics, economic sociology and territorial development, cooperative organizations emerge as institutional arrangements capable of reconciling productive activities with ecological constraints while strengthening democratic governance and collective action.

Georgescu-Roegen's (1971) contribution is central in demonstrating that every productive process involves an increase in entropy, rendering unlimited growth physically unsustainable. This shifts the focus of economic analysis from the expansion of production to the need for reconfiguring institutional arrangements.

From this perspective, Polanyi's (2000) critique of the disembedding of market economies acquires renewed relevance. By showing how modern economies tend to detach from social and ecological structures, Polanyi provides a theoretical basis for understanding the need for institutional mechanisms capable of re-embedding economic activity within social relations.

This interpretation contributes to current debates by highlighting that ecological sustainability depends not only on technological innovation or environmental regulation but also on institutional forms capable of coordinating

long-term collective responses to socio-environmental challenges.

Cooperativism enters this debate as an institutional form that challenges dominant economic logic. By combining democratic governance, collective participation and orientation toward members' needs, cooperatives introduce an alternative economic rationality that differs from profit-maximization paradigms.

In addition, territorial analysis, inspired by Santos (2006), highlights that economic organization is not neutral, but materializes in concrete territories where social, economic and institutional relations are intertwined. In this context, the territorially embedded nature of cooperativism contributes to economic dynamics that are more responsive to local specificities.

From this perspective, territorial embeddedness should be understood not merely as a geographical characteristic of cooperative organizations, but as an institutional condition that facilitates social participation, local governance and sustainable development.

Empirical evidence from renewable energy cooperatives reinforces this institutional interpretation beyond the agricultural sector. Bauwens, Huybrechts and Dufays (2020), comparing three Flemish renewable energy cooperatives, show that organizational missions shape contrasting scaling strategies. Cooperatives oriented toward broader societal interests may pursue less growth-focused strategies based on scale-out and scale-deep rather than business expansion alone. This evidence illustrates how cooperative governance can influence strategic choices concerning the scale and purpose of economic activity, providing a concrete institutional connection between collective organization and sustainability transitions.

The empirical experiences discussed above also reinforce agroecology as a field in which cooperative institutions may translate collective governance into environmentally adapted productive practices. The convergence between agroecology and cooperativism illustrates how institutional cooperation may support productive systems that combine environmental sustainability, social inclusion and economic viability.

Nevertheless, it is important to recognize that cooperativism does not constitute an automatic solution to contemporary socio-environmental challenges. Its effectiveness depends on institutional conditions, appropriate public policies and the capacity for collective organization among actors. Moreover, its integration into globalized markets presents challenges related to competitiveness, scale and economic sustainability.

Even so, by promoting economic organization based on cooperation and democratic participation, cooperativism contributes to the construction of institutional alternatives capable of reconnecting economy, society and nature. It can therefore be understood as a relevant instrument for addressing the limitations of the dominant economic model, particularly when combined with agroecological practices and territorial development strategies.

Future empirical studies may further examine how different cooperative experiences contribute to sustainability transitions across distinct territorial and institutional contexts.

Finally, the analysis of recent transformations in the digital economy, as highlighted by Srnicek (2017) and Benkler (2006), reinforces the need to further develop institutional alternatives capable of reconciling technological innovation with sustainability and social justice.

These developments reinforce the importance of continuing to investigate cooperative governance as a relevant institutional alternative within contemporary debates on sustainable development.

12. Conclusion

The analysis developed in this study demonstrates that the limits of economic growth should not be understood merely as temporary constraints, but as structural conditions arising from the embeddedness of economic activity within ecological systems. The incorporation of ecological economics—particularly through the contributions of Georgescu-Roegen—shows that every productive process involves irreversible transformations of energy and matter, imposing biophysical limits on economic expansion.

In this context, Polanyi's critique of the disembedding of market economies becomes fundamental for understanding the need to reconfigure institutional forms of production organization. By highlighting the separation between economy, society and nature, this perspective underscores the importance of mechanisms capable of re-embedding economic activity within social and ecological relations.

Cooperativism, as analyzed in this article, emerges as a relevant institutional alternative in this process. By articulating principles of democratic governance, collective participation and community orientation, cooperatives introduce an alternative economic rationality not exclusively driven by profit maximization, but by the satisfaction of collective needs and the construction of more balanced economic dynamics.

The territorial dimension of cooperativism, informed by the contributions of Santos, reinforces this potential by demonstrating that economic practices are embedded in concrete territories where social, institutional and productive relations are articulated. In this perspective, the territorial embeddedness of cooperatives contributes to

development models that are more responsive to local specificities.

The convergence between cooperativism and agroecology further expands this analysis by demonstrating the possibility of constructing productive systems that integrate economic efficiency, environmental sustainability and social inclusion. By valuing cooperation, local knowledge and collective resource management, this articulation points to viable pathways for reorganizing productive practices in accordance with ecological limits.

However, it must be acknowledged that cooperativism is not an automatic solution to contemporary socio-environmental challenges. Its effectiveness depends on institutional conditions, appropriate public policies and the capacity for collective organization, as well as its ability to navigate the constraints imposed by globalized markets.

The principal contribution of this study lies in integrating ecological economics, economic sociology and cooperative studies within a common analytical framework that interprets cooperativism as an institutional alternative for addressing the ecological limits of economic growth. The empirical experiences identified in the literature illustrate how collective governance may translate into concrete mechanisms involving resource recovery, agroecological production, renewable energy and strategic choices concerning the scale and purpose of economic activity. Rather than presenting cooperatives as inherently sustainable, the analysis demonstrates how their institutional characteristics may create conditions for reconnecting economic activity with social participation, territorial development and ecological sustainability.

This study remains limited by its predominantly theoretical nature and by its reliance on a systematized literature review. Although the empirical experiences incorporated into the analysis provide concrete illustrations of the mechanisms discussed, they do not permit empirical generalization. Future research may therefore develop comparative analyses involving different cooperative sectors and territorial contexts.

Nevertheless, by offering forms of economic organization grounded in cooperation, democratic governance and territorial embeddedness, cooperativism can be understood as a relevant institutional alternative for addressing the limitations of the dominant economic model. Its articulation with ecological economics and agroecology highlights concrete possibilities for reconfiguring the relationship between economy, society and nature, contributing to the development of more balanced and sustainable models.

Abbreviations

CMMAD – World Commission on Environment and Development

ICA – International Co-operative Alliance

Author Contributions

Neri Luiz Cenzi: Conceptualization, methodology, literature review, formal analysis, writing—original draft preparation, writing—review and editing.

Wilson Itamar Godoy: Conceptualization, supervision, validation, critical review, writing—review and editing.

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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