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<https://doi.org/10.1057/s41599-023-02236-2>

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Organic agriculture and agri-food system democracy: an institutional perspective from Kenya

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The discontent with the undemocratic agricultural food system inspired the emergence of many alternative agri-food systems, including organic agriculture. This study analysed how organic agriculture promotes agri-food system democracy concerning traditional knowledge integration, community and women participation, market, and policy integration. The study found that organic agriculture conversion increases traditional knowledge integration, community and women participation, and market integration. Although, it promotes policy integration by contributing to organic standards and policy development, the policy has remained in draft form for too long. The study implies supporting organic agriculture can promote agri-food system democracy, but its potential is compromised by the lack of an approved policy. Thus, stakeholders should increase their advocacy efforts for speedy organic policy approval and broader policy scope, including compensating organic producers for supplying public goods.

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Introduction

Democratized agri-food systems are very generous. They produce many precious goods, including nutrition, health, livelihoods, environmental sustainability, social justice, equity, and human rights (Thompson et al. 2020; Pimbert et al. 2010; Holt-Gimenez, 2008). However, agri-food systems have become undemocratic following the conventional agri-food system transformation. Since the 1970s, the agri-food system underwent significant changes, notably: concentration, specialization, and internationalization (McMichael, 2013) and intensification, leading to enormous transformation in the production system and governance of the agri-food system. New production technologies, including synthetic agrochemicals, chemically dependent seed varieties, genetically engineered crops, intensive animal production, and irrigation emerged (Scrinis, 2007). The traditional power relationships in the agri-food system were transformed as power shifted from producers to processors and then retailers (Díaz-Méndez and Lozano-Cabedo, 2020). Big companies took control over the production (seeds, pesticides, fertilizers, or machinery), collection, processing, and distribution of largely homogeneous and globally-oriented foods (Goodman et al. 1987). Through land grabbing, some companies took control over the land of the smallholders. Díaz-Méndez and Lozano-Cabedo also observed increased complexity of the agri-food system as the number and variety of stakeholders and the phases and processes that food undergoes before reaching the consumer has increased in scope.

Under the emblem of the green revolution, the transformation in the conventional agri-food system improved farm productivity, income, and food security. However, the agri-food systems failed to meet the food needs of all socio-economic classes equally or to protect farmers' livelihoods (Spear, 2014). Traditional, smaller-scale, diverse, subsistence, and independent forms of farming were undermined by larger-scale, specialised, monocultural, and export-oriented agriculture (Canwat and Onakuse, 2022). Corporations consolidated their control of the food system and shifted their roles from being rule followers to becoming rule makers (Fuchs et al. 2011). Consequently, smallholder farmers lost control over their land, seeds, and produce (Canwat and Onakuse, 2022). Women were relegated from true farmers to helpers and alienated by associating farming identity and technology with masculinity (Chiappe and Flora, 1998; Farnworth and Hutchings, 2009; Trauger 2004). The complexity of the agri-food system created disconnections between agricultural and food products and between producers and other actors, including consumers as physical and cognitive distances between the agri-food system actors increase (Lozano-Cabedo and Gómez-Benito, 2017; Thompson and Scoones, 2009). In Kenya, the agri-food system compromised food security and social justice as it undermined natural soil fertility and indigenous farmer knowledge, encouraged external dependence, exacerbated socioeconomic inequality, and its capital-intensive nature favoured medium and large-scale farmers with good access to cash, capital, and credit (Goldberger, 2008). The overuse of synthetic agrochemicals in the conventional agri-food system also negatively affected the environment and human health (Reganold and Wachter, 2016). Conventionally grown foods have immense adverse health effects due to the presence of higher pesticide residue, more nitrate, heavy metals, hormones, antibiotic residue, and genetically modified organisms.

The changes in the agri-food system governance spurred the growth of alternative agri-food systems, including organic agriculture. The systems advocate for innovative regulatory tools and demand food governance mechanisms that are more transparent, horizontal, and democratic as well as a more active role in decision-making about food consumption and food production (Freudenberg, et al. 2011). This study assesses how organic agriculture promotes the agri-food system democracy in a developing country context, using an institutional framework. In

this study, organic agriculture refers to a certified production system that sustains the health of soils, ecosystems, and people by relying on ecological processes, biodiversity, and cycles adapted to local conditions, rather than the use of inputs with adverse effects (IFOAM, 2010). The production system is certified using European Community Organic Certification standards and the Kenyan participatory guarantee system. The subsequent sections of the paper comprise a conceptual framework, research methods, results, and discussion and conclusions.

Conceptual framework for agri-food system democracy in organic agriculture

This chapter explores the linkage between organic agriculture and agri-food system democracy. Figure 1 presents a conceptual framework viewing the institutional framework of organic agriculture as a driver of agri-food system democracy. For the details of the conceptual framework, refer to Appendix 1. The chapter reviews the institutional framework of organic agriculture, concepts and dimensions of agri-food system democracy, and linkages between the institutional framework of organic agriculture and agri-food system democracy.

Institutional framework of organic agriculture. An institutional framework denotes a set of institutions and institutional arrangements that shape behaviours and political, social, and economic activities. Institutions are humanly devised constraints that shape political, social, and economic interaction by structuring incentives (North, 1990). They include formal constraints such as statutory rules, laws, and property rights, and informal constraints like norms, sanctions, taboos, and codes of conduct (North, 1991). An institutional arrangement is "an arrangement between economic units that govern how its members can cooperate and/or compete" (Kherallah and Kirsten, 2010: 112). While Kim (2020) refers to an institutional arrangement as particular organizational forms or the modes of organizing transactions, von Lüpke et al. (2022) define it as a set of organizational forms designed and deployed for a particular objective. Eaton et al. (2007) also define the arrangement as "agreements governing the activities of a specific group of people pursuing a certain objective". These arrangements include markets, contracts, networks, joint ventures, and firms and states (Kim, 2020; Ebers and Oerlemans, 2016; Kherallah and Kirsten, 2002; Eaton, 2007).

Organic agriculture has many institutions including legislation, policies, standards, and certification. Organic certification mechanisms range from individual and group third-party certification to participatory guarantee systems (Hruschka et al. 2021; Kaufmann and Vogl, 2018; Loconto and Hatanaka, 2018). Examples of organic policies and legislations include the Uganda National Organic Policy of 2019 (Bendjebbar and Fouilleux, 2022), Brazilian organic legislation, Mexican Law for organic products, and the US National Organic Program (Kaufmann and Vogl, 2018). Several institutional arrangements are also found in organic agriculture, including local organic markets (Kaufmann and Vogl, 2018), private entities, and associations of organic producers which have their standards such as Soil Association and Bioland (Arcuri, 2015; Kamau et al. 2018). Institutional arrangements also include Organic Agriculture Movements, notably: the International Federation of Organic Agriculture Movements (IFOAM) and National Organic Agriculture Movements such as those in Uganda, Kenya, and Tanzania.

In Kenya, organic agriculture is supported by many institutional arrangements, including markets, contracts, and networks. Organic networks include producer groups and the Kenya Organic

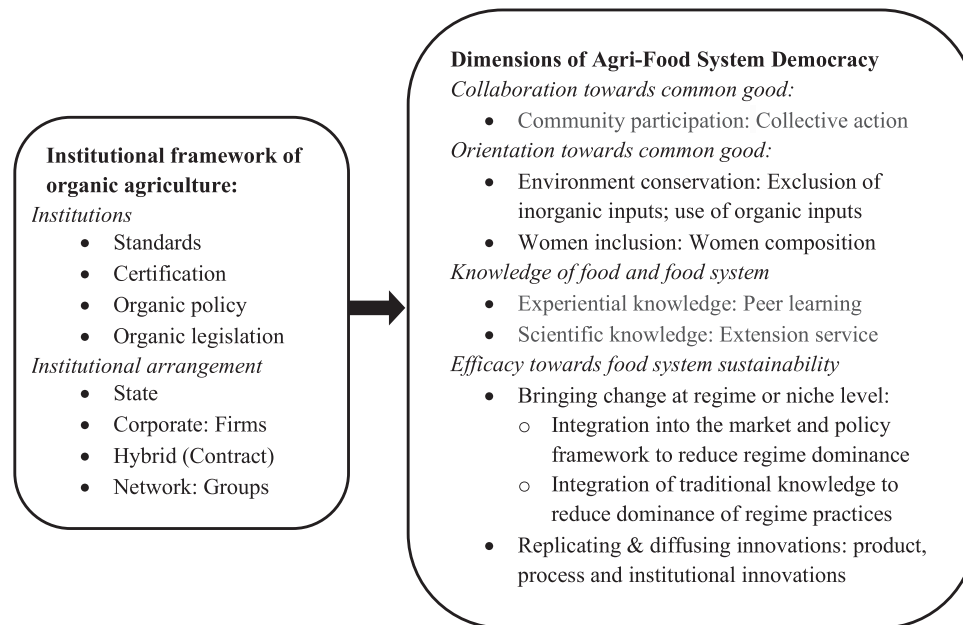


Fig. 1 Conceptual framework for the agri-food system democracy. The dimensions of the agri-food system democracy and the institutional framework of organic agriculture. The direction of the arrows indicates the influenced variables. The aim is to illustrate the relationships between the institutional framework of organic agriculture and the dimensions of the agri-food system democracy. Institutions and institutional arrangements of organic agriculture affect community participation, environmental conservation, women inclusion, experiential and scientific knowledge, integration into the market and policy framework, and integration of traditional knowledge as well as product, process and institutional innovations.

Agriculture Network (KOAN), a network that is an umbrella body of organic promoters, producers, consumers, and exporters. While the organic producer groups facilitate the organic certification and compliance with organic standards, KOAN promotes monitors, and coordinates organic agricultural activities (Canwat et al. 2020; Kamau et al. 2018). These networks also support the development of organic markets (Tankam and Djimeu, 2020). Organic production takes place on a small (0.2–3 ha), medium (3–49 ha), and large scale (50 ha and above) for both domestic and export markets. While large-scale producers mainly target the export market, small-scale producers dominate the domestic market. Medium-scale producers are also active in the domestic market, where they supply the urban market. Domestic market supplies include fruits and vegetables, but perennial crops such as essential oil and macadamia dominate the export market. Most exporters procure produce under contract from smallholder farmers for whom they provide certification, extension, and marketing services (Canwat et al. 2020).

For certifying smallholder producers, a participatory guarantee system (PGS) and a third-party system of organic certification based on an internal control system (ICS) are used (Gichure et al. 2017; Moya et al. 2019; Kamau et al. 2018). The PGS is a ‘locally focused quality assurance system’, which certifies producers based on the ‘active participation of stakeholders and a foundation of trust, social networks, and knowledge exchange’ (Dittrich, 2012, 11). For PGS in Kenya, non-governmental organisations (NGOs) closely collaborate with Kenya Organic Agriculture Network (KOAN) to organise farmers into groups, which work closely with KOAN and NGOs to enforce compliance of their members to PGS organic standards and processes (Canwat and Onakuse, 2022). In the ICS, a certified organic operator monitors and supports organic producers monthly and maintains a system of records and documents, audited for compliance by external inspectors (certification bodies) (Canwat et al. 2020).

While organic certification for the domestic market is based on the regionally developed East African Organic Products

Standards (EAOPS) and the locally developed PGS standards (Simplified EAOPS), the production for the export market is certified using a range of international standards and organisations, notably: Soil Association (UK), Ceres (USA), IMO (Germany) and the European Community Organic Certification standards (ENCERT) (Canwat et al. 2020; Kamau et al. 2018). The PGS and EAOPS standards are vital for the development of the organic market, but their effects are likely to be compromised because they lack legislative support. This follows from the observation of Ozor and Nyambane (2021) that no policy and legislative frameworks exist on organic agriculture in Kenya. Although, Ozor and Nyambane acknowledge the existence of a draft National Organic Agriculture Policy, they also observe that the policy has remained in draft form for a longer time than expected.

Agri-food system democracy. Agri-food system democracy has many definitions, but this paper focuses on two of them. Guarco (2018) defines agri-food system democracy as democratic participation by value chain actors; accessing safe and nutritious food unrestricted by any economic, social, or political reasons; and producing food without barriers from oligopsonistic behaviour or because of the lack of access to production resources. Hamilton (2004) views the agri-food system democracy as a system that acknowledges and reflects the interests of all agri-food system segments by involving and representing them in decisions; informs and educates the voters and the consumers; promotes diversity of foods and experiences and creates new opportunities for farmers, consumers, and food marketers through a proliferation of food, markets, farms, and food processors and opportunities for consumer satisfaction and education; considers local alternatives and opportunities as well as role and responsibility of each citizen, caters for local farms, support markets with a wide range of foods and appreciates the role food plays in culture and tradition.

Broadly, agri-food system democracy falls into two categories: procedural and substantive. The procedural dimension entails participatory processes that create spaces for debate, negotiation, and resistance, causing social change through the top-down development of policies and associated legislation, or bottom-up engagement in grassroots activities, including boycotts, protests, and positive actions such as identification of alternatives, institutional innovation, and civil usurpation (Friedrich et al. 2019). For Friedrich et al, the substantive dimension focuses on achieving a substantive outcome of sustainability, involving caring agricultural politics and practices that conserve the environment, ensure animal wellbeing, and promote intra and intergenerational justice and equal opportunities and dignified living conditions for all.

Dimensions of agri-food system democracy can also be classified into five categories. One of these dimensions is collaborating toward food system sustainability, which entails collective action by and among organizations to achieve sustainability in terms of ecological soundness, economic viability, and social justice and welfare (Hassanein, 2008; 2003). Food democracy involves not only collaborative participation but also meaningful participation. Hassanein categorises meaningful participation into four dimensions of agri-food system democracy, namely: having the knowledge necessary to participate effectively, sharing ideas and engaging in deliberation, being able to determine their relationship to food and public work by citizens to address and solve community food problems, and orientation toward the community or public good, which involves caring about the human and non-human communities.

Institutional framework of organic agriculture and agri-food system democracy. While organic agriculture is discredited for being less productive (Reddy et al. 2022; Canwat et al. 2020; Bhardwaj and Dhiman, 2019), the production system plays many other significant roles. In addition to providing more nutritious and safe foods (Das et al. 2020; Patle et al. 2020; Thakur et al. 2022; Reddy et al. 2022), ensuring a safe, and healthy working environment (Yadav, 2017; Asfaw et al. 2010; Forman et al., 2012), conserving the natural environment (Lori et al., 2017; Niggli, 2015; Reganold and Wachter, 2016; Reddy et al. 2022), increasing productivity in the low-input agricultural system (Reddy et al. 2022; Bolwig et al. 2009); organic agriculture promotes agri-food system democracy. Its institutional frameworks democratise the agri-food system by integrating traditional knowledge in agricultural production, promoting the participation of women and other community members, and integrating organic producers into the market and organic agriculture agenda in the policy framework.

Organic institutions and institutional arrangements promote the co-existence of traditional and scientific knowledge in several ways. For example, the organic agriculture movement in Bangladesh promoted the incorporation of cultural values into organic farming (Ferdous et al. 2021). Kultursaat, a German-based association of independent biodynamic vegetable breeders, integrates traditional and scientific knowledge in developing organic seed varieties (Sievers-Glotzbach et al. 2020). Sievers-Glotzbach et al also found a similar initiative in MASIPAG, a farmer-led network in the Philippines that integrates the traditional knowledge from farmers with scientific knowledge of crop breeders to develop new organic seed varieties. Norms of the International Federation of Organic Agriculture Movement also stress that the organic material of any source should come from the farm or the local area (IFOAM, 2014). Organic agricultural standards or regulations and rules provide incentives for scientific innovations (Forster et al., 2012). Organic agriculture combines

tradition, innovation, and science to benefit the shared environment and promote fair relationships and good quality of life for all involved (IFOAM, 2010). It uses traditional knowledge to improve, adapt, and respond to economic and local conditions, ecology, and culture (Das et al. 2020; Forster et al., 2013; IFOAM, 2005; Scialabba, 2015). This knowledge is denoted by a high plant, animal, and structural diversity, use of a wide range of microclimates, dependence on local resources, and crop varieties (Altieri and Nicholls, 2017). However, the use of local resources faces challenges of biomass shortages, high labour requirements, and inappropriate organic input marketing (Das et al. 2020; Reddy et al. 2022).

Organic promoters and movements as well as the participatory guarantee system of organic certification encourage and promote group formation (Canwat and Onakuse, 2022; Ferdous et al. 2021), which expands farmers' participation in matters concerning them. They promote group membership because technical and legislative difficulties associated with organic production and marketing require collective actions (Pugliese, 2001). For example, groups are formed to facilitate certification (May 2019; Nelson et al. 2016; Canwat and Onakuse, 2022). The organic certification system that greatly increases group membership is a participatory guarantee system. It engages producers in certification, farm visits, and decision-making (Rodrigues et al. 2021; May 2019; Canwat and Onakuse, 2022). Das et al. (2020) also observed that organic agriculture promotes the full participation of rural communities, which enhances their confidence and mental health.

Organic agriculture promotes women's participation for many reasons. Firstly, organic standards encourage manual methods of land preparation, weed control, and other operations (IFOAM, 2014; EC, 2008) that are labour-intensive (Inkoom, 2017; Farnworth and Hutchings, 2009). This tends to increase women's participation relative to that of men because of Farnworth and Hutchings' observation that women are more involved in hand labour operations and organic labour-intensive production. Secondly, some non-governmental organizations working in Kenya and Bangladesh promote women's participation in organic agriculture as a means of ensuring their economic empowerment and increased role in society respectively (Ferdous et al. 2021; Canwat et al. 2020). Thirdly, organic farming creates more women-friendly spaces than non-organic agriculture (Farnworth and Hutchings, 2009). This is because organic certification promotes the formation of groups that Farnworth and Hutchings consider as platforms for capacity building, the exchange of ideas, and accessing other benefits that encourage the participation of women. Fourthly, organic agriculture increases women's agency by enhancing their self-esteem, access to opportunities and financial services, and participation in decision-making and farming activities (Farnworth and Hutchings, 2009). Lastly, organic agriculture also promotes gender equality in labour (Das et al. 2020). Particularly, women are more likely than men to participate in organic horticulture in the U.S., U.K., Denmark, Norway, Germany (Sachs, 2006), and Nepal (Pradhan et al. 2016). However, market-oriented organic agriculture has mixed effects on women. For example, a shift from local to export marketing of organic mango in Burkina Faso created new employment for women but reduced their marketing opportunities and access to assets because women play limited marketing roles (Farnworth and Hutchings, 2009). Most women farmers are smallholders who cultivate traditional food crops for subsistence and sale, whereas men are more likely to own medium to large commercial farms and are better able to capitalize on the expansion of agricultural tradable goods¹. Farnworth and Hutchings attribute the limitation of women to access better markets to many disadvantages, including lower mobility, less access to training,

less access to market information, and less access to productive resources.

The individual third-party organic certification mechanism subjects producers to an expensive and stringent certification process, which creates obstacles for small farmers. However, an innovative organic certification mechanism such as a participatory guarantee system and group-based third-party certification or internal control system eased these constraints. While an internal control system facilitated access of smallholders in low-income countries to export organic markets (Meinshausen et al. 2019; Steidle and Herrmann, 2019), a participatory guarantee system increased access to the domestic organic market (Hruschka et al., 2021; Nelson et al. 2016; Canwat and Onakuse, 2022). Organic certification also facilitates access to the financial market. For example, a Thai microfinance institution (MFI) recognizes organic certification and contracts with buyers as loan collateral (Setboonsarng and Parpiev, 2008). Setboonsarng and Parpiev report that several microfinance institutions also integrate sustainability concerns into their services.

The integration of organic agriculture into the policy framework depends on the state policies on organic agriculture and strategies organic movements adopt toward the state. In India, for example, organic agriculture benefited from favourable government policy because the state embraced organic agriculture (Ferdous et al. 2021). Concerning strategies of organic movements, some groups engage with state programmes, others oppose government control of the organic movement (Farnworth and Hutchings (2009). The third group holds a deep ecology view combined with concerns for social justice while cooperating with the state (Fritz et al. 2021). Groups that cooperate with the state promote the integration of organic into the policy framework. For example, public organic certification in Denmark was introduced following close cooperation with the organic movement (Michelsen, 2001). Organic movements have also sought political recognition of organic farming and the legal protection of organic produce (Moschitz, 2009). In Kenya, the effort to integrate

organic agriculture into the policy framework led to the establishment of an organic agriculture desk at the Ministry of Agriculture and the drafting of the National Organic Agriculture Policy (Ozor and Nyambane, 2021).

Research methods

Research approach and design. Following Canwat and Onakuse (2022), the paper adopted a mixed method, but the quantitative method is dominant. The quantitative method used a quasi-experimental design. The qualitative method used the explanatory case study. This is because it explains causal links in real-life interventions Yin (2003). The mixed method was chosen to extend the range of inquiry and meet the complementarity objective.

Operationalization and measurement of variables. The conceptual framework shown in Fig. 1 formed the basis for operationalizing variables. In the process of operationalization, abstract concepts (dimensions of agri-food system democracy) presented in the conceptual framework were turned into measurable observations or variables. The dimensions of agri-food system democracy were operationalized into constructs. From these constructs, variables were generated. As Table 1 shows, the variables were measured as binary. When observations on a particular variable were true, they were labeled as one (1), otherwise, they were labeled as zero (0). For example, collaboration towards the common good is one of the dimensions of agri-food system democracy, which was operationalized into community participation (construct) from a variable group membership generated. The group membership was then measured as a binary with having group membership being one and having no group membership being zero. The binary measurements were then subjected to descriptive statistics and propensity score matching analysis.

Table 1 Operationalisation of agri-food system democracy dimensions.

Dimensions of agri-food system democracy	Constructs	Variables	Measurement
Collaboration towards common good	Community participation:	Group membership	Farmer is a group member = 1; 0 otherwise
Orientation towards common good	Environmental conservation	Exclusion of inorganic inputs	Exclude inorganic inputs = 1; 0 otherwise
	Integrating and empowering socially disadvantaged	Women inclusion	Farmer is a woman = 1; 0, otherwise
Knowledge of food and the food system	Scientific knowledge	Access to extension services	Received extension services in last 1 year = 1; 0 otherwise
	Experiential knowledge	Peer-learning	Group conducts peer learning = 1; 0 otherwise
Efficacy towards food system sustainability			
Efficacy: Bringing change at regime or niche level	Bringing change in production practices	Integration of traditional knowledge	Use local materials = yes; 0 otherwise
		Market integration	Receive price premium = 1; 0 otherwise
	Policy integration	Access to lucrative markets	Sell under formal contract = 1; 0 otherwise
		Access to secure market	Has access to credit services = 1; 0 otherwise
Efficacy: Replicating & diffusing innovations	Institutional innovations	Access to financial services	Participate in policy formulation = 1; 0 otherwise
		Participation in policy formulation	Official organic policy exists = 1; 0 otherwise
		Existence of official organic agriculture policy	Use innovative certification system = 1; 0 otherwise
		Adoption of innovative certification systems	



Fig. 2 Map of Kenya. The map shows the location of the study areas and how the study areas are located with respect to Nairobi City, the main market for organic products.

Data collection. Data were mainly collected from macadamia and vegetable value chains in five counties of Bungoma, Kajiado, Kiambu, Machakos, and Muranga, as shown in Fig. 2. While data collection in vegetable value chains took place in Bungoma, Kajiado, Kiambu, and Machakos, the exercise in the macadamia value chain was limited to Kiambu and Muranga. The counties were selected because they are the main suppliers of organic macadamia and vegetables in Kenya. The choice of these value chains was driven by the fact that macadamia is a better representation of perennial organic agriculture and vegetables are the most crops grown by organic producers.

Using the Krejcie and Morgan Sampling Method/Table (Krejcie & Morgan (1970), two samples of 335 vegetable producers and 201 macadamia producers were generated. However, data for 1 vegetable and 2 macadamia producers were dropped because of incompleteness, leaving the samples with 334 (222 organic and 112 non-organic) vegetables and 199 (107 organic and 92 non-organic) macadamia producers. The samples were drawn using stratified sampling. Using a geographical criterion, four strata of vegetable producers corresponding to Bungoma, Kajiado, Kiambu, and Machakos Counties, and two strata of macadamia producers corresponding to Kiambu and Muranga Counties were generated. Respondents in each stratum were randomly picked from a list of organic farmers obtained from organic promoters. Non-organic producers were selected

through a simple random sampling by picking a non-organic farmer nearest to the organic producer. Questionnaires were used to generate quantitative data and the qualitative data were collected using interviews with stakeholders listed in Appendix 1. Secondary data sources included research papers and government documents. In every primary data collection exercise, prior consent was sought from the respondents before proceeding with the exercise.

Data analysis. To analyse quantitative data, a propensity score matching model was used to assess differences in targeted variables between similar comparison groups of organic and non-organic producers. The model was chosen to address the bias of binary outcome models. Using these models to assess how target variables differ between organic and non-organic farmers is flawed by endogeneity bias. The bias renders comparison groups of non-organic (control) and organic (treated) farmers dissimilar because the control and treated differ not only in terms of treatment assignment mechanism but also concerning omitted factors. The omitted factors are relegated to the error terms, rendering the estimates unreliable because they are asymptotically inconsistent;

$$E(Y_1|t = 1) - E(Y_0|t = 0) = ATE + Bias \quad (1)$$

Where $E(Y_1|t=1)$ are outcomes of the treated units; $E(Y_0|t=0)$ are outcomes of control units and ATE is the average treatment effect on the overall study population.

Similar comparison groups of organic and non-organic producers were created by matching using their propensity scores. Three matching algorithms: near neighbor, caliper, and kernel were used. The scores were estimated using the logit model, following Benedetto et al. (2018) and Austin (2011). The choice of i individuals to become organic producers or not (y_i) depends on a latent variable y_i^* , which is a function of covariates (x_i).

$$y_i = \begin{cases} 1, & \text{if } y_i^* = \beta x_i + \varepsilon > 0 \\ 0, & \text{if } y_i^* = \beta x_i + \varepsilon \leq 0 \end{cases} \quad (2)$$

Where, ε is the error term ($\varepsilon \sim N(0, \sigma^2)$), β is a model coefficient, x_i are variables that affect or determine the decision to become organic producer or not.

Results

Integrating traditional knowledge into agriculture. Organic agriculture is revitalising the traditional form of agriculture, which declined following the introduction of agrochemicals and other technologies. Organic producers practice mixed farming and cropping, organic manure, and pesticides. Table 2 shows that organic vegetable production increases the use of manure and organic pesticides but reduces the use of inorganic fertilizers. For making bio-pesticides, organic producers use local materials such as Sodom apple, *Biden pilosa*, red pepper, red onions, garlic, Mexican marigold, Tithonia, and ash (Field Survey).

While organic agricultural practices are traditional in nature, they are ecologically and economically sound. Mixed farming, for example, promotes proper utilization of local materials as

livestock wastes are consumed by crop enterprises, and crop residues used are by livestock enterprises. The practice can improve nutrient cycling while reducing chemical inputs and generate economies of scope at the farm level (Ryschawy et al. 2012). Mixed farming and cropping also provide insurance against risks of unfavourable climatic conditions, pests, and diseases because a shock to one enterprise can be cushioned by another enterprise. The use of local materials is also cheaper, but it is sometimes less effective in controlling pests and diseases.

Organic agriculture and participation of local actors in Kenya.

Organic agriculture increases participation in collective activities. This is even higher among women than men. Table 3 shows that group membership of all farmers and women is 50 and 30 percent higher among organic than non-organic vegetable producers respectively. Non- governmental organisations organise organic producers into groups and build their capacity. The groups then participate independently in peer-learning activities and savings schemes.

Organic producers also act together with other stakeholders in their certification process. They review the compliance of their peers to organic standards and constitute an external inspection team, which conducts compliance with organic standards annually (IFOAM, 2013). As an organic farmer noted, “Inspections of organic farms for certification are done by group representatives, but the inspection guides are drawn by Kenya Organic Agriculture Network (KOAN)”. However, “KOAN, extension staff, and group members verify the inspections”, said the farmer. While participation is higher among domestic market suppliers, it is limited among suppliers of exporters. The producers lack independent group activities and governance structures. They are just assigned to clusters having no leadership structure, except co-opted representatives.

Table 2 Fertilization and pest control by organic and non-organic producers.

Variables	Matching method	Organic	Non-organic	Difference	S.E
Use manure	Near neighbor	0.80	0.36	0.44***	0.09
	Radius caliper	0.80	0.36	0.44***	0.09
	Kernel	0.80	0.36	0.44***	0.07
Use inorganic fertilizers	Near neighbor	0.00	0.83	-0.83***	0.05
	Radius caliper	0.00	0.83	-0.83***	0.05
	Kernel	0.00	0.80	-0.80***	0.05
Use organic pesticides	Near neighbor	0.38	0.00	0.38***	0.04
	Radius caliper	0.38	0.00	0.38***	0.05
	Kernel	0.38	0.00	0.38***	0.05

Notes: S.E are bootstrapped standard errors. These are standard errors estimated by the bootstrap method.
 *** Indicates statistical significance at 0.01 level.

Table 3 Group membership and collective action in marketing.

Variables	Matching method	Organic	Non-organic	Difference	S.E
Group membership = 1; 0 otherwise	Near neighbor	0.94	0.50	0.44***	0.10
	Radius caliper	0.94	0.50	0.44***	0.08
	Kernel	0.94	0.47	0.47***	0.05
Group member is a woman = 1; 0 otherwise	Near neighbor	0.65	0.30	0.35***	0.075
	Radius caliper	0.66	0.21	0.45***	0.096
	Kernel	0.65	0.31	0.34***	0.071
Group member is a man = 1; 0 otherwise	Near neighbor	0.28	0.16	0.12**	0.050
	Radius caliper	0.28	0.20	0.08	0.067
	Kernel	0.29	0.15	0.14**	0.044

Notes: S.E are bootstrapped standard errors. These are standard errors estimated by the bootstrap method.
 NGO non-governmental organizations, org organic.
 ** Indicates statistical significance at 0.05 level.
 *** Indicates statistical significance at 0.01 level.

Table 4 Access to market by organic and non-organic producers.

Variables	Matching method	Organic	Non-organic	Difference	S.E
Price of macadamia (Access to premium market)	Near neighbor	98.67	89.63	9.04***	2.71
	Radius caliper	98.67	89.63	9.04***	2.65
	Kernel	98.64	90.15	8.50***	2.62
Formal contract in Macadamia (access to secure market)	Near neighbor	0.88	0.54	0.34***	0.11
	Radius caliper	0.88	0.54	0.34***	0.11
	Kernel	0.89	0.49	0.40***	0.10
Access to inputs from buyers in macadamia	Near neighbor	0.89	0.57	0.32***	0.10
	Radius caliper	0.89	0.57	0.32***	0.10
	Kernel	0.90	0.49	0.41***	0.08
Access to transport services from buyers in macadamia	Near neighbor	0.89	0.65	0.24**	0.10
	Radius caliper	0.89	0.65	0.24**	0.10
	Kernel	0.90	0.57	0.33***	0.09
Formal contract in vegetable	Near neighbor	0.03	0.02	0.01	0.02
	Radius caliper	0.03	0.02	0.01	0.02
	Kernel	0.03	0.03	0.00	0.02

Notes: S.E are bootstrapped standard errors. These are standard errors estimated by the bootstrap method.
 ** Indicates statistical significance at 0.05 level.
 *** Indicates statistical significance at 0.01 level.

Table 5 Access to market by organic and non-organic producers.

Outcome variable	Matching method	Organic	Non-organic	Difference	S.E
Savings group membership	Near neighbor	0.78	0.34	0.44***	0.07
	Radius caliper	0.78	0.34	0.44***	0.08
	Kernel	0.78	0.33	0.45***	0.06
Access to credit (Taken credit in the last 1 year = 1; 0 otherwise)	Near neighbor	0.82	0.49	0.33***	0.06
	Radius caliper	0.82	0.49	0.33***	0.05
	Kernel	0.82	0.49	0.33***	0.07
Women taken credit in the last 1 year = 1; 0 otherwise	Near neighbor	0.55	0.26	0.29***	0.071
	Radius caliper	0.52	0.17	0.35***	0.078
	Kernel	0.57	0.27	0.28***	0.058
Men taken credit in the last 1 year = 1; 0 otherwise	Near neighbor	0.23	0.15	0.08*	0.047
	Radius caliper	0.23	0.18	0.05	0.062
	Kernel	0.23	0.14	0.09**	0.042

Notes: S.E are bootstrapped standard errors. These are standard errors estimated by the bootstrap method.
 * Indicates statistical significance at 0.1 level.
 ** Indicates statistical significance at 0.05 level.
 *** Indicates statistical significance at 0.01 level.

Organic agriculture and market integration in Kenya

Product Market Integration. Organic agriculture increases access to secure and premium markets. Table 4 shows that access to secure and premium markets is 9 and 34 percent higher among organic than non-organic macadamia producers, but similar between organic and non-organic vegetable producers.

The asset-specificity of organic farming requires formal contracting to maintain the integrity of the organic value chain. The formal contracting by companies in the macadamia value chain facilitates access of smallholder producers to inputs and transport services. Table 4 shows that access to inputs and transport services are 32 and 24 percent higher among organic than non-organic producers respectively. The adoption of a group certification mechanism also facilitated access to secure and premium markets. The group certification mechanism is much cheaper than the non-group third-party certification system (Canwat and Onakuse, 2022). The reduced certification cost made it cheaper and more affordable for companies buying organic products to cover certification costs for smallholder producers.

Financial market integration. Organic agriculture increases access to financial services. Table 5 shows that credit access is 49 percent higher among organic than non-organic producers. Table 5 also shows that credit access by women is 27 percent higher among

organic than non-organic producers. Organic agriculture increases access to financial services because it facilitates savings and credit schemes. The

participatory guarantee system of organic certification promotes group formation and builds trust, which provides platforms and enforcement mechanisms for operating the schemes. The higher women’s access to financial services is attributed to their higher group membership.

Organic agriculture and access to extension services. Organic conversion increases access to extension services. As Table 6 shows, organic conversion increases access to extension services of macadamia and vegetable producers by 36 and 30 percent respectively. However, access varies by gender, value chain, and source.

Organic conversion has a negligible effect on access to public extension services but increases access to extension services from profit and non-profit organisations. Table 6 shows an insignificant difference between organic and non-organic producers of macadamia and vegetables concerning access to public extension services, but access to extension services from non-governmental organisations (NGOs) and buyers is 31 and 26 percent higher among organic than non-organic producers of vegetables and macadamia respectively. NGOs provide extension services to vegetable producers to facilitate their adoption of organic

Table 6 Access to extension services by organic and non-organic producers.

Variables	Matching method	Macadamia				Vegetables			
		Organic	Non-org	Difference	S.E	Organic	Non-org	Difference	S.E
Access to extension service	Near neighbor	1.00	0.64	0.36***	0.09	0.93	0.63	0.30***	0.07
	Radius caliper	1.00	0.64	0.36***	0.09	0.93	0.63	0.30***	0.07
	Kernel	1.00	0.65	0.35***	0.08	0.93	0.58	0.35***	0.07
Access to extension services from buyer	Near neighbor	0.87	0.61	0.26***	0.09	0.02	0.07	-0.05	0.04
	Radius caliper	0.87	0.61	0.26**	0.10	0.02	0.07	-0.05	0.03
	Kernel	0.88	0.62	0.26***	0.08	0.02	0.06	-0.04	0.04
Access to extension service from NGO	Near neighbor	0.04	0.03	0.01	0.04	0.70	0.39	0.31***	0.08
	Radius caliper	0.04	0.03	0.01	0.03	0.70	0.39	0.31***	0.09
	Kernel	0.03	0.03	0.00	0.03	0.70	0.37	0.33***	0.07
Access to public extension service	Near neighbor	0.05	0.01	0.04	0.03	0.34	0.35	-0.01	0.09
	Radius caliper	0.05	0.01	0.04	0.03	0.34	0.35	-0.01	0.08
	Kernel	0.05	0.04	0.01	0.03	0.34	0.34	0.00	0.07
Gender-based access to extension services by organic and non-organic producers									
Access to extension services by women	Near neighbor	0.25	0.14	0.11	0.08	0.58	0.33	0.25***	0.09
	Radius caliper	0.25	0.09	0.16*	0.09	0.54	0.28	0.26***	0.09
	Kernel	0.22	0.10	0.12*	0.07	0.58	0.32	0.26***	0.06
Access to extension services by men	Near neighbor	0.76	0.50	0.26**	0.12	0.25	0.22	0.03	0.06
	Radius caliper	0.75	0.51	0.25*	0.13	0.28	0.26	0.02	0.08
	Kernel	0.78	0.54	0.24***	0.08	0.25	0.18	0.07	0.04

Notes: S.E are bootstrapped standard errors. These are standard errors estimated by the bootstrap method.
 NGO non-governmental organizations, org organic.
 * Indicates statistical significance at 0.1 level.
 ** Indicates statistical significance at 0.05 level.
 *** Indicates statistical significance at 0.01 level.

practices. For organic buyers, extension services facilitate compliance with organic standards and export requirements. However, no additional public extension service is required following organic conversion.

Access to extension services by both men and women sharply contrasts between macadamia and vegetable producers. Table 6 shows that access to extension services by men and women growing macadamia are respectively 24 and 12 percent higher among organic than non-organic producers. In contrast, the access of men and women growing vegetables are respectively 0.07 and 26 percent higher among organic than non-organic producers.

Organic agriculture and policy integration. Organic movements facilitated the integration of organic agriculture into the policy framework in Kenya by contributing to the development of organic standards and a participatory guarantee system of organic certification and lobbying for and drafting the National Organic Agriculture Policy. KOAN participated in the development of participatory guarantee systems and East African Organic Products Standards (Director of Kenya Institute of Organic Farming; Employee of Kenya Organic Agriculture Network). KOAN and other civil society organisations also enforce compliance with organic standards by conducting farm inspections annually (Employee of the Community Sustainable Agriculture and Healthy Environmental Programme; Group member of Ngong Organic Farmers Association). “We lobbied and participated in the development of the draft National Policy” (Director of Kenya Institute of Organic Farming). However, the draft National Organic Policy had remained in the draft form for too long (Director of Kenya Institute of Organic Farming; Employee of Kenya Organic Agriculture Network).

Discussion and conclusion

How organic agriculture promotes agri-food system democracy was analyzed. The analysis compared organic and non-organic agriculture concerning the integration of local knowledge, participation of local actors, market integration, and policy integration. The results show that organic conversion increases the

integration of traditional production knowledge, participation of local actors, access to extension services, and integration into the market and policy framework.

Organic conversion increased the integration of traditional production knowledge by promoting the use of local materials (Table 2). Table 2 shows that organic vegetable production increases the use of manure and organic pesticides, but reduces the use of inorganic fertilizers. The findings are expected and highlight the typical practices of organic agriculture. Because organic agriculture prohibits the use of synthetic or inorganic fertilizers, organic producers rely mainly on manure and other local materials for maintaining soil fertility and controlling pests and diseases. These observations are in line with Reddy et al. (2022) and Das et al. (2020). Reddy et al reported the use of local materials such as cow dung, cow urine, nicotine, and other plants- and animal-based inputs for producing organic pesticides and fertilizers in India. Das et al observed that organic farming uses indigenous techniques that have been practised in a wide range of rural and farming communities in India over the millennium. The use of local materials in organic production in Kenya and India suggests a similarity in organic agricultural practices in developing countries. In terms of the agri-food system democracy, using local materials is important in three major ways. Firstly, it reduces dependence on external inputs. Secondly, it promotes the conservation of local knowledge and its coexistence with scientific knowledge. Thirdly, it promotes ecological inclusiveness and plurality because its less harmfulness to living organisms permits the co-existence of living and non-living components of the ecosystem.

The organic intervention also promotes the participation of organic producers in their development activities by organizing them into groups (Table 3). The group composition of women is even higher than that of men (Table 3). Group membership is higher among organic than non-organic producers because organic agriculture promotes group formation as a means of facilitating organic certification. This is especially true for the internal control system and participatory guarantee system of organic certification,

which are group-based and the predominant certification mechanisms. These observations are in line with May (2019) and Nelson et al. (2016). May and Nelson et al view groups and networks as a means of ensuring the organic integrity of the participatory guarantee system, promoting compliance with organic standards, and reducing the organic certification cost. The higher group composition of women also concurs with Farnworth and Hutchings (2009) who found higher participation in organic agriculture among women than men. The increased participation of organic producers empowers them by building their capacity and giving them voices on issues that affect them. Women are especially more empowered than men because they have a higher group composition and are often marginalized in the rural setting.

Innovative organic certification mechanisms, notably, the group certification systems based on an internal control system facilitated access to the premium and secure product market (Table 4). The innovative organic certification takes place under the formal contract between organic producer groups and certifiers (organic buyers). The formal contracting with organic producers also facilitated access to production inputs and marketing services (Table 4). This finding concurs with Meinshausen et al. (2019) and Steidle and Herrmann (2019) who report that the internal control system facilitates access of smallholders in low-income countries to export organic markets. The finding is also in line with Prowse (2012). Prowse considers contract farming a source of numerous opportunities for farms, including access to a reliable market; guaranteed and stable pricing structures; and access to credit, inputs, production, and marketing services such as seed, fertiliser, training, extension, transport, and even land preparation. The innovative certification mechanism promotes the agri-food system democracy because it facilitates market participation of all categories of organic producers, namely: small-scale, medium-scale, and large-scale farmers. While group certification facilitates access of smallholder producers to premium markets, group members lack the freedom to sell their products individually because all members are obliged to sell their produce in one lot and the certification certificate is owned and controlled by the organic certifier. Although the production contracts associated with group certification facilitate access to production inputs, technical, marketing, and logistical support, and other services, they are often stringent and likely to exclude other smallholder producers.

Organic agriculture also facilitates access to financial services (Table 5). In terms of gender, women have higher access to financial services than men (Table 5). The finding concurs with Farnworth and Hutchings (2009). Farnworth and Hutchings observed increased access to opportunities and financial services by women upon organic conversion. Organic agriculture facilitates access to financial services because the participatory guarantee system of organic certification promotes group formation and regular meetings, which provide a platform and an enforcement mechanism for operating group saving schemes. This observation is in line with Kamau et al. (2018) who link social networks in Kenya to credit access. Regarding the rural financial market, organic agriculture promotes agri-food system democracy in two main ways. Firstly, it promotes inclusivity in the rural financial market by facilitating access of both men and women as well as the poor to financial services. Organic agriculture facilitates access to rural financial services by easing constraints such as limited and asymmetric information as well as lack of collateral that often befall women and the poor in rural areas of developing countries. Secondly, the group saving schemes that are supported by organic agricultural practices facilitate the mobilization of local financial resources and reduce dependence on external financial sources, which often have unfavourable terms and conditions.

Organic conversion increases access to extension services from profit and non-profit organizations (Table 6). While access to extension services is higher among women than men in vegetable production, it is lower among women than men in macadamia production. There is higher access to extension services from profit and non-profit organisations because these organisations provide extension services to ensure compliance with organic standards and export requirements. The access of vegetable producers to extension services is higher among women than men because women have a higher participation in vegetable production than men. However, the access of macadamia producers to extension services is lower among women than men because women have a lower participation in macadamia production than men. The higher access to extension services from profit and non-profit organizations supports observations of Paull (2019), Mitusova and Buyvolova (2017), and Schwindenhammer (2016) that the development of organic agriculture has occurred with significant private support, but limited public intervention. For vegetable producers, the higher women's access to extension services is in line with Sachs's (2006) finding that women are more likely to adopt organic horticultural production methods than men. The lower women's access to extension services by women among macadamia producers supports the findings of Farnworth and Hutchings (2009) and Oduol et al. (2017) that women tend to have lower participation in the organic export market and high-value agricultural chains than men. The finding shows that organic agriculture contributes to the agri-food system democracy by increasing the agri-food system knowledge through the provision of extension services. However, the local market-oriented production is more democratic than the export-oriented production because it integrates more marginalized members of the society, notably: women. Therefore, the finding echoes the obstacles that women face in accessing high-value agricultural chains and their associated benefits, including extension services and credits.

Organic movements contributed to the policy integration of organic agriculture. Kenya Organic Agriculture Network (KOAN) and other organisations participated in developing organic standards and a participatory guarantee system and in the drafting of the National Organic Agriculture Policy. These findings are consistent with the observations of Ozor and Nyambane (2021) that KOAN and other non-governmental organisations played significant roles in drafting the National Organic Policy. They also credit KOAN for being instrumental in developing and implementing the East African Organic Mark and Product Standards, other national organic standards, and the Participatory Guarantee Systems of certification. Taylor (2006) also observed that KOAN and the Kenya Institute of Organic Farming developed their organic standards, which informed the development of the Kenya National Organic Standards. The finding demonstrates that organic agriculture movements significantly contributed to the agri-food system democracy in Kenya by promoting and advocating for the integration of organic agriculture into the policy framework. However, their efforts have been frustrated by the slow approval of the Draft National Organic Agriculture Policy. While the process of integrating organic agriculture into the policy framework has been participatory and democratic, the agricultural policy remained undemocratic because the Kenya National Organic Agriculture Policy has not been approved since 2015 and the agriculture sector is still predominantly being inspired and regulated by the conventional agricultural principles and policies respectively.

In sum, the study implies that supporting organic agriculture can promote agri-food system democracy because it integrates traditional and scientific knowledge into agricultural production, increases the participation of community members and women in

activities that affect them, and access to all categories of farmers (women, men, small or big) to extension services, product market, and financial services. These effects of organic agriculture have been mediated by private-led institutions and institutional arrangements. Organic promoters also contributed significantly to the policy integration of organic agriculture by participating in the development of organic standards and certification and drafting the National Organic Agriculture Policy. However, the organic policy has remained in draft form for too long. This undermines the inclusiveness of the agricultural policy and development of the organic sector. Thus, there is a need for more advocacies for the government to speed up the approval of the organic policy. There is also a need to broaden the organic policy scope by providing incentives to farmers for adopting organic agricultural practices. The incentives should be provided as policy support or compensation for the provision of public goods. Organic farmers need this support because prices of organic products often do not or inadequately convey the value of public goods provided by organic farming due to problems of externalities. The policy support should be coupled with public goods assessment so that incentives provided are proportional to the value of public goods supplied.

Nevertheless, the paper has two major contributions to food politics. Firstly, it broadens our understanding of food democracy in developing countries. This is because “the majority of scholarly contributions to food democracy focus on Western countries, while the countries of the Global South rarely appear” (Bornemann and Weiland, 2019). Secondly, it contributes to the existing debate on food democracy. The scholarly contributions to the existing debate on food democracy fall into three broad categories, namely: “elaborating and differentiating food democracy”; “exploring and pushing food democracy in conceptual and empirical terms” and “challenging and enlarging food democracy” (Bornemann and Weiland, 2019:5). This paper contributes to the first category of debate by broadening our understanding of the democratic potential of the alternative agri-food system.

Data availability

The datasets used in this study is available online at: <https://doi.org/10.7910/DVN/GKXOTP>.

Received: 4 September 2022; Accepted: 10 October 2023;

Published online: 27 November 2023

Note

1 Refer to Farnworth and Hutchings (2009)

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Author contributions

VC conducted data collection, data analysis, and manuscript writing and OS guided the conception of the paper, data collection, data analysis, drafting, and editing of the paper.

Funding

This study was funded by the Education, Audiovisual, and Culture Executive Agency of the European Commission.

Competing interests

The authors declare no competing interests.

Ethical approval

Ethical approval was not required as the study did not involve human participants. In addition, participants' data were deidentified and only analysed for the purposes of this study.

Informed consent

For every individual interviewed, informed consent was sought. The informed consent was verbal, and it was sought using this script: "The researcher is interested in your knowledge and experience as a key stakeholder in organic agriculture. The purpose of the study is to assess how organic agriculture contributes to sustainable development. Your participation will involve responses to interview questions that will last between 30–60 minutes. This research will benefit the academic community because it helps us to understand the contribution of organic agriculture to sustainable development. Please know that everything will be done to protect your privacy. Your identity or will not be disclosed in any publication that may result from the study. Would it be okay to begin with my questions?".

Additional information

Supplementary information The online version contains supplementary material available at <https://doi.org/10.1057/s41599-023-02236-2>.

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