From Words to Deeds: Harnessing Innovation for an EU Agrifood System Transition

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Highlights

1. This paper presents a keynote speech delivered at the AIEAA conference.
2. Innovation must serve sustainability, not just competitiveness.
3. EU policies favour incremental over transformative food system change.
4. Agricultural exceptionalism hinders ecological and social progress.
5. Researchers should act as honest brokers in contested transitions

Abstract

This paper presents a keynote speech delivered at the 2025 AIEAA conference in Pisa, titled “From Words to Deeds: Harnessing Innovation for an EU Agrifood System Transition”. It critically examines the current EU innovation landscape in food and agriculture, arguing that prevailing policy frameworks prioritise incremental efficiency over transformative change. Drawing on recent political developments, including the rollback of the Farm to Fork Strategy, the paper highlights how vested interests, agricultural exceptionalism, and reductionist notions of competitiveness constrain progress. It advocates for innovation strategies that are normatively grounded, inclusive, and politically attuned, and underscores the need to reframe innovation as a means to achieve ecological sustainability, social justice, and democratic renewal. The paper also reflects on the roles of researchers, calling for a shift towards honest brokerage and greater engagement with the political economy of food systems. Ultimately, it calls for a recalibration of innovation policy to support genuine, structural transformation.

1. Introduction

Innovation is a central theme in current European policy discourse. From European Commission white papers to national Common Agricultural Policy (CAP) strategic plans, the imperative to "foster innovation" recurs with increasing frequency. The Draghi Report on European competitiveness, published in 2024, further entrenched this emphasis by identifying productivity, market resilience, and innovation as the foundational pillars of the European Union’s economic renewal. Its influence is

already visible in emerging frameworks such as the Commission's Competitiveness Compass, which aspires to guide future policymaking across the Union.

Yet amid this policy enthusiasm, a fundamental question remains insufficiently addressed: *what do we innovate for*? While the rhetoric of innovation suggests progress and modernisation, innovation untethered from normative goals risks becoming an end in itself. The European Green Deal — and more specifically, the Farm to Fork Strategy — initially offered a bold and coherent vision for food system transformation, situating innovation within broader sustainability and health objectives (Schebesta and Candel, 2020). However, much of that ambition has since dissipated. In its absence, innovation is at risk of devolving into technocratic tinkering: change without direction, motion without meaningful progress.

Moreover, framing innovation as a universally beneficial, politically neutral process obscures the contested terrain on which innovation unfolds. For the purposes of this contribution, innovation is understood broadly as encompassing technological, social, organisational, and institutional developments that support systemic transformation within the agrifood sector, rather than solely referring to technological advances. Every innovation pathway entails political and social choices: whose needs are prioritised, which actors gain or lose power, and which futures are rendered more or less imaginable. Resistance to change, therefore, cannot simply be interpreted as ignorance or unwillingness: it also reflects legitimate democratic preferences, policy mandates, and societal trade-offs that policymakers must navigate. In this sense, innovation is not merely a technical endeavour; it is political

through and through. This Perspective paper therefore argues that the current European approach to innovation in the agri-food domain insufficiently addresses systemic challenges, and that transformative change demands clearer goals, better-aligned policies, and more politically attuned research strategies.

2. The need for transformative innovation in the EU food system

To return to fundamentals: why is innovation needed in the agrifood system? The answer lies in the scale and severity of the interlocking crises we face. The EU food system stands at a crossroads, caught between a scientifically grounded imperative for transformation and a growing political backlash. The stakes are considerable. Globally, the food system accounts for roughly one-third of greenhouse gas emissions, making it a primary contributor to climate change (Crippa *et al.*, 2021). It is also the leading driver of biodiversity loss, responsible for water and soil pollution, nitrogen overload, and habitat destruction (EEA, 2017; e.g., Crippa *et al.*, 2022; Rigal *et al.*, 2023). Furthermore, the food system is implicated in the rise of diet-related diseases such as obesity and type 2 diabetes, contributing significantly to public health burdens (Swinburn *et al.*, 2019; e.g., Scapin *et al.*, 2025).

The EU's agricultural and trade policies also have external ramifications, contributing to deforestation, biodiversity loss, and human rights violations beyond its borders (e.g., Bodnár, de Groot and de Beer, 2024; Dekeyser, 2025). These impacts arise from the conversion of forests into feed production zones and the displacement of local communities, all in service of a globalised food economy that concentrates wealth

among a powerful few. The challenge, then, is to create a food system that, in the words of economist Kate Raworth (2017), "fits within the doughnut", i.e. one that operates within planetary boundaries while fulfilling the basic needs of all people and species.

In light of these realities, innovation cannot be treated as value-neutral or detached from broader questions of justice. The goal is not simply to produce more or better food, but to do so in ways that are equitable, inclusive, and ecologically sustainable. What is needed, therefore, is not merely more innovation, but the right kind of innovation.

This brings us to a critical distinction: the difference between incremental and transformative innovation (cf. Silvius *et al.*, 2023). Incremental innovation focuses on improving the efficiency of existing systems. Examples include precision agriculture, enhanced packaging, or improved logistics. These developments have value, but they also risk reinforcing dominant models of production and consumption. For instance, investments in biogas are often framed as climate-friendly, yet can entrench intensive livestock systems by generating new dependencies and vested interests. In addition, the expansion of biogas production can introduce competition for land; diverting agricultural resources from food or feed production towards energy uses. As we argued in a recent study, large-scale biomethane production from manure, particularly as advanced under the EU's RePowerEU initiative, risks consolidating precisely the agricultural structures that sustainability policies aim to reform (Magnolo, Candel and Speelman, 2024). Environmental benefits are often overstated,

especially when methane leakage and the limited share of manure that can be digested are taken into account. Such interventions may ultimately delay meaningful transition by dressing the status quo in the language of circularity and energy resilience.

Transformative innovation, by contrast, seeks to alter the structure and logic of the food system itself (den Boer *et al.*, 2021; Marti, Massari and Recupero, 2023). It challenges dominant paradigms and opens up new ways of thinking, producing, and organising. However, transformation should not be understood as inherently superior or as a binary condition. Whether an innovation is desirable depends on its contribution to democratically agreed societal objectives, and transformative approaches may also encounter economic, social, or institutional constraints that limit their feasibility or legitimacy. In recent research, we proposed a heuristic to assess the degree of transformative potential in circular agriculture initiatives (Silvius *et al.*, 2023; Hoogstra *et al.*, 2024). This framework reveals that initiatives differ in how profoundly they challenge prevailing norms, what directionality they pursue, and how effectively they confront systemic barriers. The transformative quality of innovation lies not in its novelty alone, but in its capacity to generate cumulative "small wins" that disrupt path dependencies and catalyse wider structural change (Termeer and Metze, 2019).

Such small wins might arise from diverse sources, such as community-supported agriculture, regional procurement policies, or collaborative land stewardship models. Over time, these initiatives can begin to shift the centre of gravity in both policy and

practice. At the same time, there is a need for bold, disruptive visions that expand the boundaries of what is thinkable (cf. Termeer, Dewulf and Biesbroek, 2024). British environmentalist George Monbiot (2022), for instance, has advocated a decentralised system of precision fermentation that would effectively decouple food production from both land and animals. Whether one agrees with such proposals or not, they serve as provocations; stretching the imagination, questioning entrenched assumptions, and widening the space of possible futures.

Ultimately, transformative innovation is not defined by technological novelty but by directionality. It is less concerned with the question "what is possible?" than with "what is desirable, and for whom?" In doing so, it reopens the political space to reconsider the fundamental purposes of the food system itself.

Importantly, transformative innovation is not confined to technological breakthroughs. Some of the most promising developments are social and institutional in nature. In the Netherlands, the *Herenboeren* model brings together approximately 200 households to collectively own and govern a farm (Schagen *et al.*, 2023). The group employs a professional farmer and makes collective decisions about what to produce and how, guided by principles of sustainability, health, and community well-being. Similarly, *Land van Ons* is a citizen-led initiative that acquires degraded farmland and leases it to farmers employing nature-inclusive practices (Jellema, Beldman and Woltjer, 2023).

These are not exercises in agrarian nostalgia, but deliberate experiments in redesigning governance structures, economic incentives, and social relations within

the food system. While citizens' views on agriculture are diverse and sometimes ambivalent — with survey data showing both support for stronger environmental ambition and concern about prices and farming livelihoods — these initiatives nonetheless signal a growing societal interest in exploring alternatives to dominant models (El Benni *et al.*, 2025). Crucially, they illustrate that meaningful innovation is not restricted to laboratories or start-ups; it is also emerging in fields, cooperatives, municipalities, and grassroots movements across Europe.

This raises a broader question of inclusion: *who is actually permitted to innovate in agriculture*? Much of the policy and academic discourse around agricultural innovation centres on the notion of "generational renewal"; encouraging younger members of farming families to take over existing farms. While succession within farming families is important, this framing is too narrow. It overlooks the potential contributions of new entrants: citizen cooperatives, mission-driven enterprises, and urban communities, many of whom are motivated by ecological and social concerns rather than family legacy.

Initiatives like *Herenboeren* and *Land van Ons* demonstrate that these new actors bring not only fresh ideas and values, but also alternative governance models that can challenge entrenched systems (cf. Pindado *et al.*, 2018), although trade-offs may emerge in the scaling of these initiatives. However, such initiatives often face significant regulatory, financial, and cultural barriers (Creaney, Hasler and Sutherland, 2023). Land access, subsidy eligibility, and legal recognition tend to favour conventional farm structures, creating a skewed playing field.

If the EU seeks to foster genuine innovation in the agrifood sector, it must broaden its understanding of who is entitled to participate. Supporting a more pluralistic, open, and inclusive landscape of actors is essential. Innovation policy should not only ask what innovations are needed, but also *who is empowered to innovate*, and under what conditions.

3. Existing policy constrains rather than accelerates transformative innovation

Despite growing recognition of the need for food system transformation, Europe's current innovation landscape remains structurally skewed against such change. Public support continues to flow disproportionately toward the dominant, industrial model of agriculture, thereby reinforcing incumbent practices and business models rather than enabling alternatives. For example, the intensive livestock sector receives 1,200 times more public funding than the animal products analogues sector, even as EU policymakers articulate ambitions for a "protein transition" (Vallone and Lambin, 2023). Similarly, a large majority of CAP subsidies remain directed toward animal-based production systems (Kortleve *et al.*, 2024). While organic, agroecological, and community-supported farming models are frequently celebrated in policy rhetoric, they must operate within a deeply uneven playing field. These alternative approaches not only receive relatively limited financial support but also contend with a policy environment that allows conventional systems to externalize environmental and social costs.

This results in what could be described as a "double burden" for transformative actors: they are under-resourced and simultaneously expected to challenge entrenched systems (Anadon *et al.*, 2016). The institutional architecture of EU policy rewards incremental optimisation within dominant paradigms while penalising more disruptive innovation. As a result, many of the innovations with the greatest potential to advance sustainability remain peripheral: they increasingly feature in speeches and strategy frameworks, and some receive funding, yet this support remains modest compared to the substantial resources underpinning the dominant agri-food system (Vallone and Lambin, 2023; Child, 2025). Without a structural realignment of incentives toward long-term societal goals, transformative innovation will remain marginalised.

What makes this policy misalignment particularly frustrating is that the contours of a more effective and coherent policy mix are already well understood. Over the past decade, researchers and civil society organisations have repeatedly offered detailed recommendations for creating an enabling environment for food system transformation (e.g., SAPEA, 2020, 2023; EEA, 2023; Agora Agriculture and IDDRI, 2025). Such a policy mix would include long-term legal commitments aligned with climate and biodiversity targets, the use of economic instruments such as taxes, subsidies, and trading schemes, interventions in food environments (e.g., through zoning regulations, public procurement, and food education), regulatory bans on harmful practices and products, and comprehensive financial and advisory support for farmers and entrepreneurs pursuing sustainable pathways.

In fact, these recommendations have become so widely circulated that they now verge on the familiar. The current bottleneck is not primarily one of knowledge but of policy change. It is not that we do not know what to do; it is that political systems have not found the will or capacity to act accordingly. This points to a persistent blind spot in both research and policy: the under-investment in understanding and ultimately transforming the political economy of food system innovation (Resnick and Swinnen, 2023).

4. Agricultural exceptionalism and reductionist innovation strategies

At the heart of this political inertia lies a persistent logic of *agricultural exceptionalism*: the notion that agriculture is too strategic, too culturally significant, and too vulnerable to be governed by the same rules as other sectors (Skogstad, 1998). This logic has long justified a separate policy architecture for agriculture, one characterised by generous subsidies, regulatory exemptions, such as excluding the extension of the polluter-pays principle to the agricultural sector. Historically, this approach has ensured stability and productivity. But it has also stymied broader reforms, shielding the sector from pressures to internalise its ecological and social costs (cf. Roederer-Rynning, 2020).

In recent years, there was cautious optimism that this logic might be giving way to a more integrated and reflexive model of governance. Scholars described this shift as a move toward *post-exceptionalism*: a governance regime in which agricultural policy would be broadened beyond narrow sectoral interests, aligned with values such as

public health, climate action, and animal welfare, and opened to participation by a wider set of actors (Daugbjerg and Feindt, 2017). The European Green Deal, and particularly the Farm to Fork Strategy, seemed to embody this vision. It proposed bold measures: halving pesticide use, expanding organic agriculture, improving animal welfare, and anchoring food policy within broader sustainability goals.

Yet this promise has largely gone unfulfilled. Over the past two years, the Farm to Fork agenda has been systematically dismantled (Candel and Daugbjerg, 2025). The Commission's proposal for the Sustainable Use of Pesticides Regulation was withdrawn. The long-anticipated Sustainable Food Systems Law was shelved. Plans to reform EU animal welfare rules failed to materialize. The Soil Health Law was scaled back to a narrower monitoring framework with few binding commitments. Agricultural and food consumption measures were removed from the Commission's initial draft of the 2040 climate targets. Meanwhile, environmental conditionalities under the CAP were relaxed under pressure. In effect, the EU has not only paused progress; it has reversed course.

This retreat was not incidental. It reflects a coordinated political backlash driven by a powerful coalition of status quo defenders: DG AGRI, national agricultural ministries, farm unions such as Copa-Cogeca, and COMAGRI in the European Parliament. These actors reframed the Green Deal's sustainability agenda as a threat to food security, national sovereignty, and farmer livelihoods. "No Farmers, No Food" emerged as the rallying cry; a scientifically dubious but politically potent slogan,

particularly against the backdrop of inflation, war in Ukraine, and farmer protests (Mazzocchi *et al.*, 2024).

The collapse of the Farm to Fork Strategy is not merely a case of policy failure. It exposes a deeper unwillingness to confront structural questions about the future of the EU's food system. The shift toward post-exceptionalist governance remains largely aspirational (Candel and Daugbjerg, 2025). Sustainability continues to be subordinated to short-term economic and geopolitical considerations.

This reluctance extends beyond agricultural policy. It echoes through the EU's broader economic and innovation strategies. The 2024 Draghi Report, for instance, rightly identifies weak productivity growth and underinvestment as major challenges. Yet its proposed solutions are framed almost exclusively in terms of competitiveness, deregulation, and technological acceleration; interpreted narrowly as Europe's ability to position itself in global markets. These themes are now institutionalised in the Commission's *Competitiveness Compass*, which guides economic policymaking in the years ahead.

Such framing risks eliding the foundational conditions of long-term resilience: ecological viability, social justice, and democratic legitimacy. Reducing innovation policy to metrics of speed and market share obscures the deeper question of innovation's purpose (cf. Kok and Klerkx, 2023). The EU's recent vision document for the agri-food sector illustrates this problem clearly. Published in early 2025, it claims to respond to public and farmer concerns. Yet the proposed solutions — streamlined regulation, digitalisation, and export growth — reflect the same techno-economic

paradigm that has contributed to the sector's systemic crises: soil degradation, biodiversity loss, farm bankruptcies, and rural decline.

What remains missing is a compelling, future-oriented vision of *qualitative innovation*; not simply more, but better: innovation that serves environmental restoration, social equity, and economic vitality in rural regions.

Crucially, the EU is not without power to change course. As a global regulatory power, the Union has demonstrated its ability to shape international norms on data protection, chemicals, and trade (Bradford, 2020). Innovation systems research shows that ambitious, long-term regulation can *accelerate* innovation rather than hinder it, by signalling clear expectations and de-risking investment (e.g., Reichardt et al, 2016). The decision to withdraw the proposed pesticide regulation, for fear of administrative burdens, exemplifies a counterproductive logic. It is precisely the absence of binding targets that has stifled investment in alternatives such as integrated pest management (Candel, Pe'er and Finger, 2023).

Rather than retreating under pressure, the EU could use its normative clout to chart a bold course forward; shaping a global economic order grounded not in extraction and short-term gain, but in sustainability, justice, and resilience. Such leadership would not only bolster Europe's strategic interests; it would also meet the growing societal demand for credible and transformative responses to a worsening polycrisis.

Realising such a shift requires more than policy rhetoric. It demands a research and innovation system capable of supporting deep, structural change. Yet here, too, we face persistent and systemic constraints. Funding architectures are increasingly tilted

toward short-term, commercially-oriented projects; those promising clear deliverables, rapid scalability, and alignment with existing economic actors (cf. Franssen et al., 2018). Co-funding requirements with private industry frequently shape the agenda in favour of innovations that reinforce prevailing business models, rather than challenging them.

As a result, entire domains of transformative knowledge production — commons-based governance, agroecology, food sovereignty, degrowth-compatible agri-food systems — are marginalised or excluded. These areas are not devoid of relevance or scientific quality; rather, they challenge the assumptions and power relations embedded in mainstream food system research. The marginalisation they face is thus not merely technical, but *political*. It reflects deeper epistemic hierarchies and institutional inertia, often internalised by researchers themselves.

5. The potential role of agricultural economics in food system research

This points to a difficult truth: as a scientific community, we have often become entangled in the very systems we are tasked with critically analysing. Agricultural economics offers a case in point. Historically, the field has played an influential role in designing and evaluating agricultural policy. Over recent decades, the scope of inquiry has broadened, reflected in growing attention to topics such as agri-environmental schemes, supply-chain relations, consumer preferences and sustainability transitions. Yet, as Qaim and Parlasca (2025) argue, despite this diversification, much of the work remains anchored in established paradigms and

tends to avoid normative reflection or systemic critique, instead emphasising incremental efficiency gains or technological fixes. The field's rigour and influence are undeniable, but so, too, is its tendency to eschew the political dimensions of innovation.

That trajectory is not inevitable. The same authors make a compelling case for repositioning the discipline to engage more directly with issues of power, equity, and directionality in food system transitions. Agricultural economics, with its deep understanding of trade-offs, institutions, and incentives, is well-placed to contribute to this agenda, if it is willing to look beyond productivity metrics and market efficiency, and toward the deeper question of what kind of food system we need, for whom, and at what cost. This moment offers a chance for self-reflection and renewal: a reimagining of the field as not only policy-relevant but also policy-critical.

6. Rising populism and cultural nationalism

This task becomes all the more urgent in the face of rising populism and cultural nationalism; forces that are reshaping the politics of innovation across Europe. Food, with its deep emotional and symbolic charge, has become a key battleground in this cultural turn. Increasingly, sustainability transitions are not challenged on technical or economic grounds, but on cultural and identity-based ones. Innovation is cast as a threat to tradition, rural life, and national sovereignty, turning legitimate debates into emotionally polarised flashpoints.

Fabio Parasecoli's (2022) work on *gastronativism* captures this phenomenon with unsettling clarity. Food is mobilised not only as a source of pride or belonging, but as a weapon to draw exclusionary boundaries and resist change. Recent developments in Italy illustrate this vividly: the government's decision to ban cultured meat was less about public health or scientific uncertainty, and more about defending a particular vision of national culinary identity. The move was celebrated as a blow against "unnatural" and "globalist" interference; part of a broader narrative in which EU sustainability efforts are reframed as a threat to sovereignty and tradition.

These dynamics are not confined to the political fringe. Across the EU, resistance to food system innovation is increasingly framed as common sense. Transformation is painted as elitist, technocratic, and disconnected from everyday realities, while the status quo is rebranded as pragmatic and patriotic. This reframing is deeply consequential. It narrows the space for public dialogue, chills investment in controversial or experimental domains, and weakens the political case for ambitious regulation, particularly at the EU level.

If we are to counter this trend, we must articulate a different narrative: one that situates sustainability-oriented innovation not as a rupture with culture, but as its continuation under new conditions. Innovation must be reframed as a means of safeguarding what matters — livelihoods, landscapes, traditions, and tastes — in the face of profound ecological and social disruption. Rather than a threat to heritage, transformation can be a way of renewing it. This requires listening closely to the

values people hold, engaging with their fears and aspirations, and demonstrating that a just transition is not only necessary, but desirable.

7. The quest for institutional and political change

Unlocking the transformative potential of food system innovation requires more than isolated initiatives or rhetorical commitments; it necessitates a fundamental reconfiguration of the institutional and political architectures that currently shape innovation pathways. At the core of this reconfiguration lies the imperative to realign incentives. This entails a redirection of subsidies towards sustainable and diversified production systems, the removal of entry barriers for new and citizen-led initiatives, and the creation of protected regulatory spaces for experimentation. Moreover, social and ecological criteria must be systematically embedded into public procurement rules, taxation policies, and investment screening mechanisms. In short, innovation must be governed not only by market dynamics, but by democratically articulated societal objectives.

Yet policy realignment alone is insufficient. Meaningful transformation also requires confronting the deeper political and institutional impediments that constrain policy change in the first place. Scientific recommendations often fail to gain traction not due to lack of evidence, but because they disrupt entrenched power structures or lack legitimacy among key constituencies. This underscores the urgent need for a more robust engagement with the political economy of food systems (Béné, 2022): whose

interests are being served by current arrangements? Who holds decision-making power? Whose knowledge is valorised, and whose is marginalised?

These are not abstract questions. They speak directly to the possibilities for institutional reform and the need to design governance frameworks that are more inclusive, adaptive, and democratically accountable (cf. Visseren-Hamakers et al, 2021). Encouragingly, some innovations are emerging at the subnational level. Across Europe, municipal governments are taking the lead where national and supranational institutions have stalled (Candel, 2019; Arcuri, Minotti and Galli, 2022). Italian cities such as Milan, Trento, and Lucca are actively experimenting with integrated food policies that promote sustainability, citizen engagement, and intersectoral coordination. These examples suggest that political momentum for food systems reform can be generated 'from below', especially when local actors are empowered to align food policy with broader agendas around health, education, and climate action.

Nonetheless, it is important to draw lessons from prior EU attempts at systemic reform. The EU's Farm to Fork Strategy represented a significant step forward, both in terms of ambition and scope. Yet its rapid unravelling highlights the importance of political strategy. Recent studies suggest that the sequencing and framing of reforms matters as much as their content (Fesenfeld *et al.*, 2020; Bendz *et al.*, 2023; Fesenfeld, Candel and Gaupp, 2023). Structural transitions often fail not because the goals are unworthy, but because the process by which they are introduced lacks political groundwork. Early, low-resistance measures — properly communicated and

inclusively designed — can serve as stepping stones for deeper reform. Transformation, in this view, is a cumulative process of trust-building, coalition formation, and institutional layering.

This is particularly salient in policy domains such as food, which are intimately tied to everyday practices, identities, and values. Public resistance to food system interventions is rarely fixed; it is contingent on how policies are framed, who articulates them, and the degree to which they are perceived as fair and participatory. Policy acceptance increases significantly when reforms are embedded in narratives of collective transition, social justice, and long-term societal benefit (Bendz *et al.*, 2023). Conversely, technocratic or abrupt interventions are often perceived as illegitimate, triggering political backlash.

Such findings challenge the widespread assumption among policymakers that public opinion constitutes a fixed constraint. On the contrary, public sentiment can be shaped, provided there is political leadership willing to engage citizens transparently and constructively. Building legitimacy for food system transformation involves more than presenting evidence; it demands a compelling narrative of societal purpose, a clearly articulated roadmap for change, and institutional mechanisms that foster accountability and inclusion.

The recent example of Denmark's approach to implementing an agricultural carbon tax illustrates this well. Rather than pursuing immediate imposition, Danish policymakers prioritised early stakeholder engagement, transparent communication,

and gradual implementation. This approach not only reduced resistance but also contributed to building the broad-based support necessary for ambitious reform. Moreover, the measure was the latest in a long sequence of reform-oriented agricultural policy interventions, including a national organic label, a pesticide tax and a fund for plant-based innovation (cf. Daugbjerg and Schvartzman, 2022). The case demonstrates that careful sequencing and inclusive governance can render politically sensitive policies feasible, even in contentious sectors such as agriculture.

In sum, transformative food system innovation cannot be reduced to technical design or market incentives. It requires sustained political strategy, institutional innovation, and normative vision. Researchers, practitioners, and policymakers each have a role to play; not only in developing better policy instruments, but in helping to navigate the contested terrain of societal transformation itself.

8. The roles of researchers in food system transformation

These insights have important implications for the scientific community. As Roger Pielke (2007) has argued, researchers in democratic societies can assume different roles. At times, we act as *pure scientists*, focused on the production of knowledge without engaging in its practical application. In other contexts, we serve as *science arbiters*, providing technical evaluations to inform policy decisions. We may also adopt the stance of *issue advocates*, aligning ourselves with particular normative agendas and working to advance specific outcomes. Yet perhaps the most crucial role in today's context is that of the *honest broker*: a figure who does not prescribe singular

solutions, but instead helps clarify trade-offs, expands the set of considered policy options, and fosters more inclusive, deliberative forms of decision-making.

While each of these roles has value, the honest broker role is particularly essential in moments of societal turbulence, when complexity, polarisation, and institutional inertia obstruct collective action. Embracing this role requires that scientists move beyond their disciplinary boundaries, engage more actively with divergent perspectives, and cultivate a capacity not only to analyse, but also to listen. In this context, universities must reimagine their public mission. They cannot afford to remain neutral bastions of detached expertise. Rather, they must become spaces where knowledge is co-produced with society; where engagement, dialogue, and collaboration are treated as core academic practices, not peripheral activities. This entails rethinking pedagogical models, revising academic incentive structures, and recognising the importance of scholarly contributions that may not yield high citation metrics but are essential for navigating complex public challenges. If we are serious about supporting food system transformation, we must also be willing to learn alongside others.

The Italian political theorist Antonio Gramsci (2000) once wrote, "The old world is dying, and the new world struggles to be born: now is the time of monsters." Penned from a prison cell during a period of political repression, these words speak to the ambiguity, resistance, and possibility inherent in moments of transition. Today's "monsters" — climate breakdown, biodiversity collapse, food insecurity, democratic erosion — are not mythical abstractions. They are systemic formations sustained by

entrenched interests, dominant narratives, and institutional path dependencies. They often feel insurmountable. And yet, they are not invincible.

Through critical inquiry, ethical reflection, and collaborative engagement, scholars can contribute to confronting these challenges. Not as isolated experts, but as participants in a broader societal effort. Whether our tools are policy models, empirical datasets, participatory methods, or digital technologies, scientific actors have an important role to play in shaping pathways toward more just and sustainable futures. The magnitude of the task should not deter us. Rather, it should galvanise our sense of purpose. In times of uncertainty and transformation, academic voices carry particular responsibility: to contribute with intellectual honesty, civic commitment, and imaginative foresight.

9. Conclusions

If we take the question of purpose seriously — if we understand innovation not as an autonomous driver, but as a tool to serve democratically defined social and ecological objectives — we open the possibility for food systems that are not only more efficient, but also more equitable, resilient, and sustainable. Achieving this vision requires more than technical ingenuity. It demands institutional reform, thoughtful sequencing of change, and political leadership rooted in transparency and accountability. It also requires researchers to examine their own positionality and to reflect critically on how their work influences, and is influenced by, broader processes of change.

In the end, food system transformation is not merely a technical challenge. It is a societal one. And it is in precisely such moments, when trajectories are contested and futures are uncertain, that scholarly engagement becomes most vital. The role of science is not to offer ready-made solutions, but to help societies ask better questions, navigate complexity, and expand the space of the possible. In doing so, we can help shape a future in which innovation serves not only economic efficiency, but the common good.

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