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The Role of Consumer-Citizens and Connectedness to Nature in the Sustainable Transition to Agroecological Food Systems: The Mediation of Innovative Business Models and a Multi-Level Perspective

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Abstract: Conventional agricultural systems have contributed to social, economic and environmental problems and are the main threat to global sustainability. In response, theoretical frameworks to describe the transition to sustainable food systems have been proposed, emphasizing the necessity to shift from farm-level solutions to a focus on interactions within the entire value chain, from production to consumption. Despite the emphasis on the importance and potential of consumers to contribute to sustainable agri-food transitions, approaches to their role have remained within the traditional, linear supply chain framework. Marketing approaches view consumers as passive actors, limited to voting with their wallets, which has deepened the disconnection between consumers, producers and nature, resulting in a triple fracture. We analyze the role of the consumer in agri-food systems, contrasting marketing approaches with other consumers/citizens concepts and locate them within sustainability transition frameworks and a multi-level perspective. We discuss the re-establishment of the connection between farmers and consumers and human–nature connectedness and explore this connection mediated through innovative business models, which act as niche innovations with the capacity to influence regimes and landscapes within the multi-level perspective. The role of consumers/citizens in the co-creation of innovative business models is also addressed.

Keywords: agroecology; sustainable agricultural transition; consumers/citizens; sustainable consumption; innovative business models; alternative agri-food networks (AAFNs); human–nature connectedness (HNC); multi-level perspective (MLP); community-supported agriculture (CSA); cooperatives

1. Introduction

Current conventional agri-food systems are among the major threats to global sustainability [1–4]. In addition, the industrial approach to food and farming has helped unsustainable agri-food systems to evolve and become firmly established [5]. Conventional agri-food systems seek to produce large amounts of standardized foods to achieve economies of scale, where production volume and yield outputs are indicators of productivity [6]. This fact results in negative environmental impacts, such as climate change, environmental degradation, stressed resources and biodiversity loss [7–10], as well as

socio-economic problems, such as "demographic change, urbanization, growing inequality, unequal access to resources, unhealthy eating habits and poverty" [11,12]. Despite the massive volume of food production in the global markets for an ever-increasing population (expected to rise to nearly 10 billion by 2050 [13]), unequal access to nutritious food has led to an increase in the number of undernourished people in the world, rising to 811 million in 2020 [14,15]. These socio-economic challenges suggest that agri-food value chains should embrace more sustainable objectives and measures.

Repositioning current agri-food systems from being the largest drivers of global environmental change [16] to becoming an agent of global sustainability transition requires a major shift from farm-level solutions to a focus on the entire value chain [17–19]. This shift concerns not only the production and processing stages but, more importantly, human–nature connectedness (HNC), or what Berti [20] refers to as the "triple fracture" in the agri-food value chain, namely, a disconnection between elements of nature, consumers and producers in the agri-food systems.

Concurrently, the important role of consumers and citizens in sustainability transition is gaining recognition, as evidenced by the increasing number of publications about this issue across sectors [21–23]. Furthermore, the agri-food sector is not an exception. In 2018, the United Nations Food and Agriculture (FAO) and the United Nations Environmental Programme (UNEP) jointly framed sustainable agriculture as "a consumer-driven, holistic concept that refers to the integrated implementation of sustainable patterns of food consumption and production", emphasizing that consumers around the world can be a powerful force for change towards more sustainable and equitable agri-food systems [24] (p. 2). In addition, on 20 May 2020, the European Union launched the Farm-to-Fork (F2F) strategy [25], comprehensively addressing food sustainability from primary production to the final consumers [26]. The F2F journey is not a simple connection between farmers and consumers, since it involves a vast range of different actors, stakeholders and agents. Moreover, it acknowledges the role of individuals as both consumers and citizens with the agency that allows them to build a coalition rather than act solely as consumers. For this reason, we refer to "consumer/citizen" herein. In addition, as a form of food democracy initiative, it provides space for the interconnection of individual and collective consumers/citizens [19,26,27].

However, despite the recognition of the high importance of consumers, citizens, users and, more broadly, civil society, in the agri-food sustainability transition, studies offer a very fragmented perspective when defining their various roles in this transition [21]. Several studies and global schemes have focused on the proximity of the consumers/citizens and producers and their potential to facilitate the sustainable transition of agri-food systems. This has been coupled with an increasing focus on transparency [28,29], traceability [30,31], a wide range of sustainable and "green" certifications and other initiatives. Consequently, there is an increased emphasis on consumer marketing initiatives and sophisticated techniques in order to stimulate "pro-environmental" consumer behavior.

This predominantly liberal market, demand-driven approach assumes that well-informed consumers will make the correct choices based on transparent information, aided by appropriate technologies and innovations such as blockchain technology [32] (p. 179), thus creating a market for sustainable agricultural products resulting from communications with consumers through marketing measures [33,34]. Yet, the physical and knowledge-based disconnection between consumers/citizens and agricultural production, or what Widener et al. [35] refer to as the absence of "food system literacy", which might stem from the commoditization of agricultural products in global supply chains [36,37], makes the meaningful role of the consumer citizen even less tenable.

This article explores the research question of how the re-establishment of HNC in the form of consumer/citizen connection with sustainable growers and nature may further enable the active role of consumers in sustainability transitions. We explore innovative business models that mediate between consumers/citizens and growers and which allow consumers/citizens to re-connect with agriculture and the natural environment. We also

consider how these niche innovative business models and alternative networks become institutionalized to connect with broader social changes in order to share knowledge and meaning among actors and to facilitate the active participation of consumers in the co-creation of more sustainable food systems. The widely referenced framework of Gliessman's 5 levels of agroecological transformation [38] and FAO's 10 elements of agroecology for the sustainable transition of agri-food systems [39] are used as a starting point to anchor our research question. Within this framework, we focus on level four, the re-connection among consumers/citizens, growers and alternative food networks, which is seen to be transformative and which precedes level five, which refers to the rebuilding of the food system itself.

Against such backdrop, this article is a theoretical analysis of such level four and the contribution of the concept of HNC and re-connectedness to nature through grower–consumer relationships, weaving together and triangulating findings from literature reviews from diverse disciplines implicated in our research question. In Section 2, we describe the methodology implemented for reviewing multidisciplinary literature. Section 3 sets out the results and discussion. Section 3.1 outlines the perception of consumers in agri-food supply chain systems (including those that are considered "sustainable") and critically discusses the limitations of current marketing approaches to consumers. In addition, we distinguish between the individual and collective roles of consumers. In Section 3.2, we introduce sustainability transitions and the framework of Gliessman's five levels of agroecology and corresponding FAO elements, locating our research focus in level four. In Section 3.3, we describe the concept of and theories on HNC and how the active role of consumers in sustainability transitions may be strengthened by such connection, that is, given a medium through which to do so. Section 3.4 outlines how consumers/citizens may be connected to growers, thus, nature, through innovative business models. The multi-level perspective (MLP) is used to demonstrate how innovative business models, niche experiments and networks may become institutionalized so as to influence agri-food systems [40–42]. Business models discussed in this article include alternative and/or innovative food networks, social enterprise and cooperative businesses, collective producer groups that share knowledge and land, collective-food-buying groups, community-supported agriculture, collective-food-buying groups, short supply chains, etc. The business models in Section 3.4 are also categorized with respect to the degree of consumers/citizens' engagement with nature (HNC) and FAO elements of agroecology.

2. Materials and Methods

In considering the role of the consumer/citizen and their relationship to nature as a bridge to sustainable transitions, we used a framework for analysis, combining Gliessman's five levels of agroecology [38] and FAO's 10+ elements of sustainable food systems [39], as well as sustainable transition literature applied to agriculture [9,14,31,41,43–47]. Gliessman's five levels of agroecology (see below in Section 3.2) comprise incremental, transformational and system-level changes. The first two levels focus on increasing the efficiency of inputs and substituting alternative practices at the farm level. The third level focuses on a redesign of agroecosystems through diversity, resilience and creating synergies. Levels four and five focus on food system change through the re-connection of consumers/citizens to farmers and the rebuilding of the global food system, respectively. Herein, our focus is on the re-connection of consumers/citizens to farmers (level four). Although the re-connection of consumers/citizens with farmers and producers does not necessarily lead to a re-connection to nature (HNC), for example, in highly industrialized farming, it does provide an increased opportunity for consumers/citizens to engage with those sustainable producers and agroecological systems that do exist as well as actively participating in the co-creation of alternative value chains [38,39].

Starting from this framework, we carried out a literature review to analyze the fundamental aspects of the three points of analysis relevant to such framework, i.e., (i) sustainability transitions in agri-food systems; (ii) the role of consumers/citizens in sustainable

transitions of agri-food and connection to nature (HNC); and (iii) innovations in agri-food systems, which mediate between consumers/citizens and growers/nature. This review formed a basis from which to triangulate these three distinct areas, illustrating the different approaches to sustainable transitions and the innovative business models that mediate the re-connection of agri-food consumers with sustainable growers and, by extension, nature. The MLP (outlined in Section 3.4) was then utilized to illustrate how incidences of niche innovative and alternative business models which make possible and enable consumer/citizen HNC may be institutionalized to contribute to the transition to more sustainable agriculture and, ultimately, influence system change.

The literature review was based on the Scopus and Web of Science databases. Selected keywords were based on the research question and the multidisciplinary nature of the subject. The initial search was run based on title, abstract and keywords in the time span of the last 20 years. According to the aim of this article, which is to combine insights from multiple disciplines, a different set of keywords was used for each of the above points of analysis.

Based on keywords in query 1 (Table 1), the first point of analysis regarding the definition of sustainability transitions in agri-food systems was addressed. A total number of 1195 results were found. Due to the high number of results, filters were implemented to limit the results to "review articles" from 2018 to 2021. Out of the review articles, 15 references were selected based on relevance and on avoiding repetition.

Table 1. Description of research queries on Scopus and WOS.

Database	Scopus	Web of Science
Research query 1:	(TITLE-ABS-KEY (agri* OR agro*) AND TITLE-ABS KEY (sustainab* W/3 (transition* OR transformat*)))	TS = ("agri*-food" OR "agro*-food") AND TS=((sustainab* transition) or (sustainab* transformation))
Results	874	365
Refined (Review only)	63	46
Total selected without duplicates	15 references	
Research query 2:	(TITLE-ABS-KEY ("Connect* people" W/2 nature) OR TITLE-ABS-KEY (connect* W/2 nature) OR TITLE-ABS-KEY ("Human nature connectedness") AND TITLE-ABS-KEY (consumer OR citizen) AND TITLE-ABS-KEY (sustainab*))	TS = (((Connect NEAR/0 people) NEAR/3 (Nature)) OR (nature NEAR/3 connect*) OR ("Human nature connectedness")) AND TS = (consumer or citizen) AND TS = (sustainab*)
Results	36	40
Total selected without duplicates	10 references	
Research query 3:	(TITLE-ABS-KEY ((sustainab* AND innovat* AND agri* AND chain*)) AND KEY ((consumer* OR citizen*)))	TS = (sustainab* AND innovat* AND "agri-food" AND chain*) AND TS = (consumer or citizen)
Results	27	40
Total selected without duplicates	6 references	

Second, to address the impact of consumers/citizens connectedness with nature in agri-food sustainable transitions, keywords in query 2 (Table 1) were implemented. A total number of 76 articles were found. After review and duplication reductions, 10 core articles were selected.

Based on keywords in query 3 (Table 1), sustainable innovations in agri-food systems focused on consumers and citizens were addressed. In total, 67 references were found and reviewed and 6 references were selected as highly relevant.

Finally, given the complexity in choosing keywords that captured the subject matter, the backward and forward snowball method [48,49] was implemented and 35 articles were selected by this method. The Google Scholar database was also consulted to fill in any gaps, particularly with respect to business models found in gray literature.

3. Results and Discussion

3.1. Approaches towards the Role of Consumers in Agri-Food Systems

Despite the recognition of the role of consumers in transforming current food systems, the widely used linear approach in the agri-food supply chain, from inputs to consumers (Figure 1), does not adequately capture the inter-relationships between all actors and multi-stakeholders, particularly that of consumers and farmers. Hence, many initiatives have remained within the framework of the traditional food system in which consumers have been relegated to the end of the value chain as passive individuals confined to using their purchasing power, or what Hatanaka refers to as "voting with a wallet" [50], to influence upstream practices and sustainability practices [51].

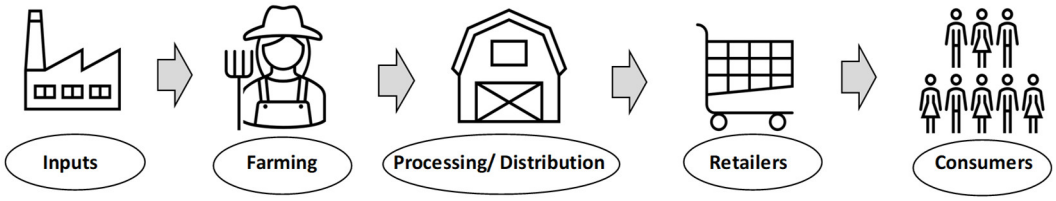

Figure 1. Consumers in the conventional agri-food supply chain (authors' elaboration).

In the agri-food supply chain, communication with consumers is generally achieved through marketing (including those supply chains which aspire to be more sustainable). A process of "consumer segmentation" is generally carried out in marketing studies, with a focus on increasing sales [52–54]. To promote environmentally responsible consumer behavior, the marketing literature has provided a conceptualization of environmentally sustainable consumer behavior, offering different dimensions for it, including "consumer acceptance", "consumer perception", "consumer attitude", "in-purchasing behaviour" and "willingness to pay", to find the best way to stimulate consumers' purchasing decision. These marketing studies concentrate on consumer segmentation in order to target each segment based on its characteristics and explore driving factors and methods to motivate more sustainable behavior and change purchasing habits through different marketing strategies [55–57]. For example, consumers are assessed in terms of perception of sustainability attributes to shape different clusters. The assessment can be based on their perceived value about the procedure of production assigned to the "fair trade" cluster, the local origin of the product assigned to the "local" cluster and based on readiness to pay for sustainable products assigned to "price-sensitive" clusters. Thus, these clusters provide useful information for corporations to implement marketing strategies directed to target consumers [55]. Moreover, exploring patterns and data obtained from consumer segmentation allows one to predict and analyze what will happen or is likely to happen, forecasting consumer demand or behavior [56]. In addition, forecasting consumers´ acceptance of innovative technologies ensures the successful implementation of new marketing strategies [53].

Although these innovative studies emphasize consumers in the agri-food systems, analyzing "consumer preferences" and "in-purchasing behaviour" to stimulate purchasing certain "green" or sustainable products, this approach tends to have limited power to result in meaningful transitions or allow consumers to engage in collective social activities with sustainability aims actively. This view portrays consumers as individual passive actors who can be manipulated and treated as simply economic actors whose participation in sustainability transition is limited solely to purchasing decisions, however well intentioned they may be [50].

Consumers/citizens, on the other hand, are becoming more concerned about the impact of agricultural activities, production and distribution of food on the environment, human wellbeing and social and economic implications [57,58]. In spite of the fact that food in developed countries has never been safer [59,60], "consumer perception on the safety of the food supply, the control infrastructure, and existing and new process technologies is often not positive" and has led to sensitized consumers who are wary of their food

supply [54]. The increase in awareness and sensitivity has resulted in consumers demanding food and ingredients free of synthetic fertilizers or pesticides, negligibly processed, easily accessible and affordable and with minimum environmental impacts [61]. Some studies have shown that, when it comes to product selection by consumers, price and taste indicators no longer necessarily outweigh environmental and health considerations [62] and consumers' strong "green" preferences increase their willingness to pay a premium price for such products [63]. In fact, consumers feel better when they purchase products from brands with an environmentally and socially responsible image [64]. Hence, corporate social responsibility (CSR) has emerged in response to consumers' needs for intangible attributes of food products [58]. Nevertheless, according to Boccia and Sarnacchiaro [65,66], CSR initiatives´ effects on consumers are low due to the lack of awareness. Moreover, some studies have shown that consumers/citizens' preoccupations with environmental protection do not necessarily drive agri-food purchasing motivations [67]. Even consumers who are committed to specific sustainable and ethical ideals may prioritize personal interests and needs (such as price or taste) over sustainability ideals when it comes to the time of purchasing [68], raising the question about the long-term commitment of consumers in their consumption practices.

In response to the traditional approach of the role of consumers in the agri-food systems, several concepts and initiatives have been developed considering a more active role for both individual and collective consumers/citizens in the agri-food value chain. For instance, sustainable consumption has emerged in marketing scholarship as a pressing matter [67,69], followed by other initiatives, such as ethical consumption [70], responsible consumer behavior [71], reflexive consumption [72], green procurement/consumption [73] and green certification [74]. However, these initiatives have also narrowed the focus only on the consumption part of the agri-food value chain and the proposed solutions have focused on merely consumers rather than a systemic alternative that encompasses a broader context involving other stages of the value or supply chain.

Additionally, it appears there is a gap in marketing studies, as very few have focused on the social dimensions of sustainability [75]. Most studies focus on individual consumer behavior, such as pro-environmental behavior in everyday personal life, individual environmental knowledge, individuals´ green product attachment and green value, personal anticipated pride and guilt, perceived effectiveness and individual aspects of connectedness to nature [76]. However, according to Verhees and Verbong [21], individual and collective consumers' roles in adapting to sustainable innovations are different due to the dynamics and behavior mechanisms. They offer a model concerning sustainable and innovative business models based on a dichotomy between individual and collective behaviors. In this model, there is a spectrum that goes from one extreme to the other, including the passive role of consumers (consumers as buyers), more active involvement of consumers in co-production and consumer-led innovations on the other side. Based on this spectrum, the collective role can range from collaborative consumption, such as "collective purchasing power" business models, where groups of people cooperate for mutual benefit, to a more active collective role, beyond simply buying, such as active participation of consumers/citizens in farming activities. The other extreme of consumers' collective role is "self-organized citizen groups" who are initiators, designers and maintainers of innovative sustainable business models in their locality (see Section 3.4). Verhees and Verbong [21] note that collective consumers use group power to create large-scale social movements. In addition, engaging in collective altruistic behavior provides opportunities for socializing, building the network and acquiring common goals and meaning among people, which is a powerful force for social movements. Thus, in order to address current environmental, social and economic challenges, there is a need to go beyond just individual responsible consumption from the marketplace to structural and large-scale societal change [77,78].

Therefore, the concept of food citizenship, referring to the collective role of consumers/citizens, attempts to proportionally distribute the burden of sustainable responsibilities across the entire agri-food value chain. Food citizenship means the responsible

act of consumers/citizens and producers who actively participate in the configuration of food systems in a myriad of ways. This includes co-producing sustainable food through engaging in the governance of the food system [50,79]. Food citizenship can encompass consumers/citizens and all other actors in the entire food system [80]. The emphasis of food citizenship is on the active engagement in decision making over the kinds of food produced and production procedure [81–84]. Another aspect of food citizenship refers to "civic engagement", meaning the individual sacrifice for collective goals [85] and transparency in food production and consumption practices, processes and relations. Food citizenship is associated with localization and the idea of short supply chains and localism enables more personalized relations direct and participatory forms of governance, which are often viewed as conducive to people acting as citizens [86].

Above, we discuss the characterization of and importance given to consumers/citizens as participants in the agri-food value chain and emphasize the necessity of changing the traditional linear approach towards consumers/citizens in the agri-food value chain. In the next step, below, we explore how system change may occur and what the role of consumers/citizens in facilitating the transition to a sustainable agri-food system is.

3.2. Sustainability Transition Framework and the Role of Consumers

Many scholars have argued that the current agri-food system should be changed through sustainable transition practices or agroecological transformation [16,46]. Weber et al. [87] used the phrase "deep change" as an umbrella term for both transition and transformation in the sustainable food system. According to Markard et al. [88], "sustainable transition" is defined as "long-term, multidimensional and fundamental transformation processes through which established socio-technical systems shift to more sustainable modes of production and consumption". The arguments presented indicate that the way food is produced should be changed, but the manner in which food is consumed is also of importance. Gaitán-Cremaschi et al. [89] maintain that a "sustainability transition" is needed to transform existing food regimes into alternative regimes.

Out of this diverse literature, different frameworks and approaches have emerged in order to analyze sustainability transition. For example, in 2017, the United Nations defined 17 goals for sustainable development (SDGs) as a roadmap to effect changes before 2030 and offered broad goals for transforming the world [90]. FAO's common vision for a sustainable food and agriculture framework, which is called FAO 10+ elements of agroecology [39], has identified a scientific pathway to achieve SDGs. In addition, the high-level panel of experts (HLPE) published a report in July 2019 [45], offering 13 agroecological principles for sustainable agriculture and food systems that enhance food security and nutrition based on SDGs. Moreover, Gliessman [91] set out five stages of transformation to agroecology (Figure 2) that also portray a pathway and different levels of transition to sustainable agriculture. According to Wezel et al. [92], FAO 10+ element and HLPE13 agroecological principles are in alignment with Gliessman's five levels of agroecology. Agroecology is understood as a science, a set of practices and a social movement [46,85,86] and is considered as an approach that can address multiple crises in the food system while addressing environmental, economic and social aspects of sustainability transitions [93].

In Gliessman's five levels of agroecology (Figure 2), the first two levels, considered "agroecosystems", involve incremental change, whereby farming systems convert from industrial agriculture systems to more ecological systems through the increase in input efficiencies and substituting alternative practices and inputs. Level three, also at the agroecosystem level, is considered transformational, given that it redesigns the whole agroecosystem based on ecological processes. However, levels four and five go beyond the farm to broader food systems and the societies in which they are embedded, emphasizing the "system change" for transformational alteration.

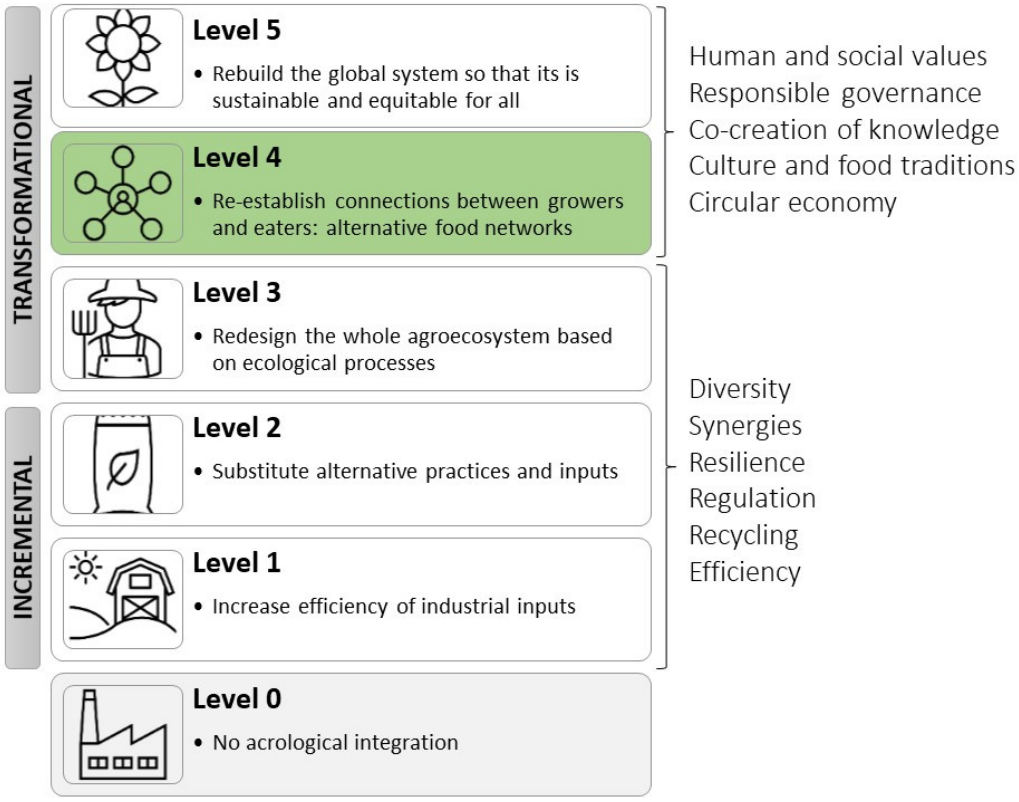

Figure 2. Authors' elaboration based on Gliessman´s five levels of agroecology and FAO 10+ elements alignment (Level 4 indicates the main focus of the article).

What is notable for this article is the reference, in level four, to re-establishing the connections between growers and consumers and the development of alternative food networks. The re-connection between consumers/citizens and farmers and, by extension nature, is part of the process of agroecological transition.

The re-connection between consumers/citizens and farmers does not necessarily mean that consumers/citizens are re-connected to nature. This depends very much on the connection to the nature of the farmers or growers. However, if growers have a connection to nature, it would be reasonable to assume that consumers/citizens would also be able to access such connections through their relationship with such growers. The latter topic of the connection of farmers with nature is outside the scope of this article, but the relationships of consumers/citizens and farmers usually involve some type of business model, food networks, or systems, through which their relationship is mediated, which is discussed below in Section 3.4.

3.3. Connectedness to Nature

The current modern lifestyle and the lack of proximity with nature have been identified as deepening the disconnection between humans and nature. Rapid urban growth, which utilizes natural areas and industrial agricultural intensification, can explain the ever-weakening HNC and, consequently, severe environmental and social problems [44,94]. There has been an increase in the number of research articles that are in favor of strengthening consumers/citizens connectedness to nature [95], in addition to articles discussing various scaling methods, such as the new environmental paradigm scale to research the relationship between environmental concern and sustainable behavior [96,97].

The separation of consumers/citizens from nature could explain the deterioration of the environment, since a decrease in individual emotional connection, simultaneous with a decline in the opportunity to experience nature directly, discourages positive attitude and emotions towards the environment and creates a cycle of disaffection [76,94].

Indeed, consumers/citizens often have little idea of the food source, initial steps of the production methods and the possible direct impact of food purchasing decisions on the environment [44,98]. This state of affairs raises the question of how consumers/citizens may have an active role in sustainable transition [67]. This disconnection is in line with the observations of Aldo Leopold, the 18th American philosopher that said that "We can only be ethical in relation to something we can see, feel, understand, love, or otherwise have faith in" [43] (p. 26). Leopold's thinking formed a basis for the objectives that the environmental conservation community and other similar environmental, "Deep Ecology" and ecological movements have long emphasized, that is, engaging people more closely with nature so as to increase their care and concern for the natural environment [94].

To this end, studies suggest different interpretations of the HNC concept. Wesley [99] described it as "the extent to which an individual includes nature within his/her cognitive representation of self", while Geng et al. [100] used belongingness for describing individuals' feelings about the connection with nature from both an emotional and a cognitive perspective. Frantzeskaki et al. [101] portrayed the concept as people's affective and experimental connection with nature. In general, there are two main views about people and nature, (i) an anthropocentric one, which deems nature as a source of materials, services or commodities; and (ii) an eco-centric view of nature that considers nature as valuable in itself, including considering nature as a stakeholder with its own rights [102]. For enabling sustainability transition of the agri-food value chain, scholars have highlighted that the scale of change is beyond what can be achieved via anthropocentric views in the incremental level of agroecology (e.g., water or pesticide management) and eco-centric conceptions of nature entail a transformational change in the relations of humans with the natural environment [103]. Consequently, to change from an anthropocentric to an eco-centric view of nature, the cognitive, emotional and philosophical dimensions of consumers/citizens' experience with nature provide us with conceptual lenses necessary for creating a sustainable transition pathway.

According to Zylstra et al. [95], individuals' experience with nature can range from merely possessing "information about nature" and having "experience in nature" to being "committed towards nature". On the other hand, Dickinson [104] recommended that, in order to promote change in social actors involved in a territory, "place attachment" has a major impact on the identity and sense of place. Place attachment has four main dimensions, place identity, place dependence, place social bonding and place nature bonding [105]. Ramkissoon et al. [106] emphasized the pluralistic nature of pro-environmental behavior in the above-mentioned four dimensions of place attachment, suggesting that the meaning of environmental actions and pro-environmental behavior is constructed through social interactions in different settings.

Consumers/citizens' place attachment might intensify the co-creation of knowledge and dialogue among different actors through nature-based environmental education, thus increasing engagement in pro-environmental behavior and circular economy [76,107]. In addition, research has demonstrated the significance of HNC with consumers/citizens engagement in agrarian landscapes and stewardship practices [108,109]. According to Auer et al. [37], agricultural landscapes are important in human wellbeing, impacting social capital. More specifically, Pérez-Ramírez et al. [110] found that the human values associated with agricultural landscapes linked with farming activities might explain a stronger sense of place, thus a sense of responsibility towards it.

As a result, HNC could provide an inherent motivation for developing ecological behavior and efforts that might last throughout people's lives. Previous research has demonstrated that solid connectedness to the natural environment in consumers results in pro-environmental behavior such as a willingness to preserve the natural environment and active engagement in environmentally sustainable consumption behavior [97,111–113] and positively impacts individual and social wellbeing [110,114]. In fact, connectedness to nature has proven to have a similar or an even more important role in stimulating consumers/citizens' environmentally friendly behavior rather than socio-demographic

segmentation [99]. In other words, the more people are connected to nature, the more they are expected to behave sustainably [111] and the less they are prone to harm it, since this damage would be considered as damage to themselves [76].

Thus, consumers/citizens' connection with nature would increase their sensitivity to the natural environment and might enhance their engagement as initiators, designers and maintainers of sustainable innovations.

3.4. Connecting Consumers/Citizens to Growers and Nature through Innovative Business Models

The need for fundamental changes in the way farmers and consumers/citizens interact with nature to achieve sustainable transformation is receiving more attention [115]. Moreover, the recent global crises have raised the question of the impact of existing corporate business models on the sustainability of the agri-food system and what initiatives may be necessary [116]. This entails realizing the organization of commercial structures in a way where not only are consumers/citizens more connected to nature, but business models and food networks are intrinsically transformative to make the transition to sustainability possible. In addition, it is important to explore how new initiatives and alternative business models may be developed and gain power in order to make transformative changes in the food system.

To understand the development mechanism in the emerging sustainable business models, a framework that conceptualizes socio-technical transitions as an interaction of social, environmental, political and economic changes is needed. The multi-level perspective (MLP) is the first and foremost approach adopted in recent sustainability transition studies [41,42]. The MLP conceptualizes transitions as an interconnection among three levels of relative stability, that is, niches that contribute at the "micro" level, regimes that contribute at the "meso" level and landscapes that contribute at the "macro" level [117] (Figure 3).

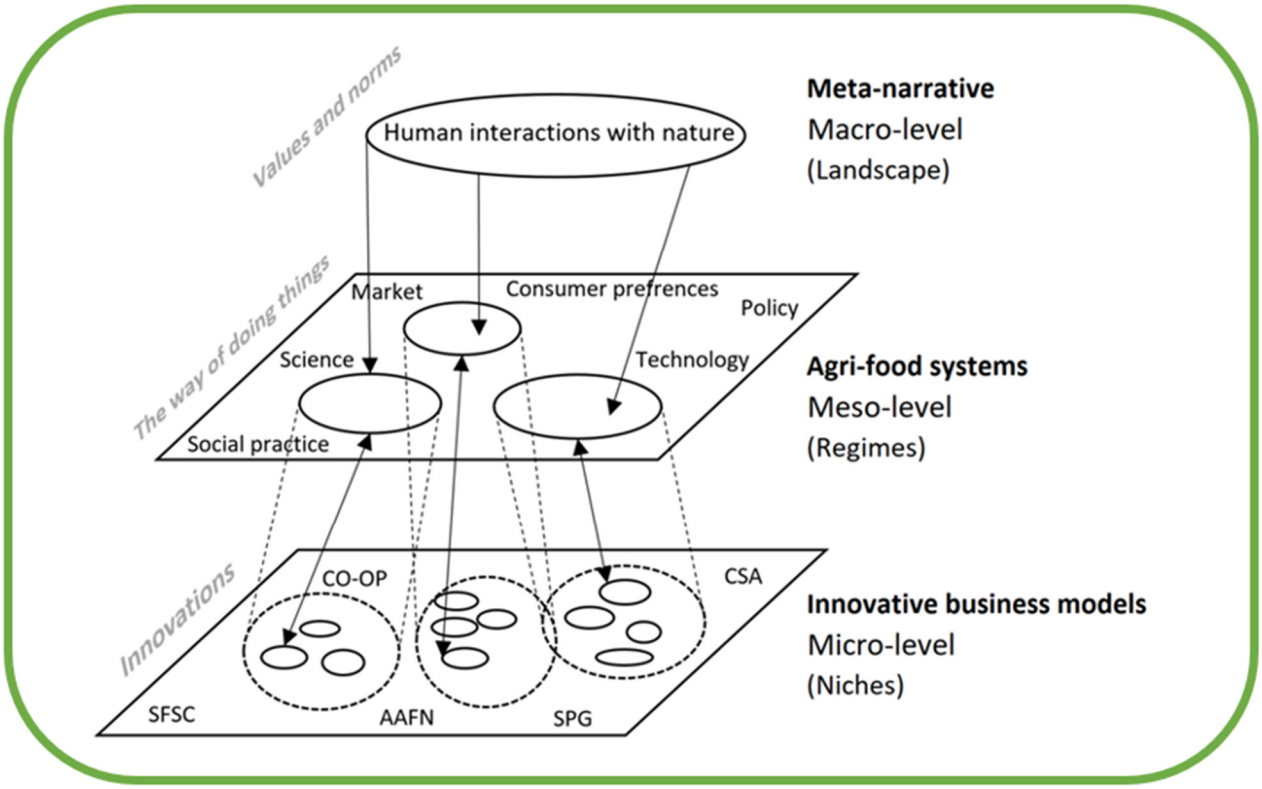

Figure 3. Authors' elaboration of the multi-level concept based on Geels, 2002 [118] (p. 1261), Pereira, et al., 2018 [40] (p. 330), and Garcia, et al., 2020 [119] (p. 420) illustrating level 4 of agroecological transition.

According to Darnhofer et al. [120], "niches" have been defined as changes that "new technologies and practices, new configurations of actor groups, new beliefs and values, new networks, new policies" might bring about [121]. The strength and maturity of the niche is necessary to reach a greater number of people and, consequently, provide the conditions to scale up and out to the meso level contributing to the agri-food transition. "Regime", in agri-food systems, refers to the intensive, conventional, industrial agro-food sector and its associated rules and practices, food safety laws, existing business networks, logistics transport and infrastructure [122]. Moreover, "landscape" refers to exogenous major social, cultural, worldwide values and norms that are difficult to influence (Figure 3). The fundamental change of the dominant regime (agri-food, for instance) is explained inter alia by pressure from niche innovations (for example, innovative business models) on the one hand and by pressure from the landscape level (meta-narrative or values and norms) on the other hand (Figure 3), which represents the slowly changing regime context [123]. This resistance at the regime level, which is also known as system lock-ins or path dependency, could be related to regime elements such as policies, practices, technologies, knowledge, or social values that stabilize each other, making change a challenging task [123].

As outlined above in Section 3.1, consumer marketing efforts have often relied on standard business models but with different motivations for consumers to purchase a particular product. However, innovative business models offer the opportunity to change the role of the consumer in the standard, linear supply chain. According to Khanagha, innovative business models may be referred to as "incremental changes in individual components of business models, the extension of the existing business model, introduction of parallel business models, right through to disruption of the business model, which may potentially entail replacing the existing model with a fundamentally different one" [124] (p. 324).

HNC innovative business models attempt to alter the modality of current human interactions with nature in agri-food systems. By shaping alternative agri-food networks (AAFNs), they prioritize local markets, support local economies and try to enable a "circular economy" by developing a virtuous cycle. In addition, they have the potential to rebalance traditional and modern food habits, promote healthy consumption and support cultural identity to enable a "cultural and food economy". Moreover, these business models might include participatory processes in which farmers´ practical knowledge blends in indigenous knowledge to promote formal and non-formal education, resulting in the co-creation and sharing of knowledge. Furthermore, by protecting and improving social wellbeing, they build autonomy and adaptive capacities to empower consumers/citizens and communities to have shared "social values" and "responsible governance". Renting et al. [84], critical of the limitations of AAFNs, advocated for those innovations that represent a shift in the role of consumers and producers as "civic food networks", which include an enhanced role of civil society from the perspective of governance.

For the scope of this article, the selected business models below are limited to those that, by their enabling of HNC and proximity with farmers, enable consumers/citizens to have an active role in the sustainable transformation; we also highlight the FAO 10+ elements where applicable.

Self-organized citizen groups (as introduced in Section 3.1) are social innovations that capture self-management and self-mobilization in supplying agri-food products. "Collective food buying groups", such as "solidarity purchasing groups" (SPG), are examples of business models which are formed for the aim of supplying food based on the mutual values and needs of the local collective citizens [70]. Solidarity purchasing groups are defined as groups of households that establish mutual coordination for the purpose of purchasing food directly from sustainable producers, who are selected in accordance with ethical and solidarity principles such as environment and social values [125] (p. 232). These collective groups have a significant role in changing both the dietary habits of consumers/citizens and farmers' production systems. They support small local producers associated with place attachment and enhancement from conventional farming to more organic and low-input systems. They might offer food baskets to consumers/citizens through networking with

organizations, finding producers and distributing to consumers/citizens in addition to creating multiple communication channels for them to meet informally, communicate and share information, learn about food systems and be involved in the governance of the organization [126].

Furthermore, other consumer-based business models go further than purchasing schemes and offer a different legal form with various levels of formality. "Community-supported agriculture (CSA)" and consumer cooperatives are examples of democratic business models that also invert the traditionally perceived flows of the agri-food value chain. For example, the consumer cooperative is one well known business model that allows consumer participation in ownership and governance [127]. As well, there are associations for the support of peasant agriculture, such as Association de Maintien de l'Agriculture Paysanne (AMAPs), which is a French CSA organization that, by the partnership between urban citizens and farmers, advocates against large-scale traditional food supply chains [128]. CSA acts as a business strategy in which consumers/citizens are members of food production procedures and share associated costs and risks. CSA is defined as "a direct partnership between a group of consumers and producers, whereby the risks, responsibilities and rewards of farming activities are distributed through long-term agreements" [27]. By avoiding intermediaries, consumers and farmers communicate directly and, in the end, not only consumers/citizens gain a portion of the food production but also CSA activities educate them about sustainable agriculture. As a result, producers may receive higher incomes due to consumers/citizens' participation in harvesting, consumers' willingness to pay a premium price and fewer intermediaries [129]. These innovative business models that strengthen people's knowledge of the multiple links between food and nature, planting, harvesting and preparation, may serve to increase HNC and place attachment [130].

Additionally, consumer cooperation contributes to mutual understanding between producers and consumer/citizens, a sense of partnership and a sense of ownership—thus food citizenship—by promoting more sustainable agri-food systems in which consumers become co-responsible, in financial and organizational terms, for the production of food, participating in farming activities when needed [50]. This organizational innovative business model enables consumers to be a part of farming activities, increasing their proximity with farmers, enhancing consumers´ place attachment and social bonding in their geographical living area, thus becoming institutionalized to connect with broader social changes [131].

In addition, there are other types of business models that make possible a closer approximation of consumers and producers. For example, short food supply chains (SFSC) bring consumers and farmers closer together either geographically or by reducing intermediaries from farm to fork. "Farmers markets", "on-farm selling" (to individual consumers, not the commercial sector) and "pick-your-own" schemes are examples of a local SFSC that allows consumers/citizens to create a social bond with local farmers, obtain information about local food and its origin directly from farmers and, in return, farmers might receive consumer feedback [57,132]. "Box schemes" and "prepaid baskets" are other direct-to-consumer e-commerce business models that connect local farmers and producers directly to consumers. Aside from the variety of products in these boxes, consumers/citizens may receive information about seasonal products and traditional recipes adapted to the modern lifestyle that create more value for consumers/citizens and de-commoditize agri-food products, an important step in HNC. As Marsden et al. [133] point out, in these supply chains, the emphasis is on the type of relationship between the producer and the consumers and on the potential of this relationship in constructing value and meaning, rather than solely selling product. Although e-commerce business models and direct selling from a producer web page and/or mobile application do not necessarily connect consumers/citizens with nature, the information provided about the natural aspects of agri-products, such as "ugly food", and production conditions, such as water use, pest management, biodiversity and open grazing for animals, creates awareness and knowledge for consumers/citizens. Addi-

tionally, e-commerce significantly reduces intermediaries between consumers/citizens and farmers, which, particularly, in rural areas, might solve poverty to a great extent and bring vitality to these areas. Despite some challenges such as lack of well-developed logistics, human resources' talent and internet-based infrastructure in rural areas, these business models may reduce waste, improve farmers' income and increase productivity [134].

In addition, another form of innovative business model is related to participatory harvesting schemes, such as the "self harvested gardens", that might be implemented in community gardens [135] or private lands and require the active involvement of consumers/citizens in the harvesting steps of food production. In addition, crowd farming refers to financial sponsorship (e.g., adoption) of a tree, vines, etc., the delegation of the harvest to farmers and the receipt of a portion of products. In this process, consumers are able to observe growers and feel like a part of the harvesting procedure whilst providing needed financing [136]. These innovative business models foster environmental and socio-cultural sustainability in agricultural landscapes through HNC [112] and provide the opportunity for consumers to experience nature and have an active role in producing their food. Internet services and platforms might play a crucial role in this type of business model, for example, to connect consumers/citizens with landowners interested in sharing part of their land and the creation of peer food networks targeting surplus production of non-commercial farmers to reach interested consumers/citizens and avoid food waste [33].

Based on consumer/citizens' demand for transparency, traceability, information and knowledge about the way agri-food products are grown, the kind of labor involved, the relationship to nature, or even the public research investments which are implied in production, the need for a new integrated approach has led to the emergence of third-party labels or certifications [23]. However, in response to criticism about the passive role of consumers who do not have control over criteria or indicators that make a product eligible to receive a certification [137], "participatory guarantee systems (PGS)" have been introduced. PGS means a group of consumers/citizens as a "represented consumer organization" who indicate criteria and standards to certify producers. In business models based on PGSs, participation is an essential, created value for consumers/citizens, as well as farmers and other stakeholders, in the definition, implementation and verification of standards and rules. Thus, a consumers' represented group (who can be other farmers and agronomists) collectively takes responsibility to peer review the production process, ensuring the integrity of products verified by the PGS. A PGS leads to equal sharing of power and responsibilities, the formation of trust and a common vision and a permanent learning process through the engagement of all stakeholders [138,139].

In Figure 4, below, the business models referred to above are categorized based on the degree of consumers' engagement and their individual or collective role. As discussed at the beginning of this section, small niche innovative business models generally do not have the economic power to transform the agri-food value chain. However, the strength and maturity of niche business models provide an opportunity for them to scale up and make a change at the regime level. The niche business models' ability to reach a greater number of people might provide the conditions for innovation to become institutionalized and add pressure on the mainstream [128]. In addition, these business models promote citizens' active participation, leading to increased awareness and construction of common goals and meanings amongst diverse social groups, which is a prerequisite in overcoming the social lock-in mechanism. Furthermore, Bennett et al. [140] point out the importance of communication in creating synergies and forming networks and alliances between niche business models in prevailing lock-in mechanisms and scaling up to the meso level (see Figure 3). The creation of new coalitions among local and small niches might lead to the decentralized power of stabilized actors and alterations in regulations, standards and policies [40] (p. 330).

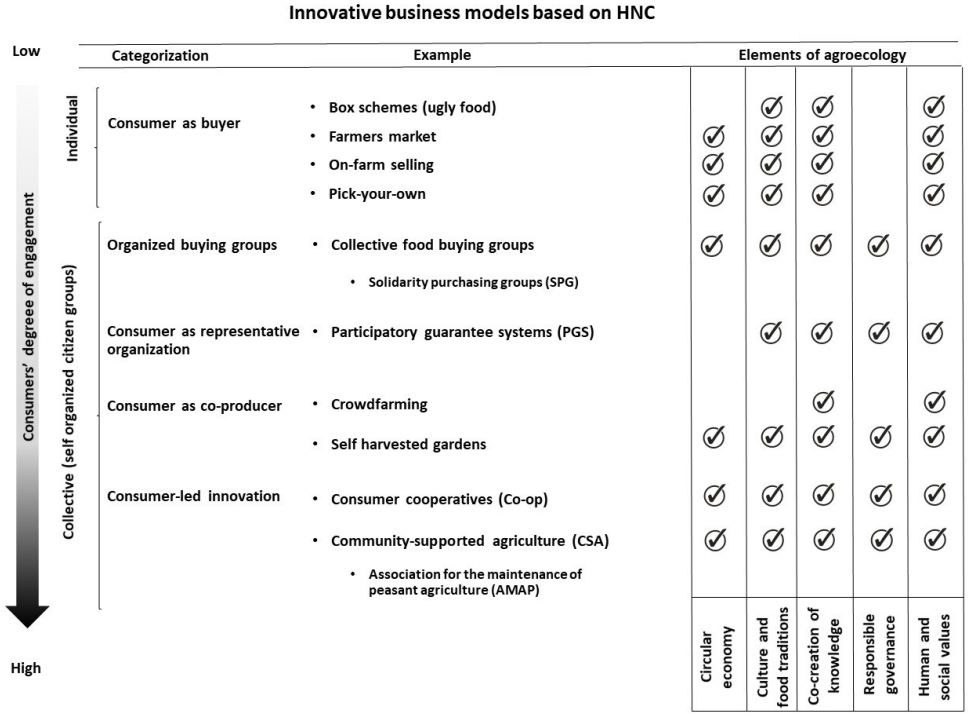

Figure 4. Innovative business models categorization (authors' elaboration).

4. Conclusions

The importance of consumers' role in sustainability transition of the agri-food value chain has gained more attention in recent years, as evidenced by the F2F strategy launched by the EU in 2020 [25], which addresses the connection between farmers and consumers, in addition to FAO and UNEP's announcement in 2017 [24], emphasizing the consumer-driven approach and integrated implementation of sustainable food consumption. Despite recognizing the role of consumers/citizens in transforming current agri-food systems, studies have remained dominated by the traditional linear supply chain framework whereby the consumers´ role is merely limited to "voting with their wallets". This linear approach from inputs to consumers does not sufficiently capture interrelationships between actors and multiple stakeholders. In addition, marketing studies generally focus on the individual consumer through consumer segmentation, perception, acceptance, behavioral attitudes and willingness to pay to promote sustainable products and increase the adaptation of innovative sustainable solutions. This approach portrays consumers as individual, passive end users who can be manipulated by green marketing initiatives and treats them as simply economic actors whilst disregarding the collective power of consumers/citizens and their potentially more active role in sustainability transitions.

In order to understand this potential for a more active consumer/citizen role, here, we focus on sustainability transition frameworks such as Gliessman's five levels of agroecology in combination with FAO 10+ elements and HLPE13 agroecological principles, which all point to the necessity for a closer relationship between consumers/citizens and growers. We focused on level four and on alternative business models and consumer-based innovations that mediate the relationship between consumers/citizens and farmers and, ultimately, the environment and nature. Although the re-connection of consumers/citizens with farmers and growers does not necessarily lead to HNC (e.g., in highly industrialized farming), if growers have a connection to nature [141], it would be reasonable to assume that consumers/citizens would also be able to access such connections through their relationship with growers.

Alternative business models reshape consumer–farmers relationships beyond merely "commodity and economic" transactions. The farmers' role significantly shifts from seller of primary or raw material to the food industry and large retailers to a source of first-

hand information about food provision and the natural environment, creating diversified values for consumers/citizens and changing the commoditization approach to agri-food products. The consumers/citizens' role, on the other hand, goes beyond that of the end user and passive buyer to one of proactive co-creator of alternative value chains through the mobilization of social learning, increased awareness and knowledge, participation in governance, and creation of common goals and meaning among different actors in the value chain, which all results in a better understanding of food system dynamics and higher HNC.

We propose a categorization for alternative business models that enable consumers/citizens to have an active involvement in the sustainable transformation of agri-food systems by proximity with nature and farmers. This categorization is based on the degree of consumer engagement, both as individual and collective citizens. Business models that create value for individual consumers, including box schemes, farmers' markets, on-farm selling and pick-your-own, are considered to provide fewer degrees of engagement in comparison with innovative business models that enable the collective role of consumers/citizens. Collaborative business models in our categorization include the following: first, collective food buying groups, such as solidarity purchasing groups that provide the opportunity for consumers/citizens to support smart local food producers; second, participatory guarantee systems in which a group of consumers (who can be other farmers and agronomists) acts as a represented consumer organization, to indicate criteria and standards for certifying producers and peer-reviewing the production process; third, participatory harvesting business models that provide the opportunity for consumers/citizens to be closer with farmers and nature as co-producers in initiatives such as crowdfarming and self-harvested gardens; lastly, consumer cooperatives and community-supported agriculture, such as AMAP, are business models that self-organized citizen groups initiate, design and maintain.

These increasingly visible and innovative business models, with different legal forms and formality levels, as illustrated in the MLP in Figure 3, may provide both a breeding ground for local community innovations to mature and reach a wider community, so as to countervail the dominance of industrial agri-food regimes in the context of the current human–nature interaction meta-narrative.

5. Future Research

Based on Gliessman's five levels of agroecology, this article concentrates on level 4 of agroecology (re-connection between consumers and growers and the creation of alternative food networks). This framework assumes that consumers' relationship with nature is implicit in a closer connection between "growers" and "eaters", with farmers being considered a mediator between consumers and nature. We point out that not all farmers and farming methods mediate connectedness to nature, as in the case of highly industrialized farming systems and, in this article, we explore alternative business models where consumers/citizens may have a closer connectedness to nature. This is an area for further study in specific contexts, particularly with respect to the categorization of the degree of consumers/citizens involvement in various business models referred to herein. Related to this, is the interaction between collective consumer activity and collective producer activity, e.g., consumer cooperatives relationship to producer cooperatives.

Furthermore, determining the impact of innovative business models on HNC in different economic, social and environmental contexts depends on each area's socio-economic aspects, technology development and cultural dimensions, which are outside the scope of this article and could be studied in a comparative analysis in future research. Moreover, the role of policymakers and policy tools in shaping the consumer adoption of innovative business models which make possible HNC and their effects on accelerating sustainable transition would be an interesting area for future research, although, due to the complexity of food systems and consumer behavior, the devising of appropriate solutions and policies would need to be informed by more transdisciplinary research.

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Abbreviations

HNC	Human–nature connectedness
AAFNs	Alternative agri-food networks
CSR	Corporate social responsibility
SDGs	Sustainable Development Goals
FAO	United Nations Food and Agriculture Organization
UNEP	United Nations Environmental Programme
HLPE	High-Level Panel of Experts
F2F	Farm to Fork strategy
NEP	New environmental paradigm
MLP	Multi-level perspective
SPG	Solidarity purchasing groups
CSA	Community-supported agriculture
SFSCs	Short food supply chains
PGS	Participatory guarantee systems
CO-OP	Cooperation
AMAPs	associations for the support of peasant agriculture (Association de Maintien de l'Agriculture Paysanne)

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