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The spaces in between: an actor network analysis of alternative food systems in Latin America and the Caribbean

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For years, researchers and activists have claimed that alternative food systems are required to increase the resilience of low-income families in the Global South and overcome the negative effects of capitalist, agro-industry regimes. Urban and peri-urban agriculture and alternative forms of local food production and distribution in urban settings are often seen as promising strategies. Yet very little is still known about how local food initiatives emerge, are legitimized, and (sometimes) survive in contexts of informality. Here we use Michel Callon's conceptual tools to reveal how alternative food networks are justified and operate in low-income settlements where informal construction and economic activities abound. We conducted 340 interviews and 312 questionnaires and followed 18 bottom-up initiatives related to food production, distribution, transformation and consumption in cities and peri-urban spaces in Colombia, Cuba, Ecuador, and Chile. Empirical results show how, seeking to stabilize food systems, local leaders create design outcomes and activities where social struggles, identities, and reified notions of time and space are key. From a practical perspective, these results show the inadequacy of regulations and policy to grasp the dynamic resistance occurring in the "in between" spaces of both identities and urban structure. Changes in urban policy and food programs are required to make sense of such complexity.

KEYWORDS

food system stabilizations, Global South, informality, built environment, actor-network theory

Introduction: the problem of food system stabilization

"Selling *yuca* is hard," explains Gabriela, a community leader in Valdivia, Colombia. "It takes almost a year [from planting to harvest] and a big investment; and then, buyers want to pay only half the price. My real motivation is that I love *el campo* (peasants' lifestyle) and harvesting my own food."

In 2019, Colombia reached a record production of 2.4 millions tons of *yuca* (Minagricultura, 2020). Food distributors pay too little to small producers like Gabriela. But in 2018, the price of *yuca* in Corabastos (the largest food market in Colombia) reached a record price. And it is not only Yuca that has become expensive. It is estimated that 131 million people in Latin America and the Caribbean cannot access enough healthy food. "The region has the highest cost for a healthy diet compared to the rest of the world," explains a 2023 UN Report (World Food Program, 2023, p. 1).

Like many other Latin Americans, Gabriela owns a small piece of land in an impoverished, disaster-prone town ravaged by violence. She cannot make a living in agriculture, but the small food production in her home's backyard brings several social and personal benefits. Her food garden is an artifact that connects rural traditions and several forms of agency in urban space. For this and other reasons, Gabriela rejects a complete urban lifestyle. But her activities fit neither the rules of city life nor the conventions of rural production. Her struggle exemplifies the difficulty of stabilizing what we call here an "alternative food system."

This paper was inspired by several similar stories, which eventually led us to wonder: How do alternative food systems, and their related artifacts (design outcomes), emerge in urban settlements in the Global South and how are they legitimized and stabilized?

To answer this question, we mobilize notions of Actor-Network theory, which provides ideal tools to explain socio-technological changes. But the answer implies explaining first the notion of alternative food systems and to contextualize them in the conditions of the Global South. We therefore start this paper by defining the notion of alterity, trying to distinguish alternative systems from other concepts in food studies. In the second part of the introduction, we explain basic notions of Actor-Network Theory, Callon's iterative moments of system stabilization and his notion of "displacement" of knowledge, agents, interests, claims, and objectives.

In the methods section, we explain how we adopted a series of action-research activities. We conducted interviews and questionnaires, but we analyzed data in a comprehensive manner using Callon's structure. In the section of results, we show how this structure allowed us to reveal food initiatives' complexity and struggles. We find the emergence of a series of artifacts within what we call here "spaces in between," and that do not fit pre-established categories used in policy and common practices. We eventually find how legitimation of change in food production, distribution and consumption is necessary in the efforts to stabilize hybrid systems. Food allows us to read systems in ways that escape dichotomies, such as the one between rural and urban production, formal and informal processes, and public and private property. The discussion introduces the notion of time as a crucial factor in translation and contends that alternative food system stabilization is never fully achieved, particularly in fragile contexts such as low-income settlements. Finally, we present some recommendations for urban and food policy and programs in Latin America and the Caribbean.

Food systems in Latin America and the Caribbean

About 6.5% of Latin Americans suffer from hunger. In 2022, close to 248 million people struggled in some way to have access to food—a problem that, like many others, affects more women than men. Here we adopt Roa-Clavijo's (2022) approach to argue that there are two main approaches to explain this problem in the Global South.

The first approach concentrates on production, innovation, and growth. It is typically presented as a goal of food security, defined as the situation "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO Agricultural and Development Economics Division, 2006, p. 1). A 2023 report by United Nation agencies claims that food insecurity in the region is caused by "a successive series of crises: the COVID-19 pandemic, inequalities and persistent levels of poverty, the climate crisis, and the effects of the conflict in Ukraine" (p. 51). The consequences, according to these organizations, are "rising food prices and food inflation, threatening the functioning, efficiency, and resilience of agri-food systems." In this view, the emphasis is often placed on systems' efficiency. The solution requires fixing market inefficiencies, so that consumers can reach the output of producers and suppliers. Figure 1 represents the linear functioning of agri-food systems under this premise. In this approach, food insecurity is primarily caused by market inefficiencies. Networks of (mostly rural) producers supply industries of transformation. Then distributors reach consumers, who are also serviced by industrial waste managers. In this dominant approach, policy must attempt that industries and the market can work at their maximum potential.

The second approach recognizes the persistence of food insecurity, but also the environmental and social impact of the agro-industry. It argues that an increasing reliance on industries fails to solve current challenges and even creates new problems. Empirical data by UN agencies confirms this argument. In the last 50 years, overweight and obesity rates tripled in Latin America and the Caribbean, affecting 62.5% of the population. It is estimated that these problems, commonly associated with the consumption of processed, industrialized food, are now responsible for close to 2.8 million deaths.

Defenders of this second approach argue that a focus on food security is insufficient. It masks issues related to food quality, patterns of consumption, the cultural relevance of food, and the conditions in which it is produced and distributed. Valdés (2019), for instance, argues that "stable food supply in the aggregate—that is, for a nation as a whole—is not necessarily synonymous with consumption stability for large segments of the population." Several scholars and activists propose other frameworks, focusing instead on alternative food networks (Watts et al., 2018), food sovereignty (Agarwal, 2014; Leventon and Laudan, 2017), food resilience (Eakin et al., 2017; Ilieva and Andreas, 2018; Sabio and Lehoux, 2022), food autonomy (Gould, 2004, p. 2; Mudu and Marini, 2018), or food justice (Alkon and Norgaard, 2009; Duncan and Pascucci, 2017; Holloway et al., 2007). In Latin America, the La vía campesina (2020) and other social movements have tried to

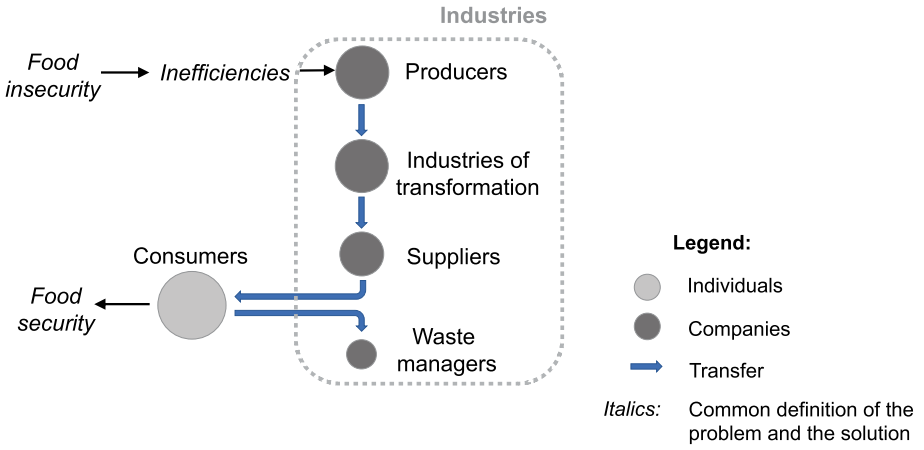

FIGURE 1
Representation of the dominant approach to food systems.

emphasize the relationships between agriculture, social justice, people's dignity and environmental protection.

These alternative frameworks have obvious differences. Food resilience, for instance, focuses on the system's capacity to face natural hazards, whereas food justice emphasizes the need of redressing historic injustices. But scholarship shows that, broadly speaking, solutions behind this second set of frameworks seek to challenge four systems' dimensions: *why* alternative systems are required (the rationale), *where* alternative systems operate (notions of place), *how* the system functions (the mechanisms of operation), and *who* participates in the system (people's roles).

1 *"Why"—Defiance:* Alternative solutions stress the value of local networks, short circuits of production and distribution, and context-specific innovative ideas. Critics consider, however, that the notion of AFS leads to an artificial distinction between "conventional" and "alternative" solutions. Holloway et al. (2007) argue that "the use of the term 'alternative' as part of a persistent dualism in which it is opposed to the 'conventional' is problematic as it loses sight of the specificity of different examples of food production–consumption." (p. 1). Some argue that AFS or alternative networks do not operate separated from conventional circuits, infrastructure, and markets. This criticism, however, challenges some defenders of AFS, who consider that ignoring the specific nature of non-industrial, local, and culturally relevant solutions dilutes their value and betrays people's struggle against capitalist agro-food regimes. They underscore the value of forms of defiance and resistance that characterize bottom-up solutions (Kirwan, 2004).
2 *"Where"—Place:* Alternative systems challenge the idea that production happens only in rural areas, opening the door to production within the built environment. A classic example is urban agriculture. But these frameworks sometimes challenge even the urban–rural dichotomy that persist in planning documents, regulations, and epistemology. Defenders of alternative systems regret that most planners adopt a view where dense areas are considered "central" and rural or peri-urban areas "peripheral." For them, urbanites' "centrality" often denotes power imbalances where peasants and their activities are considered marginal (Pérez-Martinez, 2016).
3 *"How"—Mechanisms:* Alternative frameworks challenge distinctions between formal and informal means of production and activities. Scholars, for instance, have pointed to misleading separations between private and public property in land tenure (Payne, 2004). They point to the fact that several customary, pre-industrial, and traditional forms of space occupation are based on collective use and control over land (Durand-Lasserve and Selod, 2009). Aristizabal and Gómez (2004) identify 14 tenure categories in Bogotá, eight of which are non-statutory. For many, the private-public binarism translates western influences imposed on indigenous communities where the private-public divide was traditionally elusive (Kombe and Kreibich, 2000). Others have tried to dissipate the conventional dichotomy between formal and informal settlements (Lizarralde, 2014). They contend that, in reality, there is a continuum in the Global South, where total formality or informality are only abstractions (Keivani and Werna, 2001).
4 *"Who"—Roles:* Defenders of AFS often challenge the fragmentation between producers (typically farmers and fisherfolk) and consumers (typically urbanites) that characterizes industrialized systems. They do not to see agents as being almost exclusively consumers or producers—some authors call these agents "prosumers" (Moreira and Mayo Fuster, 2020). They also challenge common distinctions between rural life (the realm of agriculture) and urban systems (often associated with services and the transformation of raw resources). These frameworks have contributed to debates around how to define Latin-American peasants or *campesinos*. Is a *campesino* someone who lives in rural areas and whose livelihood depends on agriculture? Someone who identifies with vernacular traditions and rituals? Are those who conduct industrialized agriculture also peasants? A branch of knowledge, known as "peasant essentialism" considers that peasantry is "a general (and generic) social 'type' (entity, formation, society, class and so on)" (Bernstein, 2006, p. 401). It recognizes a set of distinct qualities—such as subsistence,

solidarity, reciprocity, egalitarianism, and commitment to life in community—that distinguishes *campesinos* from other social groups such as rural proletarians or market-oriented entrepreneurial farmers. But, for many, this categorical way of seeing the peasantry does not capture the complexity of current capitalism and economic conditions. For Bryceson, the notion of "peasantry" is a blurred, moving target (Bryceson, 2000). Several authors thus reject static concepts and argue that, in times when few families can depend exclusively on small farming, peasantry is rather characterized by several means of "persistence" and "resistance" (Douwe van der Ploeg, 2010) and that different forms of peasant economy co-exist (Shanin, 1973).

Figure 2 illustrates the functioning of alternative food systems as understood by this second set of frameworks. Here, vulnerabilities motivate the creation of networks where individuals and small companies can engage in short circuits of learning, production, distribution, access, consumption, and waste management, eventually leading to social justice and favoring environmental protection.

Actor-network theory

In *We Have Never Been Modern*, Latour (2012) argues that current problems and solutions tend to be artificially categorized as natural or social. For him, this classification rarely corresponds to reality, where a series of hybrids abound. Latour points to the Ozone layer as an example of risks that imply intricate relationships between nature, science, and technology. Among this contribution, his efforts to explore the agency of non-human actors within networks (Latour, 2005) has inspired numerous scholars in social sciences. Latour rejects "fundamental modernistic and philosophical dichotomies: between object and subject, facts and values, and between the primary and secondary values of natural objects" (Blok and Elgaard Jensen, 2011). For him, fluid relations (which he calls translations, mediations, and circulations in witty grammatical figures in French) are ontologically primary. Society, projects, and even nature, become their secondary effects.

Proponents of Actor-Network Theory (ANT), such as Michel Callon, explore the hybrid character of innovation systems, where scientific knowledge about nature and the narratives that legitimize change are key. He argues that scholars should reject several readymade categories to explain how science and innovation interact and radically re-orient our understandings of the role of scientists and engineers. Specifically, Callon (1986) insists that scholars are not outside reality looking in (or down), but play a vital role in the making of technological artifacts and the framing of institutions, concepts, and even nature itself (Sage et al., 2011). Callon examines the case of scallop farming in Saint Brieuc, France, to illustrate his argument. In trying to understand how scallops became such an important feature of the region's culture, economy, and cuisine, he finds a complex and dynamic process that involved three scientists in the 1970s. He finds that the researchers set in motion a process to study scallops' biology and modify their eco-system. But they were also activists attempting to alter the economy of the region, restaurants' demands, and even political agendas. To do so, they had to not only develop technological artifacts (that is, the outcome of human design), but legitimize broader changes—and try to convince others of their benefits.

When it comes to the role of scientific knowledge in shaping institutions, Callon and Latour adopt somehow a Foucauldian approach. They argue that transitions need to be legitimized through knowledge, negotiation of interests, and sometimes, the exercise of power (Foucault, 1994b). Here knowledge is not a morally-neutral outcome of science, but a social construct shaped by human motivations (Foucault, 1994a; Steins, 2001). Callon uses the notions of "translation" and "displacement" to describe moments in which actors, representations, knowledge, and technology interact with nature (and knowledge about it) to achieve a certain stability.

Alternative food systems mobilize the perfect Latourian principles, for they require constant displacements between human and non-human actors, components of both nature and culture, technology and ecology, and the characteristics of rural production and urban transformation. It is perhaps for this reason that ANT has been previously used to study food networks (Watts and Scales, 2015), markets (Le Velly and Dufeu, 2016), and innovation (H. Farhangi et al., 2020). However, to our knowledge, no study has examined bottom-up food initiatives in Latin America and the Caribbean through the lens of ANT.

Callon's four moments of translation

In Callon's first moment, *problematization*, key agents of change establish a research and implementation agenda and create gateways so that other actors in the network acquire the knowledge and skills required to align with new practices. By controlling the research agenda and defining the requirements to pursue it, these agents try to make themselves indispensable (Chu et al., 2024). In the second

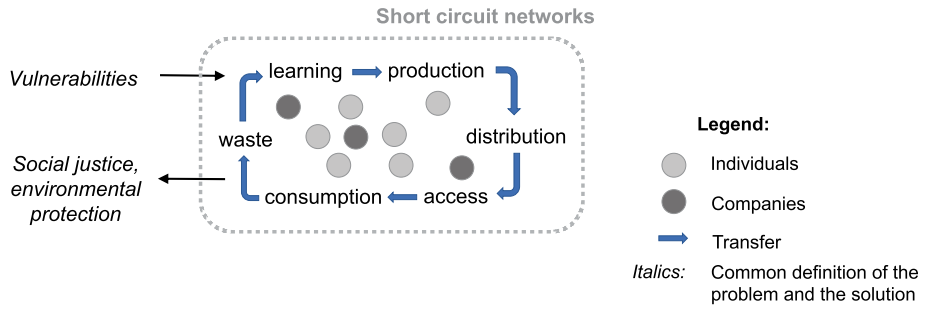

FIGURE 2
Representation of alternative food systems.

moment, *interessement* (a French word often translated as "intermediation"), key agents often act as brokers in order to stabilize the interests or identities of other parties and to deal with distrust and resistance to collaborate. These brokers act as intermediaries between other parties to mediate an eventually stabilize relationships between them. This can be achieved through direct negotiation or by providing incentives or rewards. *Enrolment*, the third, moment, concerns the efficient translation of interests among actors. For Callon, it is a form of "alignment" that often occurs through "trials of strength," including coercion, seduction, transaction, and consent. These transactions eventually help define and co-ordinate actors' roles, but also test actors' identity. Finally, *mobilization* concerns representativity and refers to the situation when actors can predictably speak in the name of others and represent them. These actors become "spokespersons," who translate the interests, roles, and relations of others. They become therefore powerful macro-actors who can convince others to adopt new roles (Baiocchi et al., 2013). After successful mobilization, the network can consolidate and grow (Mouritsen et al., 2001).

Methods: action research

This project was conducted between 2021 and 2024 by a team of 19 researchers from Colombia, Ecuador, Cuba, Chile, and Canada. It included researchers in geography, urban planning, architecture, environmental sciences, engineering, and social work, as well as two representatives from a Colombian NGO that focuses on disaster risk reduction. The project was mainly funded by a Canadian development center; but included contributions from local partners and funding and in-kind support from Latin American universities.

We focused our work on conducting action-research in six urban settlements. The idea was to include areas having both similarities and differences. In terms of similarities, we selected: (a) disaster-prone low-income areas of informal origin or with a strong presence of informal construction and economic activities; (b) locations where housing and urban conditions are in a process of consolidation—mostly through progressive self-help construction; (c) settlements that are close to water bodies and are affected by meteorological hazards; and (d) areas that are home to low-income residents. In all locations there are rural immigrants and international refugees (notably from Venezuela, bar the case in Cuba).

In Colombia, we analyzed changes in the towns of Usme and Valdivia, and the settlement of Siloé in Cali (see Figure 3). In Ecuador, we explored the case of the settlement La Lucha de los Pobres (literally, "the struggle of the poor") in Quito. In Cuba, we examined the case of the city of Cienfuegos and in Chile, a settlement called Nonguén in the city of Concepción.

In terms of differences, we put together cases with various governance and political conditions. Cuba represents a case with a particular socialist government, whereas in Colombia, Ecuador, and Chile several neoliberal practices were put in place in the past few decades. We also selected cases with different urban morphology configurations. Usme, Siloé, and Nonguén are areas of transition between the city (Bogotá, Cali, and Concepción respectively) and rural areas—see Figure 4. Cienfuegos is a more consolidated urban area.

In the first step, we collected and analyzed planning documents, regulations, construction codes, and government programs in each location. Table 1 shows the researchers, leaders and students directly involved in each case study. In the second step, we used basic tools for narrative analysis of key documents to identify recurrent themes

FIGURE 3
A view of Siloé, a settlement of informal origin in Cali, Colombia. Figure by authors.

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and concepts. In the third step, we conducted 340 interviews with local leaders, officers, residents, and other stakeholders (see Table 2). Some interviews were recorded (audio only or video) and transcribed. However, we noticed that recording made some interviewees uncomfortable and, therefore, in many cases we relied on notes taken during the interview by a senior researcher or a

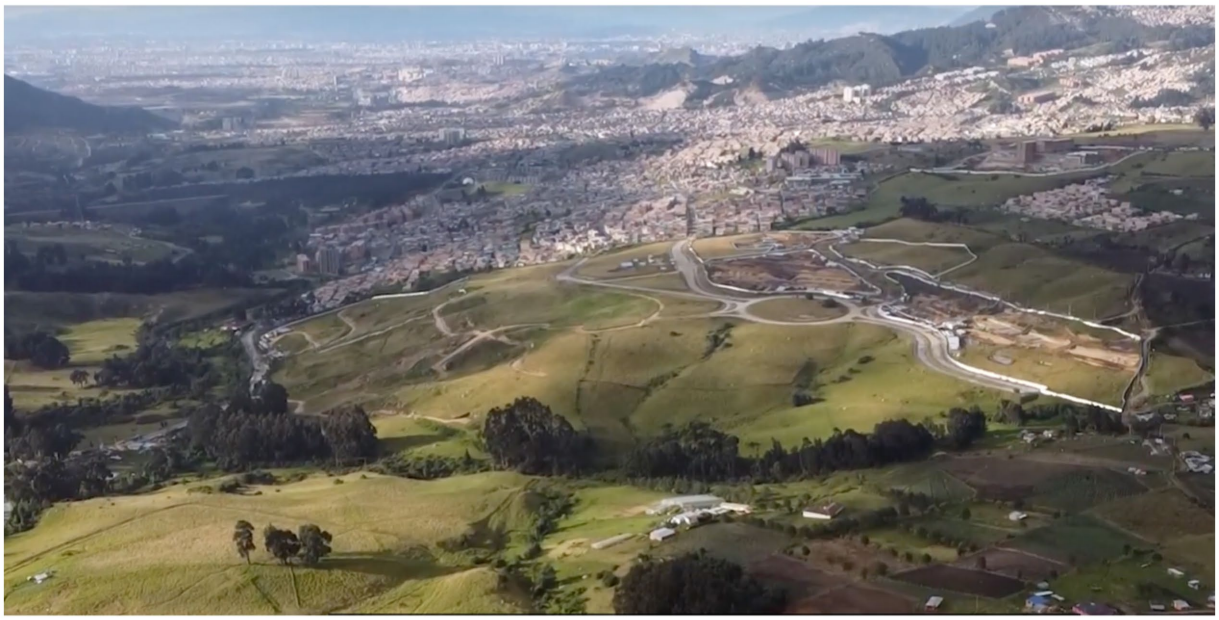

FIGURE 4
The city is coming. Image of the *Vereda La Requilina*, Usme (Bogotá in the background). Figure by authors.

TABLE 1 Researchers, leaders, and students involved in the project.

Case	Settlement	City, Country	Leaders		Researchers		Students & interns	
			Female	Male	Female	Male	Female	Male
1	La Lucha de los pobres	Quito, Ecuador	9	1	2	0	4	1
2	Valdivia	Antioquia, Colombia	5	2	2	1	0	0
3	La Requilina	Usme, Colombia	13	0	2	1	2	0
4	Siloé	Cali, Colombia	12	3	1	1	2	1
5	Punta Gorda	Cienfuegos, Cuba	2	0	1	3	1	3
6	Nonguén	Concepción, Chile	4	2	4	5	2	2
		Total	45	8	12	11	11	7

Table by authors.

TABLE 2 Interviews and questionnaires conducted in each case study.

Case study	Interviews				Surveys		
	Leaders	Residents	Officers	Academic and others	Responses to survey A	Responses to survey B	Responses to survey C
Quito	30	54	5	5	30	10	9
Valdivia	2	37	15	11	37	15	11
Usme	3	27	10	11	30	10	11
Cali	13	22	12	13	22	12	14
Cienfuegos	9	27	11	5	54	17	12
Concepción	5	7	0	6	7	5	6
Total	62	174	53	51	180	69	63

Table by authors.

research assistant. The work was conducted with a university ethics certificate that covered studies with human beings. All interviewees and survey respondents, therefore, provided consent to use their responses.

We used methods of Social Network Analysis and Semantic Network Analysis (Segev, 2022) to map the alternative systems. We used the software Cytoscape to map network conditions and adopted the methods used by Borgatti et al. (2024) to reveal links through semantic work. We included both human and non-human agents as nodes and their most relevant relationships (conflicts, influences, knowledge transfer, coordination, mediation, use, and collaboration) as identified in the case study reports.

In the fourth step, we conducted surveys in each location. We adapted a basic questionnaire to three types of respondents: Residents and local leaders (survey A), representatives of municipalities, regional governments, and NGOs (survey B) and scholars and experts in each country (survey C). All surveys had 25 questions that covered the same subjects, but from the perspective of the three groups. Scholars, officers, and experts were contacted by local teams via email. Residents and local leaders were contacted in person or through social media platforms, focus groups, and other group activities organized by local teams. Residents and leaders could answer the survey in person or in paper, while representatives of institutions and scholars replied online.

We tried to standardize the questions as much as possible. However, some questions had to be reformulated to respond to local terms and jargon. In the case of Cuba, some questions were significantly modified to address local conditions (the socialist system creates situations that do not exist in other locations, such as the government's program of food rations given to families). The questions were presented in the form statements with Likert scales at 5 levels, such as: "The quantity of food that is produced locally is: very poor (1) to very high (5). We received a total of 312 answers: 180 in survey A, 69 in survey B, and 63 in survey C. Here we report the answers to some questions about respondents' perception of food systems and common barriers to them.

We wanted to understand not only how citizens legitimize change in food systems, but also to what extent they effectively build artifacts and impact homes and settlements in the process. To do so, we designed a strategy to support their initiatives with funds coming from the research grant so we could follow their implementation activities. Following action-research methodologies, we engaged with community members and local leaders on the ground. In this way, we were not passive observers of transformation, but active agents in the process. This engagement was important to gain people's trust, and understand, from within, the process of space transformation in response to food activities.

We set up a committee of five team members (senior researchers from different fields and four countries) to select the most pertinent bottom-up initiatives that emerged in informal contexts. We considered activities in food production, education, information, marketing, distribution, and consumption. The committee prioritized initiatives led by women, but also funded artifacts with mixed or male leadership. Communities and local leader were asked to identify solutions that could be funded with a USD$ 2,600 grant or that could be co-created with scholars and students. We eventually selected 18 local initiatives that addressed different aspects of the food system and targeted several social groups (see Table 3). For about 3 years, we followed local leaders' activities and documented spatial changes in each location through drawings, photographs, and plans. We then triangulated data, comparing responses to the questionnaires and ethnographic exercises with effective interventions on the ground. This paper summarizes the main patterns found.

The study faced three key challenges. First, most bottom-up initiatives started in 2021 or 2022, so there has been limited time to analyze their mid-term impacts. Second, some co-authors are also professors and part of the local networks. We adopted an ANT constructivist approach in which we recognize that researchers are not external to the knowledge and technological processes developed, but key actors within them. We thus tried to reflect on our own role in the process. Results must be taken with prudence and cannot be considered "independently validated" from a positivist perspective. Finally, it is important to remember that this study focused on alternative systems in low-income settlements with informal conditions, which cannot be generalized to other forms of production, distribution, and consumption in other types of settlements. More studies, including quantitative analyses of data, are surely required in Latin America and the Caribbean to produce further generalizations.

Results: the challenge of stabilizing AFS

> "We underscore our identity as campesinos and stick to the idea that, from here, we are creating a new way of producing the city."

It is in these terms that a community leader in Usme, Colombia, summarized the connections between identity, traditions, resistance, and space. She is not alone in her goal to change the status quo. Interviews show that most local leaders see their involvement in AFS as a form of resistance against social injustices. "Everything here has been a struggle," explained a resident in *La Lucha de los pobres* in Quito. But different explanations of the "local problem" were advanced by network participants and therefore negotiations and displacements were constantly required. But before explaining this, it is important to clarify how alternative networks were created.

The characteristics of alternative networks

In all case studies, leaders embarked in food systems by mobilizing existing activities and consolidating immediate networks. Core participants were often university professors and elderly residents (mostly women) who have lived in the area for a long time and thus benefit from strong social capital. These networks were later enlarged by enrolling new agents such as men and young community members, municipal officers, government representatives, university students, and NGO workers. In a first step, women tried to involve family members. One resident in Quito explained: "It is me who works in the garden, but in the dry season my daughter helps me with the hose, and my husband helps with making fertilizers." In a second step, *mingas* (intense collective activities) and other forms of community work were useful to enroll new actors (see Figure 5). In all cases, elderly and women leaders have struggled to involve youngsters. In some cases, community members and local leaders had to negotiate decisions

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TABLE 3 Main characteristics of the local initiatives.

Case study		Title of the initiative and related artifact	Components of the food system					Targeted population		
			Production	Transformation	Distribution	Consumption	Waste	Children/ youth	Women mostly	Elderly mostly
Quito	1	Collective restoration of green areas with edible plants	●			●	●	x	●	
	2	Strengthening of agroecological collective urban vegetable gardens	●		●	●	●			●
	3	Promoters of healthy eating				●	●		●	
	4	Local communicators on responsible food consumption	●	●	●	●	●	●		
Valdivia	5	Motivation for engagement in alternative food systems	●	●	●	●		●	●	●
Usme	6	Co-creation of knowledge	●	●	●	●	●	●		●
	7	Base and productive origins	●			●			●	
	8	Nourishing our soil		●			●			
	9	Technological innovations for food sustainability	●			●			●	
Siloé	10	Medical gardening system	●	●	●	●	●	●		
	11	Organic waste transformation system	●				●		●	
	12	Marketing alternative food system production	●	●			●		●	
	13	Landslide vulnerability reduction system			●	●			●	●
Cienfuegos	14	Urban public spaces for alternative agriculture	●	●			●			●
	15	Promoting urban agriculture	●				●			
Nonguén	16	Growing food sovereignty and community	●		●		●	●	●	●
	17	Growing together: Reinforcing community and neighbors	●	●		●	●	●	●	●
	18	Educational networks for food sovereignty	●		●			●	●	●

Table by authors.

FIGURE 5
A seed trade activity led by a local women leader in Nonguén, Chile. Figure by authors.

regarding the use of space and economic activities with police and armed forces. Some tried to avoid evictions (Quito and Cali) and, in the case of Valdivia and Cali, some leaders had to consider the constant influence of gangs and criminal groups.

As expected in ANT, non-human actors, such as government policy, educational material, forests, and residential buildings also played a part in the emergence of AFS. However, as Table 4 shows, these networks were sometimes different and non-human actors changed according to contextual conditions. Informality also manifests in different ways. In Cuba, for instance, it has to do more with informal economic transactions, whereas in Siloé informality is common in construction and real estate.

Water bodies, such as streams, estuaries, canals, and rivers, were seen simultaneously as a threat (floods are common in all locations), and a source of life. This challenged residents about how to deal with water—from repairing drains (Siloé) to finding ways to collect water (Concepción).

Problematization

In Quito, experts on food issues and academics consider that the main problem has to do with new patterns in food purchasing and consumption. Processed and ultra-processed food sold in supermarkets and *tiendas* (ubiquitous local stores) have less fiber and are high in fat, sugar, and salt. This change in diet, together with the decrease in physical activity, has increased overweight, obesity, diabetes, hypertension, and other health problems. In response, the city of Quito recently partnered with AGRUPAR, an NGO, to promote urban agriculture (see an example in Figure 6). But bottom-up initiatives in *La Lucha de los Pobres* arise instead within residents' demands for housing, infrastructure, services, and green areas. In a context where there is a fierce competition for space, gardens become a solution to preserve public areas. The reasons behind residents' engagement in these initiatives include leisure, sociability, care for the environment, healthy eating, preservation of knowledge, and income generation. "Gardens help us reduce stress," exemplified one respondent, "and then what we produce can help for consumption." Yet after some work conducted by local academics and social workers, some leaders now regret that residents see traditional foods as "poor" and processed and ultra-processed products as "modern." "People think that a traditional diet is a sign of poverty, and it is not," said a member of the group *60 y piquito* (or 60 and above, in reference to members' age). Then she added, "processed products only have the benefit of ease of consumption and filling the stomach."

Government officials in Bogotá perceive the problems in the neighboring location of Usme as consequences of insufficient development. Planning documents, therefore, seek to develop infrastructure and facilitate residential developments in the area. But local *usmeños*, deplore that permissive zoning has led to residential developments that threaten their peri-urban lifestyle. Despite Usme's proximity to Bogotá (a city of 8 million people), most residents identify as "campesinos" and wish to maintain rural traditions and practices. Their farms, however, are often too small to fully support an agricultural livelihood. Most men, therefore, are employed in the city and only engage in farming occasionally or during the harvest season. Engagement with alternative food systems is for many women a way of reaffirming their identity and preserve an agricultural lifestyle, while household members share activities in both urban and rural

TABLE 4 Main characteristics of the actor-networks, including their differences.

City (Neighborhood)	Context	Demographic characteristics	Housing typology (average plot size)	Main human actors involved	Main non-human actors involved
Quito (La Lucha de los pobres)	A densely populated area, typically seen as a slum in the border of Quito.	About 38,000 inhabitants, mostly 2nd and 3rd generation of rural migrants	Masonry units, 2–3 story-high (180 m^2)	Community members, university professors and students	Education materials, workshops, community centers, orchards, water stream
Valdivia	A small town close to forests and the Cauca river	About 15,000 inhabitants, mostly 1st and 2nd generation of rural migrants. Presence of international refugees, Black and indigenous communities	Masonry and wood units, 1 to 2 story-high (55 m^2)	Community members, university professors, NGO representatives, Refugees, armed forces	River, illicit drugs, forest
Usme (La Requilina)	A town in a transition zone between Bogotá and rural areas	A town of 17,000 residents. Presence of International refugees	150 m^2 masonry and wood units, one story-high (2,000 m^2)	Community members, university professors and students, city representatives	Farms, cattle, chicken, pigs, residential development
Cali (Siloé)	A densely populated area, typically seen as a slum in the border of Cali.	About 60,000 residents, mostly 1st and 2nd generation of rural migrants. Presence of international refugees and Black communities	Masonry units, 1–4 story-high (60 m^2)	Community members, university professors and students, government representatives, refugees, police	Water stream, primary schools, community centers, teaching material
Cienfuegos (Punta Gorda)	A historic city with medium urban density (3,300 hab/km^2)	About 13,000 inhabitants. Little international immigration.	Masonry houses, 1–3 story-high	Community members, university professors and students, community architect	Policy, housing projects
Nonguén (Concepción)	A peri-urban settlement close to Concepción	About 50,000 inhabitants, mostly 1st and 2nd generation of rural migrants. Presence of international refugees	Masonry and wood houses, 1–2 story-high	Community members, university professors and students, government officials	Estuary, forests, policy, housing projects

Table by authors.

conditions. Scholars find that politicians and technocrats misunderstand local lifestyles and values. They endeavor to better understand traditions, rituals, and practices and explain them to decision-makers.

Siloé is known as the largest slum in Cali. Here, residents and leaders seek to protect space for recreational activities and leisure. In a place where floods are common, urban density is very high and most construction is informal, scholars see bottom-up initiatives as ways of improving the landscape and creating conditions for disaster risk reduction in the context of climate change impacts. But competition for space is common. Mr. Mesa and Ms. Pulgarin, for instance, rent an apartment in a two-story house in Siloé. They initially were allowed to use the house backyard, so they built a food garden and started to produce organic fertilizers and pesticides. During the COVID-19 pandemic in 2020, they tried to sell the food they produced, but the price was too low to recover their investment. They maintained, nonetheless, the organic fertilizers business. A couple of years later, the owner of the land decided to build an apartment for rent and eliminated the garden. Mr. Mesa and Ms. Pulgarin lost their business.

Cienfuegos is a well consolidated city. Whereas the socialist central government offers a program of food rations, residents find that the food provided is insufficient. They are increasingly trying to reinforce their diets by producing food in open areas and backyards (Figure 7).

Valdivia is a small and impoverished town surrounded by coffee plantations and impressive forests and rivers. Most residents see food as a way of improving their income and reinforce social links. Women seek to produce and commercialize products to increase family revenues, while creating social activities that reinforce community ties. Several government and NGO programs target agriculture activities as ways to create economic alternatives to the production and commercialization of cocaine and other illegal drugs.

In Concepción, Chile, residents are concerned with mental health, education, and memory, and see food initiatives as opportunities for socialization and networking. Rituals and traditions are important for local leaders and residents who are

trying to incorporate food content in schools (Figure 8). They fear the loss of traditional techniques and knowledge related to local plants, agriculture, and cooking. Yet, government programs, such as the Ministry of Housing's *Quiero mi Barrio*, tend to focus on urban upgrading and settlement consolidation. Academics often highlight the disconnects between political and economic elites and low-income settlements. They see themselves as key actors capable of bridging gaps between government and communities.

Contrary to many food experts, locals rarely initially framed the problem as one of deficiencies in nutrients, calories, or fiber. In fact, surveys in all locations show that residents and local leaders perceived that the quantity and quality of food in their communities is better than what academics and officers perceive. Table 5 shows how each groups rates the quality and quantity of food in the areas under investigation, showing how locals tend to have a more optimistic view of their conditions than externals. It also shows separately the data from Cuba where academics and external experts had a more positive view of food than officers and government representatives.

Table 6 summarizes the main explanations of local problems in the networks under investigation.

Intermediation

Actors perceive different barriers to AFS (see Table 7). Residents and local leaders find that lack of funding is their main challenge and tend to believe that they have the skills and knowledge to produce food locally. Officers and government representatives have the opposite perception. They put less emphasis on available resources and rather see lack of people's skills as more problematic. Lack of space and support from authorities are also major problems for regular citizens, but tend to be underestimated by officers, who instead point to infrastructure problems such as lack of utilities, and roads. This confirms what we found in interviews, notably, that officers perceive the problem as one of insufficient infrastructure, whereas citizens point to lack of support from authorities.

FIGURE 6
A family food garden in La Lucha de los Pobres, Ecuador. Figure by authors.

TABLE 5 Perceptions of the quality and quantity of food in areas under investigation (rates from 1.0 or "low" to 5.0 or "high").

	Survey A (residents and local leaders)	Survey B (officers)	Survey C (academics and food experts)
Quality of food consumed in the locations in Chile, Colombia and Ecuador	3.9	2.5	2.3
Quantity of food consumed in the locations in Chile, Colombia and Ecuador	3.4	2.9	2.8
Quality of food consumed in the location in Cuba	2.9	2.4	2.7
Quality of food locally produced in the location in Cuba	3.7	2.4	2.7

Table by authors.

TABLE 6 Core network actors and their explanations of the "local problem" in the case studies (scholars: 1; residents and leaders: 2; government officials: 3; NGO representatives: 4).

	Health problem	Lack of public space	Disaster risk	Poor quality/ variety of food	Violence and crime	Lack of education and awareness	Environmental degradation
Quito	1	2		1, 3, 4	2, 3	1, 2	
Valdivia			1, 4		3, 4		1
Usme			1, 4	1, 4	2	2	2
Cali		2	1		3, 4	1, 2	1, 2, 3, 4
Cienfuegos		1, 2		2		1	
Concepción			1			1, 2	2

FIGURE 7
A food garden in a front yard in Cienfuegos, Cuba. Figure by authors.

Given these differences, academics in local universities conducted a series of actions to mediate between communities and government, science and practice, and problems as defined bottom up and solutions as defined top-down.

In Quito, social scientists and local organizations have conducted educational programs and workshops to develop awareness about connections between diet and health conditions. They also facilitate dialogues between AGRUPAR, other organizations, and residents. Elderly residents are constantly motivated to work in gardens and orchards. But as they age, this involvement becomes more difficult. "I have been promoting food gardens in the neighborhood," explains one senior man who lives alone. "But some people here are now old. My neighbor, for instance, can no longer work on the garden. Sometimes his children come to help him, but my children cannot, because they have a job and do not live here."

In Valdivia, an NGO acts as an intermediary between low-income citizens and government representatives and programs. In Usme, a private university in Bogotá has engaged for many years in a community action program aimed at deploying knowledge, students, professors, and administrative capacity to improve living conditions among vulnerable groups. In Siloé a similar program is conducted by professors in architecture, urban planning, and engineering from a public university in Cali. In Cienfuegos, this role is conducted by academics from a faculty of architecture and construction in a university in the central city of Santa Clara. These researchers have maintained for more than 12 years close relationships with stakeholders involved in housing and urban planning in central Cuba. Finally, a public university in Concepción has been actively involved in improving living conditions among vulnerable communities around its main campus, including the Nonguén area.

FIGURE 8
A food garden in a school in Nonguén, Chile. Figure by authors.

TABLE 7 Perception of the main barriers to AFS among each surveyed group.

	Survey A (residents and local leaders)	Survey B (officers)	Survey C (academics and food experts)
The lack of resources (funding) in the community to undertake initiatives is a barrier to producing food locally	4.4	3.7	4.2
The lack of space to produce food is a barrier to produce food locally	4.1	3.5	3.8
The lack of training and education in agriculture and food production is a barrier to producing food locally	3.6	3.8	3.7
The lack of support from the municipality is a barrier to producing food locally	3.8	3.4	3.7
The lack of interest from my neighbors is a barrier to producing food locally	3.8	3.7	3.5
The lack of infrastructure such as water, electricity, drainage, sewage, etc. is a barrier to producing food locally	2.8	3.5	3.5
The municipal regulation is a barrier to producing food locally	3.3	2.9	3.4
The lack of roads and transportation is a barrier to producing food locally.	3.0	3.4	3.1

Table by authors.

In all these cases, academics have an interest in integrating students and research assistants in the design and implementation of strategies that respond to communities' interests and expectations. They deplore that politicians and authorities do not pay enough attention to the needs of residents living in low-income settlements. They also note that these residents rarely trust government representatives. They therefore see themselves as key players capable of connecting different groups and find that they enjoy the credibility and legitimacy to link both government and citizens. They conduct frequent activities that are attended by members of different groups and direct courses and workshops toward actions that can have an impact on vulnerable communities.

Enrolment

A series of negotiations and transactions were required to conduct artifacts. These transactions sometimes created conflicts and tensions between government officers and community members. A common challenge to engage in AFS in all locations was the availability of time. Women often take care of children, elderly family members, home cleaning, food, water, and other domestic activities, while trying to produce additional income. This

burden limits their capacity to devote time to collective activities and meetings and to scale-up their food initiatives. "Most women here are single-parents," explains one resident in Valdivia; "we live from subsistence activities; so if we do not work we do not eat; this reduces the time we can devote to farming." Uneven engagement of community members in collective endeavors sometimes crated tensions between them.

In Quito, key actors of the *60 y piquito* tried to align other stakeholders through different strategies. Academics conducted activities to facilitate communication and awareness about health issues. Interviews show that residents have now adopted the language and basic concepts about a healthy diet. In the meanwhile, residents tried to convince authorities about the importance or orchards and food gardens. One resident explained: "as people started building more and more, they used green areas as wasteland. We met with city officers and asked them to grant us permission to build organic food gardens in these open areas."

In Valdivia, residents find that lack of support from the state limits their capacity to start businesses and generate income. NGOs recognize the importance of substituting illicit activities with food-related businesses, but also find that there are few economic incentives to guarantee this transition.

In Usme, the network, now known as *Corporación Mujer y Tierra*, has been enlarged. But key actors deplore that there is insufficient government funding to support their activities and that they receive is little support from the municipality.

In Siloé, a group called *Multipropaz*, has managed to reinforce educational programs in a public school. But they find that funding for public schools does not allow for the creation of such alternative programs. The support of the university has been key to overcome the lack of government's funding and support.

In Cienfuegos, and Cuba in general, private businesses have now emerged to fill the gap left by a declining national program of food rations. But most products offered by private businesses are unaffordable to low-income families. In response, families are trying to establish their own food production and distribution initiatives. But lack of resources limits their capacity to scale-up bottom-up initiatives.

In Concepción, tensions often emerge between communities and public entities. Residents find that authorities not always honor their engagements, and this erodes trust on them. Academics have played a crucial role in creating spaces for what they called "sustained conversation" where tensions and differences are exposed, and solutions are found.

Mobilization

In a matter of one to 2 years, individuals' leadership eventually consolidated within communities. These leaders started gaining visibility and helped connect other actors. Most of them saw themselves as representatives of unheard voices and deplored that government programs are often disconnected from real needs and expectations in their communities. The activism of community leaders often relied on emotions such as love for the community and the territory, disappointment and frustration with authorities, and awe and amazement for nature and ecosystems. Their narratives often relied on how their communities have been victims of social injustices and how authorities are "in debt" and should therefore better support their bottom-up actions.

Even though leaders see their activism as "political" they often try to disentangle from political parties. One leader in Valdivia explains: "We have the particularity that we take distance from the interest and behavior of political parties. We rather emphasize our family and community values. This, of course, bring us some other problems."

In Quito, some women leaders and university professors have become spokespersons to pursue education and awareness about health issues. In Valdivia, an NGO has become a representative of local actions. This NGO has well-established connections to mobilize private companies and the administrative capacity to fuel and manage resources to the community. In Usme, the *Junta de acción comunal* (a local committee that acts as a non-administrative council) is often the space where social groups are represented and get a voice. In both Cali and Concepción, schoolteachers have become key spokespersons of AFS, linking education with activism and networking. In Cienfuegos, delegates of the *Consejo Popular* (a local council of the socialist party)

TABLE 8 Principal characteristics of translation processes in each location.

Case	Problematization	Intermediation	Enrolment	Mobilization
Quito	Tensions between representations of the problem	Need to include residents of different ages	Need to convince authorities to accept changes	Establishment of community groups
Valdivia	Presence of crime and violence	Need to deal with illegal stakeholders and security forces	Need to have a stronger presence of the State	Partnerships with NGOs
Usme	Tensions between urban planners and locals	Struggles to maintain rural lifestyles in a rapidly changing environment	Need to convince authorities to stop rapid change	Establishment of collaborations with academic institutions
Cali	Difficulties to take care of the environment in a highly populated, informal settlement	Need to involve academics to mediate between parties	Need for additional resources	Establishment of collaborations with academic institutions
Cienfuegos	Tensions between the need to produce food and existing mechanisms	Importance of convincing authorities of required changes	Need for additional resources	Establishment of new leaders
Nonguén	Need to protect the environment from a capitalist, neoliberal system	Need to involve academics to mediate between parties	Need to involve academics to mediate between parties	Establishment of partnerships between civil society, universities and public institutions

are the legitimate spokespersons of change. However, other "informal" leaders have emerged and assumed key roles to consolidate AFS.

Table 8 summarizes the main characteristics of translation processes in each location. The table shows that different tensions emerge in the way the problem is represented in our case studies. This leads to different forms of intermediation, enrolment and mobilization. Table 9 presents the main forms of alterity in each location according to the four main variables previously identified in the literature. Table 10 presents the main actors and relationships we identified and mapped in Cytoscaoe software. Figure 9 presents the results of this social network analysis (SNA) and mapping process.

The social network and semantic analyses reveal that community leaders and academics are central actors in alternative food systems, serving as key mediators between other nodes, such as NGOs, residents, and government policies. The most significant connections include the transfer of knowledge between academics and residents, as well as the support provided by NGOs and local authorities to community initiatives. The network shows moderate density, suggesting that multiple collaborative relationships exist, although not all actors are directly connected. Subgroups or communities are identified within the network, such as local actors (leaders, residents, natural resources) and institutional actors (academics, NGOs, politicians).

Discussion: five key dimensions in stabilization

These empirical results confirm that common attributes of alternative systems (defiance, place, mechanisms, and roles) play a key role in network stabilization. Previous studies have already added a spatial dimension to food systems. The notion of food landscapes, for instance, captures the idea that food systems modify urban form and space (Goodman, 2016). But ANT helped us reveal the dynamic character of this space. Time was in fact a key component of network stabilization. Let us now see how the patterns we found validate or extend previous research results.

1 **"Why"—Defiance:** Tensions about food narratives have been previously studied by Roa-Clavijo (2022), who reveals the struggle of defenders of alternative systems in Colombia. Our findings confirm his patterns regarding how some stakeholders defy the role of capitalist actors. But they also show that for most residents and local leaders in urban informal settlements, engagement with AFS had less to do with improving food consumption than with the social struggle per se. In general, locals saw their work in food systems as a form of fight against social injustices and resistance against unwanted change enacted by others. They saw gardening and other food activities as means to fight against what they see as menacing urban development allowed by permissive policy (notably in Usme and Concepción), rapid urban densification (Cali and Quito), forms of oppression by economic and political elites (in Valdivia, Cali, and Concepción), and absence or inefficiencies from the state (Cienfuegos, Valdivia, Usme, Cali).

We also found that locals feel that social and environmental injustices lead to risk and vulnerabilities. "We have been affected by the expansion of Bogotá," explained a leader in Usme. In Siloé, a women known as Doña Rubiela, collects waste to produce fertilizers, and, concerned with flood risk, is simultaneously building water protections in her backyard. Community members, leaders, scholars, and NGO representatives often "accommodated" narratives about risk and space to take advantage of opportunities such as government funding or social programs (for instance, support given during the pandemic or urban upgrading programs). We did not find in this opportunism to be something necessarily malicious, but interpreted it instead as a natural adaptation strategy to operate in hostile conditions where resources are scarce.

2 **"Where"—Place:** Work in AFS required constant negotiations about land use, where orchards, food gardens, and spaces for animals competed with other uses such as housing (in Usme and Concepción), plantations for illicit drugs (in Valdivia), and recreational activities (in Cali, Cienfuegos, and Quito). Engagement in AFS also revealed the importance of land

TABLE 9 Summary of forms of alterity in food systems.

Case	Defiance	Place	Mechanisms	Roles
Quito	Struggle against the problems associated with industrialized food systems	Competition for the use of space	Education and favoring awareness about food issues. Protect open areas	Consolidation and empowerment of new leaders
Valdivia	Struggle against the indifference of the State	Competition for the use of space	Facilitate new sources of income to discourage residents from depending on criminal activities	Consolidation of new partnerships
Usme	Struggle against authorities' forms of development	Preservation of rural attributes and lifestyle	Show authorities that there is a value in rural lifestyles	Consolidation and empowerment of new leaders
Cali	Struggle against the indifference of the State	Competition for the use of space	Involve new actors to create demonstration projects	Consolidation of new partnerships
Cienfuegos	Struggle against chronic lack of resources	Struggle for the possibility to use available space	Involve new actors to create demonstration projects	Consolidation and empowerment of new leaders
Nonguén	Struggle against a neoliberal system	Preservation of environmental attributes	Involve new actors to create demonstration projects	Consolidation of new partnerships

TABLE 10 Main variables used for SNA and information included in Cytoscape.

Source (Actor A) Agent that initiates the interaction	Destiny (Actor B) Receptor of the interaction	Type of relationship
Community Leaders	Residents	Leadership, Collaboration
Community Leaders	Academics	Knowledge Sharing, Mediation
Community Leaders	NGOs	Coordination, Support
Academics	Government Policies	Policy Advice, Knowledge Integration
Academics	Educational Materials	Creation, Distribution
Academics	NGOs	Collaboration, Project Support
Residents	Agricultural Land	Utilization, Food Production
Residents	Water Bodies	Resource Use, Risk Management
Residents	Infrastructure	Maintenance, Access
NGOs	Local Authorities	Advocacy, Project Implementation
Academics	Residents	Education, Resource Allocation
Local Authorities	Government Policies	Implementation, Oversight
Local Authorities	Residents	Regulation, Support
Water Bodies	Infrastructure	Impact on Access, Development

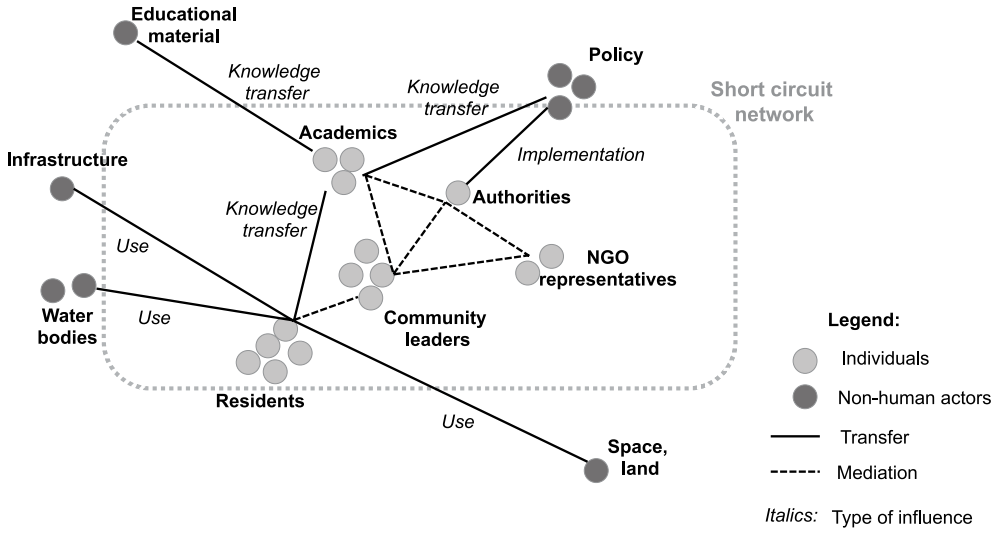

FIGURE 9
Results of SNA based on semantic relationships.

tenure, notably because orchards, food gardens and other artifacts challenged preferences about the use of both private and public space.

AFS also challenged notions of productivity among physical and non-physical networks. Some gardens in all locations produced a significant yield of one single product, but this production hardly solved households' food needs. Truce and exchanges were therefore needed to facilitate a balanced diet and guarantee that food was not wasted. Physical artifacts (gardens, for instance) required *intangible* networks (a seeds exchange circuit, for example). At the same time, intangible systems (food exchange, for example) required physical artifacts to operate (a space to exchange seeds, for instance).

AFS in our cases also blurred the boundaries between private and public goods, something that scholars have identified before in other areas (Durand-Lasserve and Selod, 2009). Some initiatives were conducted in private land through collective work (*mingas*). In other cases, private initiatives were conducted in public land. Given that land use creates tensions (when, for instance, public space was used to deposit garbage in Quito), food initiatives emerged as a mechanism to create value that benefitted most residents. This fluid comprehension of property, lead us to reflect on to what extent food can be considered a private or a collective resource in low-income communities.

3 **"How"—Mechanisms:** The notion of AFS has been criticized by some contemporary authors who find that it disregards or

minimizes trade as a component of food security (Maletta and Maletta, 2011). AFS have also been accused of being less efficient, fostering protectionists and exclusionary orientations, and producing detrimental impacts on other activities (Tregear, 2011). ANT offers a framework to analyze how AFS are justified and emerge, pointing to the negotiations and transitions that emerge in the process.

However, recent scholars have criticized ANT's approach as a "horizontal" analysis of systems. Critics find that, given that for ANT there are no à priori hierarchies between systems components, the framework tends to ignore human inequalities. "If all agents and positions are treated equally, how can it be argued that any given network is more or less ethically desirable?" wonder Watts and Scales (2015). We did not find in ANT a limitation to understand power dynamics. We found instead that this framework allowed us to reveal political dynamics (such as social struggles, tensions, negotiations, etc.) that are more difficult to perceive through traditional epistemologies in architecture, planning, and other socio-economic studies.

AFS also challenged the role of institutions. Primary schools and community centers, for instance, became key spaces to develop food activities in Siloé and Concepción. The Office of the *arquitecto de la comunidad* (community architect), a strong institution in Cuba that mostly works on housing upgrading, got involved in the promotion of food gardens. This said, we found that AFS were never fully stabilized. In fact, they depended on fragile networks where personal commitment was key. Tensions among and between social groups as well as constant pressures from the political, social, and economic environment constantly challenged the stabilization of AFS. People's struggle for change was a constant endeavor that implied frequent displacements, but did not reach a stabilized order.

4 **"Who"—Roles:** Actors conducted several displacements between systems typically labeled as urban or rural. AFS often incorporated characteristics of rural identity (agriculture, home-based work, and a sense of collectivity, for instance) with those of urban life (such as intense negotiations for open space and access to public utilities). Actors shared fluid representations of what is rural and urban and constantly challenged our notions of where the city ends, why, and how. In many cases, residents saw themselves separated from the city. People in Usme for example, talk about "going to Bogotá" and those in Siloé see Cali as a different location. But they simultaneously saw that their neighborhoods are now affected by urban dynamics (residents of Nonguén, for instance, know that they must negotiate decisions with authorities in Concepción).

Even though several elderly residents still claim a *campesino* identity, they also recognize that, as household members start working in urban jobs, their families are losing rural lifestyles. Work in AFS also combined activities that can be seen as "formal" and "informal." Food gardens in schools in Concepcion and Siloé, for instance, were formalized with school directors and through pedagogical programs. But several activities in Cienfuegos and Siloé, did not seek authorities' approvals. Attempts to sell food in Cuba and Siloé, for instance, were never the result of formalizing a company but, instead, of integrating the informal sector to obtain additional income.

This dynamic character rarely fit public approaches. Social programs and subsidies in Colombia and Cuba, for instance, target either agricultural activities or formal businesses. They also tend to distinguish between artisan and industrialized work. But AFS required displacements between all these categories. Selling yogurt and *cuajada* (a form of cheese) in Usme, for example, combined agricultural activities (to obtain milk), some form of industrialization (in marketing the product, for instance), and artisan work (in traditional packaging for cheese with plantain leaves, for example). Regulations often prevented residents from using public space for agriculture, even when that space did not have a specific use. In many cases, housing programs and subsidies, focus on residential outputs only, neglecting the role of livelihoods and collective uses of space.

5 **"When"—Temporalities:** AFS relied on time cycles that were different from those used for production, political terms, projects, and daily operations. Tensions emerged between those cycles. For instance, food gardens and other physical artifacts were not strictly "projects" as understood by project management scholars (PMI, 2008). They did not have a clear beginning and end. Instead, artifacts were in constant evolution and were sometimes abandoned, to be recovered later.

Time often blurred dichotomies in space. What is "rural" today will become "urban" tomorrow. What is considered "public" today can become private tomorrow and an informal activity can be later formalized—and vice-versa. Therefore, most categories only applied for a moment in time and tended to mask the dynamic character of translations. AFS required temporalities that rarely corresponded to the calendar of other systems.

Food production required actions at different time cycles, which made it difficult to coordinate collective agency. In Quito, for instance, work in AFS was often linked to rain cycles. Corn, beans, and squash were planted along with other short cycle crops, such as aromatic herbs and vegetables, during the first rains in October. Residents often relied on moon cycles to carry out different garden activities. Engagement also had to do with people's own life cycles. When community members retire, they have more time available to engage in AFS. But as they age and health conditions deteriorate, their involvement becomes more difficult. Likewise, engaging children at school was relatively easy in Cali and Concepción, but it is more difficult to engage teenagers, who are more independent and have other priorities. AFS also respond to social time cycles. During the COVID-19 pandemic, for instance, there was more involvement in food production than after 2022.

Our SNA results highlight the importance of interdisciplinary and multi-actor collaboration in efforts aimed at stabilizing networks in informal contexts, while also suggesting potential areas for strengthening, such as greater integration between government actors and local communities. Figure 10 represents the main variables of alternative system's stabilization, including the way they challenge notions of time ("when").

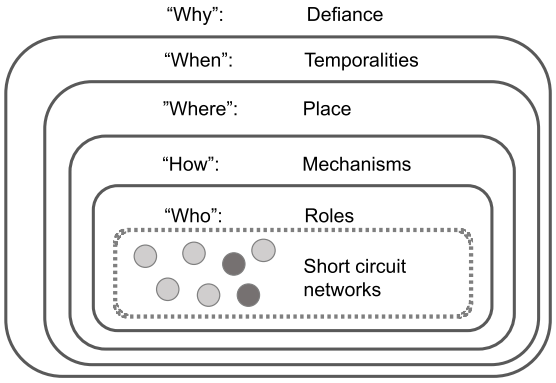

FIGURE 10
Dimensions of system stabilization.

Conclusions: food systems' unfinished stabilization

We explored the motivations and agency of people who engage in alternative food systems in six low-income settlements in Colombia, Ecuador, Cuba, and Chile. We confirmed a pattern found by previous scholars: defenders of alternative systems tend to challenge rationales (the "why"), notions of space ("where"), mechanism of production and distribution ("how") and people's roles ("who"). We also found that their activities also put to the test ideas about time ("when"). Translations, however, do not lead to a complete stabilization of alternative food systems. Tensions and struggles do not disappear. On the contrary, they constitute the very variables that shape systems over time.

Local leaders and community members see their involvement in alternative systems of food production, distribution, and consumption as acts of resistance against external forces. In this way, their activities are part of larger struggles to obtain services, housing, income, and to redress social and environmental injustices. They see AFS as collective efforts to reduce their vulnerability toward disaster risk, pandemics, violence, urban development, and cultural alienation, among other threats. In this effort, leaders resort to building artifacts, incorporating traditions, rituals, culturally-relevant time cycles, and social references. For them, food is a crucial way to connect to territories, to their past, traditions and rituals. While developing dynamic artifacts that influence space, they engage in constant displacements to engage other stakeholders, take advantage of funding opportunities, and obtain support from authorities and NGOs.

Our results confirm the works of other scholars. The local view of "the problem" and its "solution" contrast with authorities' approaches that tend to highlight food insecurity as a problem to be fixed by enhancing systems' efficiency, building infrastructure, bringing "development" to impoverished areas, and producing and distributing more food.

Social struggles, time, space, identities, and politics emerged from this study as key components of the translations and displacements that characterize networks of change in ANT. It is therefore crucial to keep trying to understand their complex relationships in conditions of informality. In several local practices related to food, traditional dichotomies used in policy, planning, and programs become irrelevant. Practices, policy, and programs in the built environment must account for the intrinsic dynamic and fluid character of the "spaces in between" and other complex and dynamic systems. Interventions by government and agencies must recognize the challenges that exist in stabilizing alternative networks. This implies avoiding representations that "romanticize" alternative practices and identifying effective ways to meet their challenges.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors without undue reservation.

Ethics statement

The studies involving humans were approved by Comité d'éthique de la recherche en arts et humanités (CERAH) de l'Université de Montréal. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

GL: Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing. SL: Conceptualization, Investigation, Writing – review & editing. NC: Conceptualization, Investigation, Methodology, Writing – review & editing. BH: Conceptualization, Investigation, Methodology, Project administration, Software, Visualization, Writing – review & editing. MaP: Conceptualization, Investigation, Writing – review & editing. KG: Conceptualization, Formal analysis, Writing – review & editing. MyP: Investigation, Writing – review & editing. EM: Investigation, Writing – review & editing. NO: Investigation, Writing – review & editing. RB: Investigation, Writing – review & editing. CA: Investigation, Writing – review & editing. LB: Conceptualization, Writing – review & editing. RD: Writing – review & editing. AL-V: Investigation, Writing – review & editing. OL-B: Investigation, Writing – review & editing. AO: Investigation, Writing – review & editing. PM: Investigation, Writing – review & editing. GA: Investigation, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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