Workshop Proceedings
The True Cost of Food

The True Cost of Food:

Policies for Sustainable Production of Coffee and other Export–oriented Crops in East Africa

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The authors of the respective chapters of this proceedings are mentioned in each of the chapters and are gratefully acknowledged.

May the insights gained through the Workshop inspire continued collaboration and meaningful reform within our food systems.

A FOREWORD

Bernard Bashaasha, Rosemary Isoto, Joachim von Braun

It gives us great pleasure to present the proceedings of the workshop on True Cost of Food, a timely and thought-provoking engagement that brought together scholars, practitioners, policymakers, private sector actors, and development partners to reflect on the real costs embedded in our food systems.

Food systems are central to human wellbeing, economic development, and ecological stability. Yet the prices paid for food in domestic and international markets do not reflect the full range of costs generated along agricultural value chains. Social and environmental externalities, such as child labour, inadequate remuneration of workers, occupational health risks, greenhouse gas emissions, soil degradation, water depletion, and biodiversity loss, remain largely invisible in market transactions. These hidden costs are borne by children, workers, farming households, ecosystems, and future generations rather than by consumers or market actors who benefit most directly from global food trade.

This imbalance is particularly pronounced in export-oriented agricultural systems. In many low- and middle-income countries, agricultural exports are a cornerstone of economic growth, foreign exchange earnings, and rural livelihoods. Crops such as coffee, tea, horticultural products, and oilseeds connect millions of smallholders in Africa to international markets. However, the social and environmental consequences of producing these commodities are often concentrated in exporting regions, while consumers and policymakers in importing countries remain largely detached from the indirect costs of production. As a result, the global agri-food system continues to generate prosperity and affordability at the expense of social equity and environmental sustainability.

The proceedings presented in this volume emerge from years of research presented at a two-day international workshop dedicated to examining these challenges through the lens of True Cost Accounting (TCA). The conference brought together research insights, policy perspectives, and practical experiences to explore how externalities in export-oriented agricultural value chains can be identified, measured, and ultimately internalized. With a regional focus on Eastern and Southern Africa, the workshop created a platform for dialogue among researchers, policymakers, practitioners, and value-chain actors committed to transforming agri-food systems in line with sustainability objectives.

Rethinking Value in Global Food Systems

At the core of the conference was a shared recognition that prevailing product prices convey incomplete and misleading signals. When social and environmental costs are excluded from prices, production and trade decisions systematically favour practices that undermine long-term resilience. Child labour, for

example, may reduce short-term production costs but imposes lifelong consequences on children's education, health, and future income prospects. Environmental degradation such as soil mining or deforestation may temporarily boost yields or export volumes while eroding the natural resource base on which agriculture depends.

True Cost Accounting offers a structured approach to confront this problem. By systematically identifying, quantifying, and, where possible, monetizing externalities, TCA makes visible what is otherwise hidden. Importantly, the conference acknowledged that not all externalities can or should be fully expressed in monetary terms. Certain social harms, particularly those affecting human dignity and fundamental rights, resist reduction to financial metrics.

Participants explored how TCA can complement existing sustainability instruments, such as certification schemes, due-diligence regulations, and voluntary corporate commitments, while also highlighting their limitations. These proceedings with the concluding statement reflect a growing consensus that incremental improvements are insufficient and that deep structural changes are required to realign incentives across global value chains.

The proceedings also highlight how accounting for these true costs could alter perceptions of competitiveness and efficiency in international trade. When externalities are considered, some export systems that appear economically attractive under conventional accounting frameworks that neglect externalities, may be revealed as socially or environmentally unsustainable. Conversely, investments in improved labor standards, ecosystem services, and climate resilience, often perceived as cost-increasing, may prove economically rational when long-term benefits are taken into account.

Innovation, Transformation, and Agency

Beyond diagnosis, the workshop placed strong emphasis on pathways for transformation. One thematic stream focused on innovation in sustainable agri-food systems, examining how technological, institutional, and financial innovations can reduce externalities while enhancing productivity and resilience. Contributions addressed topics such as digital traceability, climate-smart agricultural practices, alternative financing models, and collective action among producers. A key question running through these discussions was who shapes innovation agendas and who benefits from them. The proceedings underscore the importance of inclusive approaches that recognize smallholders, women, and youth not merely as beneficiaries of innovation but as active agents of change.

Another recurring theme was the tension between voluntary and regulatory approaches to sustainability. While private standards and corporate initiatives have played an important role in raising awareness and piloting solutions, participants widely acknowledged their limitations in addressing systemic externalities. This recognition informed discussions on the role of public policy in setting minimum standards, and aligning incentives across borders.

Policy, Trade, and Governance

The governance of international value chains formed a second major pillar of the conference. Sessions examined how national policies, regional strategies, and international trade regulations shape production

incentives and market access. Particular attention was paid to emerging sustainability-related trade measures, which are redefining responsibilities along value chains and placing new demands on producers and exporters.

Several contributions emphasize the need for policy coherence and supportive measures. Internalizing externalities requires not only standards and enforcement but also investments in capacity building, infrastructure, and institutional support. This includes strengthening data systems, supporting farmer organizations, and ensuring that the costs of certification are fairly shared across value chains, actually mainly at the retail and consumer end, rather than with primary producers.

Towards Actionable Recommendations

In addition to presenting research findings, participants engaged in structured discussions aimed at developing actionable recommendations for governments, businesses, and research institutions. These discussions recognized that no single actor can address externalities in isolation. Instead, coordinated action across scales and sectors is required.

The recommendations emerging from the conference point towards several priority areas: advancing methodological standards for TCA; integrating true cost considerations into policy appraisal and investment decisions; aligning trade and sustainability objectives; and fostering partnerships that bridge research, policy, and practice. Importantly, the proceedings highlight that addressing externalities is not merely a technical challenge but also a political and ethical one, requiring explicit consideration of power relations, distributional impacts, and social justice.

Purpose of This Proceedings Volume

This proceedings captures the richness of the conference discussions and the diversity of perspectives brought together over the two days. It is intended for a broad audience, including researchers, policymakers, development practitioners, private-sector actors, and students interested in sustainable agri-food systems and international trade. By documenting case studies, analytical insights, and policy reflections, the volume aims to contribute to ongoing debates on how to make food systems more equitable, transparent, and sustainable. It does not claim to offer definitive answers. Rather, it seeks to advance a collective learning process and to support informed action towards internalizing the true costs of food. It is the hope of the organizers that this proceedings will inform, inspire, and support those working to transform export-oriented agricultural value chains for the benefit of present and future generations.

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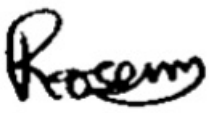

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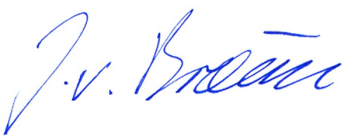

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STATEMENT OF CONCLUSIONS

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Executive Summary

Export-oriented agriculture - especially coffee, horticulture, tea, and groundnuts - remains a cornerstone of economic growth, foreign exchange earnings, and rural livelihoods in East Africa. Evidence presented at the workshop confirms, however, that a substantial share of these gains relies on unpriced environmental, health, and social costs, including land and water degradation, pesticide exposure, and hazardous child labour. These externalities are systemic rather than marginal, and in several value chains their monetised value equals or exceeds farm-gate prices. Internalising these hidden costs is increasingly a prerequisite for competitiveness rather than a threat to it. Access to high-value export markets is now shaped by sustainability requirements, notably on deforestation, labour standards, food safety, and environmental performance. The evidence highlights three central policy insights: most externalities originate at the production stage, making farm-level interventions the most effective leverage point; no single instrument is sufficient: effective responses require balanced policy mixes combining regulation, incentives, voluntary standards, and enforcement, and third, fair cost-sharing along value chains is critical. Smallholders cannot bear transition costs alone; downstream actors and consumers must contribute through pricing, contracts, and co-investment. True Cost Accounting (TCA) emerges as a practical policy tool to make trade-offs explicit, prioritise interventions, and design proportionate, development-sensitive regulations. While not all externalities can be eliminated, many—particularly hazardous child labour and pesticide-related health risks—are preventable at relatively low cost. Priority actions include: integrating sustainability incentives, regulation, certification, and digital traceability into national agricultural and trade policies; sharing compliance costs through fair contracts and long-term sourcing commitments by private-sector actors; Strengthening farmer organisations to reduce certification and compliance costs; Providing concessional finance and technical support for sustainable practices; and Ensuring sustainability regulations in consumer markets are development-sensitive.

The workshop concludes that addressing the true cost of food is not an obstacle to development, but a necessary foundation for inclusive, resilient, sustainable and competitive export growth in East Africa.

1. Introduction

This concluding statement synthesises the evidence, analysis, and deliberations emerging from the Workshop on the True Cost of Food: Policies for Sustainable Production of Coffee and Other Export-Oriented Crops in East Africa. Convened under the EU-funded FOODCoST project, the workshop brought together researchers, policymakers, farmer organisations, regulators, private-sector actors, and international value-chain stakeholders to examine how environmental, health, and social externalities shape the sustainability, equity, and long-term performance of export oriented agricultural systems. This statement is by the conference organizers and does not necessarily reflect a consensus of all conference participants.

The statement reflects deliberations at the workshop and draws on ten policy and research briefs on concepts of true costs, and developments and trends in East Africa's agricultural export sectors. Insights from new household-level surveys from Uganda and studies from Ethiopia (coffee), Kenya (green beans), and Malawi (groundnuts) provide details.

The important opportunities of agri-food systems for economic growth, employment, and sustainable development in Africa are noted. How to enhance these opportunities is spelled out well in the CAADP agenda and the Kampala Declaration of the African Union from 2025. This workshop wants to contribute to this African agenda in three ways:

1. **To consolidate and communicate core research findings** on the magnitude, drivers, and distribution of opportunities and (hidden) costs in export-oriented agricultural value chains in East Africa;
2. **To articulate the implications of these findings** for competitiveness, livelihoods, environmental integrity, and social outcomes; and
3. **To outline policy implications and recommendations**, with a focus on shared responsibility among governments, private sector actors, development partners, and consumers.

The statement is structured in two main parts. The first presents the research findings, organised thematically across countries and commodities. The second sets out policy implications and recommendations, with differentiated guidance for key stakeholder groups.

2. Conceptual Foundations: The True Cost of Food in Export-Oriented Agriculture

2.1 Externalities and Market Failure in Food Systems

A central finding across all studies is that agricultural export markets systematically fail to reflect the full environmental, health, and social costs generated along value chains. These unpriced effects, externalities, create distorted incentives that encourage production and trade patterns that may be privately profitable but socially and environmentally inefficient. Negative externalities identified in the studies fall into three broad domains:

- **Environmental externalities**, including greenhouse gas emissions, deforestation, biodiversity loss, soil degradation, water pollution, and depletion of scarce water resources;

- **Health externalities**, such as pesticide exposure, food safety risks (notably aflatoxins), and productivity losses associated with illness; and
- **Social externalities**, particularly child labour, gender inequality, and unsafe working conditions.

Across all cases, these externalities are not marginal side effects but structural features of current export-oriented agricultural systems. Addressing them could enhance the true benefits of the export-oriented agriculture.

2.2 Scale and Significance of Hidden Costs

Estimates suggest that worldwide food system externalities amount to trillions of dollars annually, comparable to or exceeding total food expenditures. While global figures are necessarily uncertain, their order of magnitude confirms that food prices consistently understate real societal costs. The country-level and value-chain-specific studies presented at the workshop confirm that this global pattern holds at regional and national levels in East Africa. In multiple cases, monetised externalities equal or exceed farm-gate prices and, in some instances, approach or surpass export values. This implies that a substantial share of the apparent economic gains from export agriculture is achieved through the implicit transfer of costs to ecosystems, workers, children, and future generations.

3. Economic Importance of Export-Oriented Agriculture in East Africa

3.1 Export Performance and Macroeconomic Significance

The studies reaffirm the continued centrality of agricultural exports to East African economies. Coffee, tea, horticulture, flowers, and cocoa remain key sources of foreign exchange, fiscal revenue, and rural employment. Recent years have seen particularly strong export performance, driven by favourable global prices and resilient demand:

- Coffee exports in Uganda and Ethiopia reached historically high values in 2024–2025.
- Kenya's tea and horticultural exports continued to generate substantial foreign exchange earnings.
- Diversification into crops such as cocoa and groundnuts is increasing export opportunities in some countries.

These trends confirm that export agriculture remains a cornerstone of economic strategy and rural transformation across the region.

3.2 Employment, Livelihoods, and Gender Dimensions

Export-oriented agriculture provides livelihoods for millions of smallholder farmers and workers. Employment effects extend beyond farms to processing, logistics, transport, and trade. However, the distribution of benefits is uneven:

- Smallholders capture only a limited share of final export value.
- Women supply a large proportion of labour but often lack control over income, land, and decision-making.

- Seasonal and informal employment remains prevalent, with limited social protection.

These structural characteristics shape both the scale and distribution of social externalities identified in the studies.

4. Environmental Externalities: Patterns, Drivers, and Trade-offs

4.1 Environmental Costs in Coffee Value Chains

The coffee studies from Ethiopia, Uganda, and Tanzania reveal environmental externalities at the production stage, driven primarily by Greenhouse gas emissions from cultivation, processing, and land-use change; Water pollution associated with processing effluents; Soil degradation and nutrient depletion in some systems. A significant number of households use pesticides on coffee plots, including hazardous substances approved in Uganda but not authorized for use in the EU. While positive externalities such as carbon sequestration and biodiversity conservation are present, especially in shaded and forest-based systems, their estimated monetary value is small relative to negative impacts.

4.2 Land Use Change and Deforestation

Evidence from Uganda and Ethiopia challenges simplistic narratives that equate coffee expansion directly with deforestation. Most recent coffee expansion has occurred on previously cultivated land, and coffee under shading trees is widespread. Deforestation risks persist where land tenure is unclear and enforcement is weak. The introduction of EU deforestation-free regulations in key export markets aims to transform forest conservation from a voluntary sustainability objective into a binding condition for market access. Yet, not only concern for forest, but a more comprehensive land use change approach is required when biodiversity and carbon sequestration goals are pursued. This is because often it is not forest but crop land being converted to coffee under shaded trees and that may actually have positive environmental impacts, compared to crop land.

4.3 Environmental Externalities in Horticulture and Groundnuts

The Kenya green bean and Malawi groundnut case studies highlight crop-specific environmental challenges:

- In Kenya, environmental costs are dominated by blue water scarcity, pesticide and fertiliser pollution, energy use in cold chains, and emissions from air freight.
- In Malawi, environmental externalities arise from greenhouse gas emissions, land degradation, water pollution, and water use, with risks increasing under commercialisation scenarios.

Across all cases, production stages account for the majority of environmental externalities, underscoring the importance of farm-level interventions.

5. Health Externalities: Visibility, Prevention, and Human Impact

Health externalities tend to be smaller in monetary terms than environmental or social costs but have profound human consequences.

- In Kenya, pesticide exposure among farmers and packhouse workers contributes to acute and chronic health risks.
- In Malawi, aflatoxin contamination poses serious risks to both producers and consumers, with long-term implications for public health and productivity.
- In coffee systems, health risks are linked to agrochemical use and processing practices, though they remain under-documented in many contexts. Hazardous child labour adds to health risks.

A consistent finding is that many health externalities are largely preventable through improved regulation, safer technologies, awareness creation and better information.

6. Social Externalities: Child Labour and Education

Child labour emerges across all case studies as a deeply embedded feature of smallholder-based agricultural systems. Evidence from Uganda shows that a substantial share of children in coffee-growing households engage in farm work, with significant exposure to hazardous activities. Drivers of child labour include poverty, labour intensity, seasonal demand, limited access to education, and weak enforcement of labour standards. Importantly, child labour is shown to have measurable negative effects on educational attainment, reinforcing intergenerational poverty traps.

7. Quantifying the True Cost: Evidence from True Cost Accounting

True Cost Accounting (TCA) analyses conducted for coffee, green beans, and groundnuts demonstrate that:

- Total hidden costs per unit of output often equal or exceed market prices.
- Environmental and social costs dominate the total, with health costs smaller but significant.
- The cultivation stage is the primary source of externalities.

Importantly, TCA reveals trade-offs rather than simple win-win solutions. For example, intensification may raise incomes but increase environmental costs; local value addition may improve employment but raise emissions. These trade-offs must be explicitly managed rather than ignored.

8. Stakeholder Perspectives and Willingness to Internalise Externalities

Across countries and value chains, stakeholders recognise the existence of negative externalities and express support for action. However, preferences are consistent:

- **Financial incentives** are strongly preferred, especially by farmers.
- **Mandatory measures** are accepted as unavoidable but often resisted or weakly enforced.
- **Voluntary measures** are least attractive unless linked to clear economic benefits or market access.

This reflects a fundamental political economy constraint: actors are unlikely to internalise externalities if costs fall disproportionately on them, particularly in contexts of low and volatile incomes. This needs to be also considered in EU regulation proposals, and costs of certification schemes for small holders in export crop production.

9. Overarching Policy Implications

9.1 Internalising Externalities Is important for Competitiveness

Child labour prevention, deforestation regulations, and related consumer expectations increasingly condition access to high-value markets. Internalise externalities insures market access, product reputation, and competitiveness.

9.2 Production-Level Interventions Offer Leverage

Since most externalities originate at the production stage, policies should prioritise interventions that improve practices on farms and in the farming households, while recognising that smallholders require support to adopt them. Such support could be in form of access to credit, ease of mechanization, and easing accessibility to required amenities.

9.3 Balanced Policy Mixes Are Essential

No single instrument is sufficient. Effective internalisation requires a combination of incentives, regulation, voluntary standards, and social protection, tailored to specific contexts and actors.

9.4 Fair Cost-Sharing Along Value Chains Is Critical

Smallholders cannot bear the full cost of transitions to sustainable systems. Downstream actors and consumers must share the true costs through pricing, fair contracts, and co-investment mechanisms.

9.5 Strengthening Evidence on Hidden Costs in Agricultural Value Chains

Further research on the different crops such as tobacco, tea, and sugarcane can uncover labour, environmental, and governance challenges that affect different value chains. Additional evidence supports support more comprehensive policy measures that simultaneously address different value chains.

10. Stakeholder-Specific Policy Recommendations

10.1 National Governments

- Consider optimal policy mixes among tariffs, taxes, subsidies, incentives for sustainable production and processing
- Certification of producers and labelling of products
- Support digital traceability, satellite-based land use monitoring, and compliance
- Address causes of child labour by facilitating access to education, social protection, and rural services.
- Integrate TCA into agricultural, trade, food safety and environmental policies.

10.2 Private Sector Actors (Exporters, Processors, Retailers)

- Share the costs of sustainability compliance through pricing and long-term contracts with farmer organizations.
- Invest in traceability, safer inputs, and low-emission technologies.
- Embed child labour commitments into sourcing strategies.
- Consider farmers' livelihoods in contract designs

10.3 Farmer Organisations and Cooperatives

- Facilitate the formation of cooperatives in the export crop sectors, to achieve scale, manage certification of standards.
- Strengthen bargaining power and service provision for members of farmer organizations and cooperatives.

10.4 Development Partners and Financial Institutions

- Provide concessional finance and grants for sustainability investments.
- Support capacity building, data systems, and TCA implementation.
- Encourage international harmonisation of standards and learning.

10.5 Retail industry and Consumer organizations

- Consumer information and motivation of demand for sustainable products
- Promote sustainability regulations are development-sensitive and proportionate.
- Recognise that affordable food and sustainable production require systemic solutions.

11. Conclusion

- The workshop findings converge on a clear message: East Africa's agricultural export opportunities are real but are resting in part on unpriced environmental and social costs. Making these costs visible through True Cost Accounting reveals both the scale of the challenge and the pathways for action.
- Sustainable export growth is achievable through deliberate, coordinated efforts to align economic incentives with social and environmental objectives. This should be viewed as a long-term agenda, starting with the most important and feasible areas of internalization of hidden costs, such as hazardous child labour and pesticide regulations.
- This concluding statement affirms that addressing the true cost of food is not an obstacle to development, but a foundation for inclusive, resilient, and sustainable growth in East African agri-food systems

Understanding the foundational concepts of the true cost of food

1. What are externalities and why are they important for sustainable food systems?

A sustainable food system should deliver food security and nutrition for the current generation without compromising the environmental, health and social stocks of future generations (High-Level Panel of Experts (HLPE), 2014). However, the link between market activity and environmental or social harms is not directly visible or reflected in the incentives that drive economic systems (von Braun and Hendriks, 2023). As a result, the economic value of food, which drives the economic choices of businesses, consumers, and governments may be distorted. Externalities are not directly obvious in farm or business balance sheets or national gross domestic products (Mirzabaev and von Braun, 2022; von Braun and Hendriks, 2023). For example, the degree to which the food systems contribute to climate change, deforestation, or poor health is not factored into crucial economic indicators for policymakers, such as the gross domestic product (GDP). Yet externalities constitute a barrier to attaining sustainable food systems when prices provide distorted information and signal disincentives for the production, storage, processing, distribution, marketing, retailing and home food preparation and consumption of sustainable and healthy food (von Braun and Hendriks, 2023). Raising awareness of these hidden costs and their impact can inform food system actors and stakeholders about the negative impacts of externalities and support more responsible actions by all concerned, including producers, processors, distributors, retailers, consumers, government agencies, policymakers and non-governmental organisations.

Externalities are hidden positive impacts (benefits) or negative effects (costs) on natural capital, human health and social welfare (Hendriks et al., 2023). Negative externalities in food systems (see Table 1) are hidden consequences, i.e. often not visible in markets, of the choices of food system players that pollute the environment, detriment human health and exacerbate social injustices, making sustainable and healthy food less affordable for consumers and less profitable for producers (von Braun and Hendriks, 2023).

Meeting the future needs of a growing global population will require expanding and intensifying agricultural production and food processing. However, such expansion may add costs to the environmental, human health and social welfare, hindering the transition towards sustainable food systems (Hendriks et al., 2023). Environmental externalities in the food system affect natural capital such as air, land and soil, causing negative consequences such as air and soil pollution, biodiversity loss, greenhouse gas (GHG) emissions and ecosystem degradation. Conversely, positive food system environmental externalities include air quality regulation, carbon sequestration, nutrient cycling, pollination and soil formation. The negative health externalities affect human health, causing diet-related chronic diseases and productivity losses due to diseases and zoonoses. Positive

health externalities promote sound nutrition and prevent diseases. The social food system externalities affect human welfare, social capital and social rights, resulting in child and forced labour, gender inequality and unfair wages. Conversely, positive social externalities of the food systems include food security, training and human skills development.

Table 1: Important externalities in food systems

Externality	Examples of externalities	Impacts
Social (effects on social rights and human & social capital)	Child and forced labour Discrimination and harassment High and variable prices Underpayment	Poverty, well-being, food security
Environmental (effects on natural capital)	GHG-emissions Air, water, and soil pollution Soil depletion Water use	Contribution to climate change, health effects, reduced ecosystem services loss of biodiversity and species
Health (effects on human health)	Unhealthy diet Obesity Undernutrition Antimicrobial resistance Zoonoses	Human life (mortality and the quality of life), economic (medical costs, informal care, lost working days)
Economic (effects on financial, manufactured, and intellectual capital)	Food waste Tax evasion	Increased food demand, decrease in public funds

Source: von Braun and Hendriks, 2023.

2. How significant are food system externalities?

Estimating these externalities and identifying options for internalising them could support actions across the food system to ensure more environmentally sustainable, health-protective and socially equitable value chains. Quantifying and monetarizing these hidden costs help raise awareness of the magnitude and urgency of addressing food system externalities. Environmental externalities are typically estimated per unit of product. Each externality has its own unit of measurement, as illustrated in Table 2. Once quantified, externalities are typically monetised, converting units of harm into US dollars for comparison between externalities. The valuation of environmental and social impacts is typically based on the cost of abatement (reduction of harm), compensation, prevention, restoration or retribution costs,

depending on the specific appropriate measure for the externality. For example, environmental impacts are measured as abatement, replacement and damage costs measured in different units such as kilograms of carbon dioxide emitted, minerals leached into water, deaths attributed to air pollution etc. While health costs represent the third-party negative health effects caused by an activity that is not paid for by the producer or consumer engaged in that activity.

Using a common currency allows comparison across products and policy choices and design. For example, monetarisation allows consumers to compare food alternatives and make sustainable and healthy choices based on objective information and traceability data. This is helpful in the complexity of weighing up the environmental and health cost trade-offs in choosing between animal and plant-based foods.

Annual global estimates in 2021 indicated that externalities in the food systems were twice as high as the amount spent on food purchases, that is, about 19.8 trillion United States dollars (USD) in externalities compared to nine trillion USD of food purchased at market prices (Hendriks et al., 2023). These costs comprised seven trillion USD (range 4-11) in environmental costs, 11 trillion USD (range 3-39) in health costs and one trillion USD (range 0.2-1.8) in social costs (Hendriks et al., 2023). According to Food and Agriculture Organisation of the United Nations (FAO) (2023), the annual global estimates of food system environmental, health and social externalities in 2023 were 12.7 trillion USD at 2020 purchasing power parity (PPP). The global externalities had a 95% chance of being 10.87 trillion USD at 2020 PPP or higher and a five per cent chance of being 16 trillion USD at 2020 PPP or more (FAO, 2023).

Table 2: Units of estimation for food system externalities.

Externalities	Footprint indicators	Unit
Environmental externalities		
Contribution to climate change	Greenhouse gas (GHG) emissions	kg CO_2-eq
Air pollution	Terrestrial ecotoxicity from 1,4 dichlorobenzene (1,4-DB) emissions	kg 1,4-DB-eq emitted to soil
	Marine ecotoxicity from 1,4-DB emissions	kg 1.4-DB-eq emitted to seawater
	Particulate matter (PM) formation	kg $PM_{2.5}$-eq
	Photochemical oxidant formation from non-methane volatile organic compound (NMVOC) emissions	kg NMVOC
	Photochemical oxidant formation from nitrogen oxides (NO_x) emissions	kg NO_x-eq

	Acidification from sulphur dioxide (SO_2) emissions	kg SO_2-eq
	Ozone layer depletion from trichlorofluoromethane (CFC11) emissions	kg CFC11-eq
	Ammonia emissions (NH_3)	kg NH_3-eq
Water pollution	Freshwater eutrophication from phosphorus (P) emissions	kg P-eq to freshwater
	Marine eutrophication from nitrogen (N) emissions	kg N-eq to marine water
Soil pollution	Freshwater ecotoxicity through toxic emissions to soil	kg 1.4-DB-eq emitted to freshwater
Land occupation by green beans	Land (grassland/savannah) occupation	mean species abundance (MSA) *ha*yr
Land transformation	Land ((grassland/savannah) transformation	MSA *ha
Scarce blue water use	Scarce blue water use	m^3 scarce water
Soil degradation	Soil organic carbon (SOC) loss	kg SOC
Health externalities		
Human toxicity from air pollution	Disability-adjusted life years (DALYs) due to toxic emissions to air	DALY
Health impacts from pesticide exposure	Disability-adjusted life years (DALYs) due to exposure to pesticides	DALY
Social externalities		
Child labour	Underage workers below minimum age for light work (5–12 years) involved in non-hazardous economic work	Child full-time equivalent (FTE) and number of children not attending school
	Underage workers above the minimum age for light work and below the minimum age (13–15 years) involved in non-hazardous and non-light economic work	
	Workers above minimum age (16–17 years) and below 18 involved in hazardous work	
	Underage workers that are not attending school	
Insufficient income for farmers	Living income gap	United States dollars (USD)

3. What can be done about food system externalities?

All stakeholders need frank reflection on the ineffectiveness of the current system to provide sustainable, affordable yet profitable and healthy food. Bold policy reform is essential across the food system to align policies with true values and adjust behaviour and practices across all food system actors.

Estimating externalities is sometimes referred to as estimating the 'true costs of food'. This data can support planning decisions and choices between technological options and approaches to food production, processing and transportation relating to carbon emissions and air and water pollution. They can be used in evaluations of ecosystem services in land-use systems. Moreover, monetarized externalities can be used to determine the multi-dimensional impact of policy change on the environment (such as carbon taxes), society (minimum wages) and health (for example, sugar taxes).

Taking responsibility for such actions is termed 'internalising' externalities. The active engagement of all food system actors in reducing and internalising externalities is essential for accelerating food system transformation while promoting environmental sustainability and social equity.

While these approaches seek to raise awareness of the true cost of food, the intention is not to simply include these costs in the price of food as this would make food more unaffordable and cripple the food system. Instead, there are multiple ways for food system actors and stakeholders to embrace and own these externalities and take steps to reduce or minimise these negative effects.

These options can be summarised as:

- **Regulatory measures** that implement strict environmental regulations and standards to ensure sustainable practices; fines and levies for environmental pollution; regulated minimum levels enforced and monitored; licensing and tradable permits to allow trading of pollution permits to limit overall environmental impact. Similar actions to reduce health externalities could include implementing strict health regulations and standards to ensure activities do not harm public health such as in food safety and pesticide use. Implementing regulations such as fines and levies for child labour could ensure activities do not harm social well-being. Regulated minimum age and wages could also be enforced and monitored.
- **Liability and compensation approaches** could hold food system actors accountable for environmental damage and requiring them to compensate for it. Workers' Compensation Insurance Schemes could provide compensation to employees who suffer job-related injuries or illnesses, covering medical expenses and lost wages. Entities could also be held accountable for social damages that requires them to compensate affected communities.
- **Certification and labelling** can help consumers make informed choices and support companies that prioritize social responsibility. These schemes are often voluntary. Eco-labels certifying and labelling products that meet certain environmental standards to inform consumers and encourage sustainable

choices. Health labels can identify products that meet certain health standards to inform consumers and encourage healthier choices. Social labels certify and label products or services that meet certain social standards to inform consumers and encourage socially responsible choices such as Fair Trade, Rain Forest Alliance, B Corporation (B Corp) certification meet high standards of social and environmental performance, accountability, and transparency.

- **Public policies could include financial incentives** (such as conditional subsidies) and disincentives (such as fines and taxes) to change behaviour and promote sustainable practices and products, promote health (such as imposing taxes on activities that negatively impact health such as tobacco and sugary drinks to discourage their consumption) or provision of subsidies for healthy foods and preventive healthcare. Financial incentives could promote social well-being through subsidies for community development projects.
- **Business models and strategies:** developing business models that prioritise sustainability and internalise environmental costs, promote health and internalise health costs and foster social well-being while internalising social costs.

In summary, food systems externalities do significant harm to the environment, human health and society and must be addresses in a comprehensive, collaborative way across the food system. There are many ways to reduce, prevent and compensate for these costs.

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Agricultural exports in East Africa: volumes, values, employment, social and environmental dimensions

SUMMARY

Agricultural exports form a **critical economic pillar** in East Africa, underpinning foreign exchange earnings, rural employment, and livelihoods. Key export sectors include **coffee, tea, cocoa, and horticultural products, including cut flowers and vegetables such as green beans**. Recent years have seen r**obust export growth in coffee and tea**, supported by higher global prices, while horticultural exports continue to generate substantial foreign exchange earnings and remain a major source of export revenue in countries such as Ethiopia, Kenya, or Tanzania.

Despite growth opportunities, the region contends with **social risks, including persistent child labour in agricultural value chains, and environmental pressures from land use change and deforestation**. Policy action is needed to balance economic gains with sustainable and inclusive development.

1. Overview of export trends in East Africa

East African countries (e.g., Kenya, Uganda, Ethiopia, Tanzania, Rwanda, Burundi) rely heavily on agricultural exports such as coffee, tea, and horticultural products, which are often labour-intensive and regionally competitive. These crops constitute a significant share of export earnings and engage large segments of the rural workforce.

A recent regional review noted that despite broader export diversification challenges, coffee, tea, fish, and flowers continue to drive rural export performance, with Kenya's tea exports alone reaching about US $1.7 billion in 2024 (up from USD 1.4 billion the previous year).

2. Sectoral export performance

2.1 Coffee

Coffee remains the most valuable agricultural export for many East African countries:

- **Uganda:** In the 12-month period to late 2025, about 8.4 million 60-kg bags (about 504,000 t) of coffee were exported, generating earnings of about US $2.4 billion. The export volume increased from 5.8 million bags a year earlier.
- **Ethiopia:** Alongside Uganda, Ethiopia is a leading coffee exporter. In 2024-25 Ethiopia exported about 7 million bags amounting to approximately 470, 000 t of coffee. The export volume increased by about 170, 000 t from the previous year, contributing to Africa's growing share of global coffee trade.
- **Kenya & Tanzania:** Kenya's coffee exports were reported around 47,861 t (about 797,000 bags) in 2023, generating roughly US $251.9 million, while Tanzania exported around 1.26 million bags (about 75,600 t) in 2024.

Price Influence: Increases in global coffee prices, which nearly doubled during parts of 2024–2025, have amplified export earnings and encouraged higher shipment volumes.

2.2 Tea

Tea is a major export, particularly for Kenya, which is one of the world's top tea exporters. Kenyan tea exports reached around US $1.7 billion in 2024, reflecting strong global demand. Tea exports also feature in Rwanda and Burundi, where they comprise meaningful shares of agricultural trade.

2.3 Cocoa

Although less dominant than coffee and tea, cocoa is gaining importance as an export commodity in some East African economies, particularly Uganda and Burundi. Uganda exported approximately 52,281 t of cocoa in 2024, with both export volumes and values increasing in recent years. Data suggest cocoa contributes to export diversification, though regional values are generally more modest compared to West African exporters.

2.4 Flowers (Horticulture)

The cut-flower sector, especially in Kenya, is a globally competitive horticultural export industry:

- Kenyan flower exports generated approximately US $720 million in 2024, with total export volumes around 175,805 t of fresh cut flowers and buds.
- Kenya is considered one of the top cut-rose exporters worldwide, with the EU (especially the Netherlands) and the UK as major destinations.
- Horticulture exports have expanded into new markets, including the Middle East and Asia.

Horticultural exports, including flowers and vegetables, have also been identified as key drivers of rural income and employment across the region under expanding continental and regional trade frameworks.

2.5 Green Beans and Vegetables

East Africa also exports fresh vegetables such as green beans, although on a smaller scale compared with coffee, tea, and flowers. Tanzania, for example, exported about 849 t of fresh vegetables, of which mainly green beans, and generated about US $372,000 in 2023. Kenya plays a significant regional role in common beans production, with potential to grow export volumes further.

3. Employment and economic importance

3.1 Jobs in Agricultural Export Sectors

Agricultural exports are major sources of rural employment in East Africa:

- Coffee, tea, flowers, and horticulture engage millions of smallholder farmers and agricultural workers.
- In Kenya, the flower industry alone employs hundreds of thousands of workers, with labour demand peaking during planting and harvest seasons.
- Across the region, agricultural exports form core livelihood sources in rural areas, contribute to income generation, and often stimulate secondary employment in processing, logistics, and trade.

3.2 Gender and Inclusion

While agricultural labour is pervasive, value capture and control over earnings often vary by gender, with women traditionally performing much of the labour but facing constraints in accessing higher-value roles and revenues.

4. Social side effects: child labour and working conditions

Child labour remains widespread in agricultural contexts across East Africa, with many children involved in planting, weeding, harvesting and other tasks in coffee, tea, horticulture, and

vegetable production. Seasonal spikes often coincide with peak harvest periods.

Drivers include poverty, household labour needs, limited access to quality education, and weak enforcement of labour standards. While targeted interventions have shown local improvements, national-scale reductions are limited, and agriculture continues to account for the largest share of child labour cases in rural economies. Recent national surveys in Uganda highlighted about 40 % of children aged 5-17 engaged in child labour, with agriculture dominating the sector. This pattern reflects broader trends across rural East Africa.

5. Environmental impacts: land use, forests, and sustainability

5.1 Land Use Change and Deforestation

Export crop expansion can contribute to land conversion and pressure on forested ecosystems, especially in areas where infrastructure, market access, and prices incentivize bringing new land under cultivation. Coffee and horticulture developments can extend into previously uncultivated lands without proper safeguards, raising concerns about biodiversity loss and soil degradation.

5.2 Climate Change and Water Use

Climate variability, including changing rainfall patterns, poses risks to yield stability, notably for coffee and tea. Horticultural crops, such as flowers and green beans often requires intensive water and energy inputs, with environmental costs if not managed sustainably.

5.3 Compliance with International Standards

Exporters are increasingly subject to environmental standards (e.g., EU deforestation regulations), necessitating traceability, responsible land management, and certification to maintain market access. The costs of these regulations for producers in East Africa, not just for traders and processors and consumers in the EU, need further review. These costs should not be imposed upon the primary producers who are often earning a low share of export crop earnings.

6. Policy recommendations and conclusion

Agricultural exports remain foundational to East Africa's economic performance, with coffee, tea, flowers and allied horticultural crops generating substantial foreign exchange and employment. While export values and volumes show resilience and growth, particularly in coffee and tea driven by global price rallies, challenges abound. Social dynamics, especially child labour, and environmental sustainability require integrated, multi-sectoral responses. Strategic investments in value addition, social protection, and sustainable land management will be key to ensuring that export growth is inclusive and environmentally responsible.

Strengthening Sustainable Export Growth

- Invest in value addition and processing to capture greater portions of export value within East African economies.
- Support price risk management tools (e.g., futures, forward contracts) to cushion farmers against global price volatility.

Improving Social Outcomes

- Expand social protection and education access to reduce the economic drivers of child labour and bolster pathways for youth in value chains.
- Promote labour rights awareness and enforcement mechanisms across agricultural sectors.

Environmental Sustainability

- Mainstream climate-smart agriculture and landscape planning to protect forests, water resources, and soils.
- Facilitate certification and market access support for compliant producers to meet international sustainability requirements.
- Refrain from rapid introduction and enforcement of regulations that might harm low income farmers, but phase in new regulations, combined with training and capacity building measures of primary producers, and payment systems of regulations that consider fair burden sharing along the value chains.

This policy brief was developed within the frame of the FOOD Costing and Internalisation of Externalities for System Transition (FOODCoST) project funded by the Horizon Europe Framework Programme (project number: 101060481) in preparation for the Workshop “True cost of food: policies for sustainable production of coffee and other export–oriented crops in East Africa”, 25-26.02.2026, Entebbe, Uganda.

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Uganda's agricultural exports: growth, prices, employment, and social–environmental challenges

SUMMARY

Agriculture remains a cornerstone of Uganda's economy, supporting the majority of the labour force and contributing significantly to export earnings. Traditional cash crops, such as **coffee, cocoa, and tea**, have experienced notable growth in export volumes and values, driven in part by favourable international price developments for coffee and cocoa. Coffee alone supports the livelihoods of an estimated 12 million people in Uganda and contributes approximately 15–17% of the country's foreign exchange earnings, underscoring the strategic importance of export-oriented agriculture for national development.

However, this growth coexists with **persistent social and environmental challenges, including high levels of child labour**, land use pressure, deforestation risks, and climate vulnerability. While targeted interventions have achieved localized improvements, child labour in agriculture remains widespread at the national level. This brief reviews export performance, price trends, employment impacts, and sustainability risks, and outlines policy priorities for inclusive and responsible sector growth.

1. Export and price dynamics: coffee, cocoa, and tea

1.1 Coffee

Coffee remains Uganda's most important agricultural export. In the 12-month period from late 2024 to late 2025, Uganda exported approximately 8.4 million 60-kg bags, generating an estimated US $2.4 billion in export earnings. This represents a sharp increase from the previous year, when exports stood at around 5.8 million bags valued at roughly US $1.3 billion.

This expansion reflects both rising export volumes and higher international prices. Global coffee prices increased significantly during 2024–2025 due to weather-related supply shortfalls in major producing countries such as Brazil and Vietnam. Average export prices for Ugandan coffee rose from roughly US $3.2 per kg in early 2024 to peaks above US $5.0 per kg in early 2025, with specialty Arabica achieving even higher premiums. Although prices remain volatile, improved price levels have supported higher export revenues and improved farm-gate prices for producers.

1.2 Cocoa

Cocoa has emerged as one of Uganda's fastest-growing agricultural exports. Export volumes increased from 47,470 t in 2023 to 52,281 t in 2024, while export values more than doubled from about US $140,7 million to about US $306 million.

The sharp rise in export value relative to volume indicates a strong increase in unit prices, driven by tight global supply and robust demand. While international cocoa prices have shown volatility, elevated price levels have significantly boosted Uganda's export earnings, increasing the crop's importance in the national export portfolio.

1.3 Tea

Tea exports play a smaller role and have faced recent challenges. In 2024, Uganda exported about 60,000 t of tea, earning US $56 million, representing declines in both volume and value compared to the previous year. This suggests relatively flat or declining unit prices, compounded by strong global competition and limited product differentiation.

2. Employment and economic contributions

Agriculture employs an estimated 60–70 % of Uganda's workforce, with coffee, cocoa and tea production dominated by smallholder farmers. Coffee alone supports several hundred thousand farming households and provides seasonal employment in harvesting, processing, transport, and trading.

Rising export prices for coffee and cocoa have had positive income effects, increasing farm revenues and improving the capacity of households to hire labour and invest in production. However, price transmission to farm-gate level is uneven, and smallholders often capture only part of international price gains due to transaction costs, market power imbalances, and quality differentials.

Beyond farming, export growth creates jobs in processing, grading, logistics, and export services, especially where value addition is undertaken domestically. Expanding these segments offers opportunities for more stable and skilled employment.

3. Child labour in Uganda's agriculture

3.1 Scale and sectoral concentration

Child labour remains a challenge in Uganda's agricultural sector. According to national survey data, approximately 6.2 million children, around 40 % of all children aged 5–17, are engaged in child labour, excluding household chores. Agriculture accounts for the largest share (around 70–80 %) of child labour cases.

Children commonly participate in planting, weeding, harvesting, carrying loads, and processing crops, including coffee, cocoa, tea, sugarcane, rice, and tobacco. Many of these activities qualify as hazardous work, involving long hours, heavy physical labour, or exposure to tools and agro-chemicals.

In coffee-growing areas specifically, studies indicate that between one-fifth and three-quarters of children in farming households may be involved in farm work during peak seasons, often alongside school attendance disruptions.

3.2 Trends: reducing or still high?

At the national level, child labour in agriculture remains high and has not shown a clear downward trend. Official data indicate that the number of children engaged in child labour increased substantially between 2016/17 and 2021, reflecting economic pressures, population growth, and vulnerabilities in rural livelihoods.

While localized reductions have been reported in districts where targeted interventions are in place, such as community child protection programs, school retention initiatives, and livelihood support, these improvements remain modest and geographically limited. Overall, the evidence suggests that child labour remains structurally entrenched in agriculture.

3.3 Key drivers

- Poverty and income insecurity, especially in rural households reliant on seasonal agricultural income
- Limited access to quality education, including long distances to schools and hidden costs

- Labour shortages and rising production demands during peak agricultural seasons
- Weak enforcement of labour regulations in rural areas

High commodity prices can raise household incomes, but without complementary social protections, they may also increase labour demand during harvest periods, reinforcing reliance on family and child labour.

4. Environmental pressures and land use change

Agricultural export growth interacts with environmental sustainability challenges. Expansion of cultivated land, particularly for coffee and cocoa, can contribute to land use change. While many export crops are grown on existing farmland, incentives created by high prices may encourage encroachment into forested or marginal areas, yet not much of that is found in Uganda.

International regulations, such as the EU Deforestation Regulation (EUDR), increase scrutiny of export supply chains, requiring traceability and proof that commodities are not linked to recent deforestation. Compliance will be critical to maintaining market access, especially for coffee and cocoa exports to Europe.

Climate variability, including irregular rainfall and rising temperatures, further threatens long-term productivity, reinforcing the need for climate-smart and environmentally sustainable production systems.

5. Policy recommendations and conclusion

Uganda's agricultural exports, led by coffee and increasingly cocoa, have achieved strong growth in volume, value, and prices, reinforcing their role in employment and foreign exchange earnings. However, child labour remains widespread, and environmental pressures are growing alongside export expansion. Sustaining long-term competitiveness will require policies that align export growth with social protection, labour standards, and environmental sustainability, ensuring that agricultural success translates into inclusive and responsible development.

Inclusive and Responsible Export Growth

- Promote value addition and quality upgrading to sustain export revenues beyond price booms.
- Support price risk management tools and stronger farmer organizations to improve price transmission to producers.

Reducing Child Labour

- Integrate child labour prevention into agricultural extension and export-promotion programs.
- Expand education incentives, social protection, school meals, and income-stabilization mechanisms in agricultural regions.
- Strengthen monitoring and enforcement, particularly of hazardous child labour in export supply chains such as coffee and cocoa.

Environmental Sustainability

- Incentivize sustainable land management in and around export crop systems.

- Support traceability systems to ensure compliance with national and international environmental standards.

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Farm gate prices in coffee value chains in Eastern Africa overlook substantial "hidden costs" from environmental and social externalities

1. Background

Hidden costs associated with the indirect consequences of production and other processes within the value chain remain unaccounted for in market prices and undermine the efficiency, resilience, inclusiveness, and sustainability of key value chains in achieving the Sustainable Development Goals (SDGs). The highly context- and location-specific nature of the hidden costs associated with externalities requires a detailed understanding of the source, magnitude, and point in the externality supply chain to identify effective interventions to reduce hidden costs in these value chains.

Coffee is an everyday product for billions of consumers and among the three most traded agricultural commodities in the world. East Africa is among the top coffee producers globally. Ethiopia is Africa's largest coffee exporter, with coffee playing a crucial role in the country's economy and supporting the livelihoods of about 15 million farmers. Over the past few years, Uganda has grown rapidly in coffee production, employing about two million smallholder farmers in the coffee sector. In all three countries, coffee exports are an important source of income and foreign exchange.

The coffee value chain includes various actors: producers, local labourers who pick cherries during the harvesting season, wholesalers, cooperatives, and international trading companies. However, the level of value addition at various stages differs. Initial processing often begins on-farm before the coffee is transported to collectors, processors, or cooperatives and sold through various channels.

KEY TAKEAWAYS

- Farm gate prices received by farmers do not account for the "hidden costs" associated with environmental and social externalities.
- The hidden costs are equivalent to 70%–125% of the farm gate price for Arabica and about twice the farm gate price for Robusta Coffee.
- The hidden costs are highest in Ethiopia (USD 6.24-7.40 per kg), followed by Uganda (USD 5.08-6.77 per kg) and are lowest in Tanzania (USD 4.72-6.03/kg).
- Differences in hidden costs can be explained by (i) low yields, (ii) lower farm gate prices and (iii) the cost of living across and within the three countries.
- Results reveal critical trade-offs between environmental and social sustainability objectives, with profound implications for policy design

At the production level, there are environmental externalities associated with greenhouse gas emissions from production practices, water pollution from processing, and deforestation for expanding coffee plantations. Social externalities, on the other hand, include child labor, gender inequality, and the living income gap, defined as the difference between what coffee farmers earn and what they need to afford a decent standard

of living. We provide hidden costs average values for different scenarios, including intensive and extensive production.

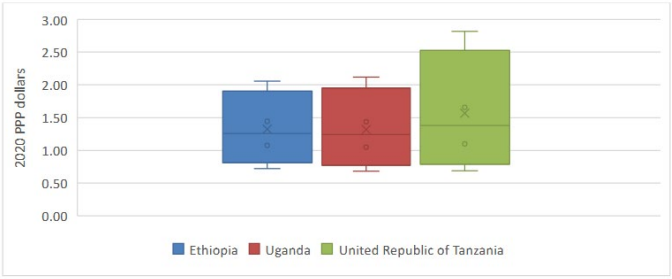
Our study highlights the hidden costs of environmental and social externalities in coffee chains in three countries in eastern Africa, Ethiopia, Uganda, and the United Republic of Tanzania, that lead African coffee production. Using the True Cost Accounting (TCA) framework, a comprehensive and replicable approach to quantifying the environmental and social externalities of coffee production is developed as a first step toward identifying possible internalization options. Environmental externalities are valued using Lord (2023) and the True Cost Initiative (2022) monetization factors. The living income gap, gender pay gap, and child labour, are quantified using representative household survey data.

2. Hidden costs of environmental externalities

The hidden costs of environmental externalities at the production stage include climate change (CO2, N2O, and land-use change), water, pollination, and soil, and were estimated at an average of USD 1.32 for Ethiopia and Uganda and USD 1.57 for the United Republic of Tanzania (Figure 1). Climate externalities were estimated to range between USD 0.38–1.21, depending on the scenario – from extensive production (with minimum land-use change and low yields) to intensive production (with maximum land-use change and high yields). Hidden NO2 costs are larger than other costs from carbon dioxide emissions and land use changes. The monetary benefits from carbon sequestration was estimated at USD 0.02. Among the various emission-related externalities, those arising from processing – particularly the differences between wet and dry processing – are the most significant, though they do not vary much by location.

Overall, the hidden costs of water externalities are lower than those of climate externalities: For coffee production, the hidden costs of the grey water footprint (water pollution) are substantially larger than the blue water footprint (water use). The variation in ecosystem externalities associated with water pollution is substantial, as fertilizer use is strongly linked to water pollution, resulting in much higher levels in intensive coffee production systems. Although variations may exist, the hidden costs (benefits) of pollination and soil externalities are generally very low and were estimated to amount to USD ¢ 4 in soil erosion costs, USD ¢ 0.02 in solid buildup benefits, and USD ¢ 4 in pollination benefits.

Figure 1: Total environmental costs per kg of green



coffee bean production

Source: Authors' own elaboration

3. Hidden costs of social externalities

The Living Income Gap: The living income gap is the difference between the actual net income that farmers earn from coffee and the amount needed for them to afford a decent standard of living - including food, shelter, clothing, education, and health – accounting for the income share households receive from coffee sales. Based on nationally representative data from the World Bank Living Standard Measurement Surveys (LSMS), we estimate that the average living income gap ranges between USD 2.82 per kg (in the United Republic of Tanzania) and USD 5.58 per kg (in Ethiopia)

(Figure 2). Differences emerge from variations in average profits, production costs, and the cost of living in the three countries. Extensive production, on average, creates higher profits and is associated with a smaller living income gap.

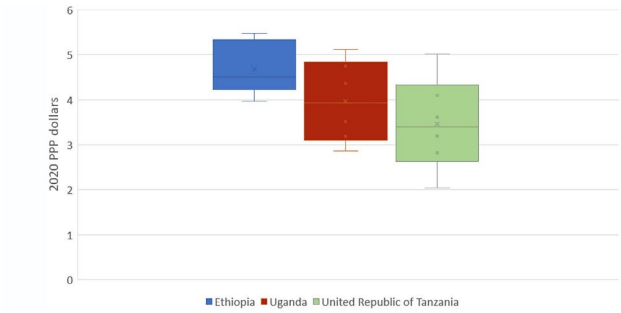


Figure 2: Living income gap per kg of green coffee bean production

Source: Authors' own elaboration

Costs of child labor: Traditionally, children support their families through farming, but depending on the child's age, the activities performed, and the interference with school attendance, not all child labor creates externalities. Therefore, we define hazardous child labor as all activities involving children younger than 11 years of age, work activities of children between 11 and 14 that exceed 14h a week, and work activities of children above 14 that exceed 43h a week. Prevalence of hazardous child labor is prevalent in all countries.

Based on the average work activities recorded for the three countries, hazardous child labor is monetized using the value provided by True Price (2023). The hidden costs of child labor in Ethiopia are estimated at USD 0.27 per kg for Arabica. In Uganda, hidden costs are USD 0.32 per kg for Arabica and USD 0.42 per kg for Robusta. In the United Republic of Tanzania, the hidden costs are USD 0.08 per kg for Arabica and USD 0.11 per kg for Robusta. These values are averages, while the hidden costs occur on coffee farms where hazardous child labor is practiced only.

4. Overall hidden costs and the Implications for policy

The average hidden costs of the coffee value chain in each country relative to farmgate prices and free-on-board quotations, amount to USD 7.40 for Garden coffee and USD 6.24 for Forest coffee in Ethiopia; USD 5.08 for Arabica and USD 6.77 for Robusta coffee varieties in Uganda; and USD 4.72 for Arabica and USD 6.03 for Robusta coffee varieties in the United Republic of Tanzania (Figure 3). These hidden costs represent 70–125 percent of the farm gate price for Arabica coffee and two times the farm gate price of Robusta coffee (compared with the average farm gate prices at the time of the surveys). Both social and environmental externalities contribute significantly to hidden costs, with Robusta Coffee exhibiting higher hidden costs than Arabica's prices due to its lower farmgate prices. The hidden costs are highest in Ethiopia, driven primarily by the living income gap among coffee farmers.

Findings also reveal substantial heterogeneity in hidden cost estimates. On the one hand, hidden costs vary across the three countries studied, driven by differences in agroecology, productivity, market structures, and household characteristics. On the other hand, hidden costs vary by value chain channel and actor relationships. Total hidden costs were highest in Ethiopia (USD 6.24-7.40 per kg), primarily driven by the large living income gap (USD 3.38-4.1 per kg). Hidden costs in Uganda were moderate (USD 5.08-6.77 per kg), with greater variation between Arabica and Robusta. Tanzania had the lowest average hidden costs (USD 4.72-6.03 per kg) because of lower living cost benchmarks. High hidden costs can be explained by (i) low yields of forest coffee in Ethiopia, (ii) lower farm gate prices for Robusta

coffee, and (iii) differences in the cost of living across and within the three countries.

However, our results reveal critical trade-offs between environmental and social sustainability objectives, with profound implications for policy design. These include trade-offs between coffee income and environmental externalities. Internalization policies for environmental or social externalities may have opposing effects on the other externalities. For example, there are trade-offs in relation to local value addition which often results in higher farm incomes but also higher environmental externalities when roasted coffee is shipped by air.

The sustainability trade-offs cannot be eliminated, but they emphasize the need for comprehensive strategies that balance environmental and social sustainability considerations through systems-level thinking. Rather than optimization along single dimensions (minimize environmental externalities, minimize social externalities), policy should: (i) explicitly identify trade-offs and make deliberate choices recognizing societal trade-offs; (ii) combine multiple policy tools addressing different externalities simultaneously (e.g., environmental regulations + farmer income support + market governance reform); and (iii) use TCA to monitor whether interventions are reducing net hidden costs or merely shifting externalities between categories.

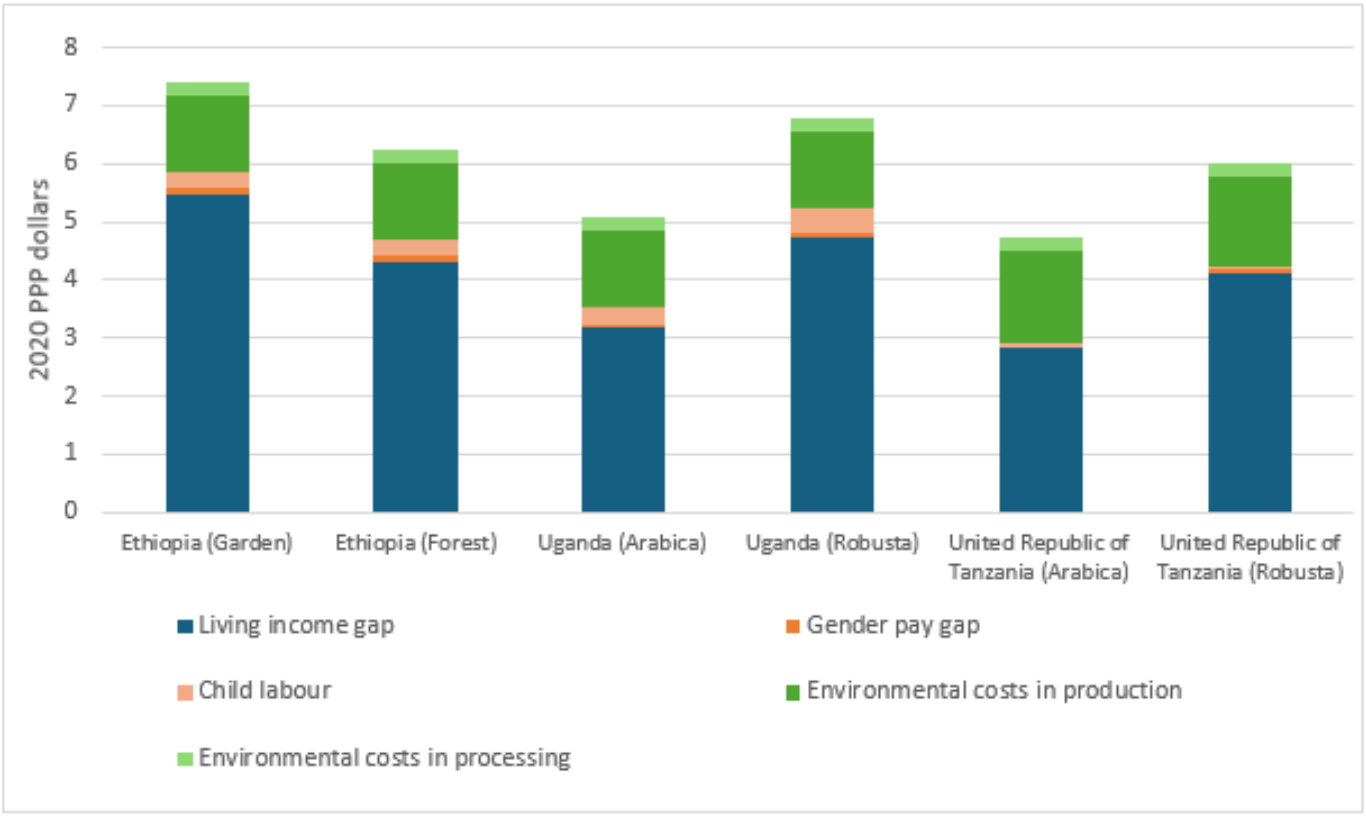


Figure 3: Total hidden costs per kg of green coffee bean production

Source: Authors' own elaboration

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Child labour in smallholder coffee systems in Uganda: prevalence, determinants and education trade-offs

1. Background

Global food systems provide tremendous benefits by nourishing people, generating income and employment, and managing natural resources. However, they also generate substantial social and environmental externalities that are rarely reflected in market prices. Among these, child labour represents a particularly severe yet often hidden cost in agricultural value chains. Uganda's National Employment Policy (2011) defines child labour as *"work which by its nature or circumstances, in which it is performed, is likely to harm the health, safety or morals of children"*.

Despite global commitments to eliminate child labour by 2025, including Sustainable Development Goal 8.7, recent ILO-UNICEF estimates suggest that 138 million children (7.8%) worldwide remain engaged in child labour. More than 60% of children aged 5-17 engaged in child labour worldwide work in agriculture. Sub-Saharan Africa accounts for two-thirds of all children in child labour, with a prevalence of 21.5%. Progress has been uneven and, although rates have declined in most regions, population growth has kept the absolute number of affected children in Sub-Saharan Africa unchanged.

Coffee is Uganda's most important smallholder export crop and a cornerstone of rural livelihoods, yet children's involvement in coffee production and their exposure to hazardous tasks remain poorly documented. This gap is particularly relevant given the growing attention to social and environmental externalities in international food trade, where the external costs of export-oriented commodities are largely borne by producing countries while remaining invisible to consumers in high-income countries. Addressing these hidden costs is essential for achieving equitable and socially sustainable growth in line with the Sustainable Development

KEY TAKEAWAYS

- **14% of children were engaged in child labour** (16% boys, 12% girls); incl. household chores, prevalence rises to 16% (17% boys, 15% girls).
- **42% of children participated in coffee production** over the past 12 months.
- **23% of children** working in the previous week had been **exposed to hazardous activities** in coffee production over the past year.
- Child labour is strongly linked to **age, school attendance, relationship to the household head, and household head's education;** older children and non-biological household members face higher exposure to hazards.
- **Every 10 additional hours worked** per week is associated with **falling more than half a year behind in school** and a 37-percentage-point higher likelihood of leaving school.
- Policy action should prioritize **continued school attendance**, increased parental/ caregiver **awareness** and **protection** for the most vulnerable children.

Goals and the Comprehensive Africa Agriculture Development Programme.

This policy brief draws on primary data collected in October 2024 from 491 coffee-producing households/ 1,252 children across five sub-regions in Uganda (Tooro, Elgon, Southwest, Buganda South and Buganda North) and addresses three key questions:

(1) What is the **prevalence of child labour** among smallholder coffee farmers in Uganda?
(2) What are the **drivers of child labour and children's exposure to hazardous agricultural work** in Ugandan coffee production systems?
(3) What is the **effect of child labour on children's education** among coffee smallholder households in Uganda?

By exploring these questions, the brief aims to inform policies that minimize child labour and reduce children's exposure to hazardous work.

2. Prevalence of child labour

17% of boys and 15% of girls worked in the last 7 days

Child labour in the seven days preceding the survey affects a substantial share of children in coffee-producing households.

When child labour is defined in line with the System of National Accounts production boundary, excluding excessive household chores, 14% of children are engaged in child labour. Expanding the definition to include excessive household chores raises the prevalence to 16%. Boys are significantly more likely than girls to be engaged in child labour under the narrower definition (16% versus 12%), reflecting higher exposure to hazardous agricultural work, particularly among older boys aged 15-17. Once excessive household chores are included, however, the gender gap narrows considerably (17% versus 15%), suggesting that girls' work is more concentrated in unpaid household activities.

42% of children worked in coffee (last 12 months)

Children's involvement in coffee production (last 12 months) extends well beyond those classified as being in child labour.

Overall, 42% of children participated in at least one coffee-related activity during the last two agricultural seasons, with slightly higher participation among boys than girls and similar engagement levels across Robusta- and Arabica-producing households. Coffee harvesting was the most common activity (32%), followed by weeding, including herbicide application (24%), and coffee drying (11%). Many children performed multiple tasks, and in more than half of coffee-growing households at least one child was involved in coffee production during the most recent season. Among those engaged, children worked an average of nearly four days during the last coffee season.

23% of children exposed to hazardous activities

Exposure to hazardous activities represents a particularly concerning dimension of children's work in coffee systems.

Among children who were engaged in labour activities in the seven days prior to the survey, nearly one quarter (23%) had been exposed to at least one hazardous activity in coffee production during the previous twelve months. Boys were more frequently exposed than girls (25% versus 20%). The most commonly reported hazards included the use of sharp tools (13%), land clearing activities such as felling or burning vegetation (6%), and working long hours on school days (5%) or exceeding recommended daily and weekly working time limits (5%). These findings indicate that a significant share of

children involved in coffee production face risks that may undermine their health, safety, and educational attainment.

3. Drivers of child labour

Child labour in coffee-producing households is associated with multiple factors, including age, schooling status, household structure, socio-economic conditions, and characteristics of the coffee production system.

Children's engagement in labour activities varies predictably with age, reflecting the fact that older children are generally contributing more to household and farm work. While this is largely accounted for in international child labour definitions through age-specific working-hour thresholds, older children still face higher exposure to hazardous activities within coffee production.

Schooling status is another key factor shaping child labour outcomes. Children who have left school are significantly more likely to engage in labour activities and to work more hours than those who remain enrolled, pointing to a strong and persistent link between school dropout and child labour. However, the direction of this relationship remains unclear, as child labour may both contribute to and result from school dropout. Within coffee production, school dropout is not strongly associated with participation in coffee production, suggesting that many children combine schooling with seasonal coffee work rather than leaving school altogether.

Household structure plays an important protective role. Children who are the biological children or grandchildren of the household head are consistently less likely engaged in child labour and tend to work fewer hours than other children living in the household. Within coffee production, these children are just as likely to participate as others, but they are significantly less likely to be assigned hazardous tasks and face fewer risks. This highlights the heightened vulnerability of fostered children, orphans, and other non-biological household members.

Socio-economic conditions further shape children's labour outcomes. Higher educational attainment of the household head is associated with lower child labour prevalence and intensity, while children living in households with better housing conditions, a proxy for wealth, are also less likely to engage in child labour. Gender differences are relatively modest: girls are generally less involved in economic labour and work fewer hours, but these differences largely disappear when hazardous activities and household chores are taken into account.

Finally, characteristics of coffee production itself influence children's labour exposure. Children in Arabica-producing households tend to work more intensively and face higher risks of hazardous exposure than those in Robusta systems. A larger share of land under coffee cultivation is also associated with greater reliance on children's labour. These findings suggest that child labour risks are shaped not only by household vulnerability, but also by the organization, productivity, and intensity of coffee production, with important implications for targeting policy and value-chain interventions.

4. Child labour and education trade-offs

Child labour is strongly associated with educational delays and school dropout.

On average, children in the study lag two years behind their expected grade level. School dropout, reported for 5% of children, is most commonly driven by the inability to afford schooling or by unwillingness to attend.

Increased work intensity is negatively associated with education: a 10-hour increase in child labour

hours over the past seven days is associated with children falling approximately half a year behind their expected grade level and a 37-percentage point higher likelihood of school dropout.

Household and individual characteristics further influence these trade-offs. Girls perform slightly better than boys, while children who are the biological children or grandchildren of the household head face fewer educational delays and are less likely to drop out. Greater household economic resources, reflected in higher per capita expenditure, better housing, and higher educational attainment of the household head, are all associated with improved educational outcomes and reduced grade-level gaps.

These findings indicate that child labour is not only a social and short-term economic concern but also a significant barrier to children's learning and long-term human capital development.

5. Policy recommendations

The findings of this study point to the need for targeted policy responses:

1. **Strengthening access to education is critical for reducing child labour.** The study highlights that children who have left school or are falling behind are more likely to engage in labour activities. Policymakers should therefore prioritize interventions that support children's continued participation in education. This includes overcoming direct and indirect barriers to schooling, such as reducing costs of schooling by reducing school fees, providing school feeding programs, motivating teachers and improving infrastructure like classrooms and safe transportation.
2. **Raising awareness among parents and caregivers is essential to protect children from hazardous work.** Even when children are engaged in labour that is considered age-appropriate, the study shows that many are exposed to risks such as using sharp tools, clearing land, and working long hours on school days. Programs that educate parents, communities and caregivers about these hazards, safe labour practices, and the long-term consequences for children's health, safety, and education can help reduce exposure.
3. **Targeted protection for the most vulnerable children is needed to ensure equitable opportunities.** Non-biological children, including orphans or those living with relatives, are more likely to be engaged in labour and exposed to hazardous tasks than biological children or grandchildren of household heads. Policies and programs must therefore specifically identify and support these vulnerable children, for instance, through social protection measures or targeted educational support.

The policy brief is based on the study:

Isoto R.E, Schilling F., Shortall P., Bashaasha B. and von Braun J. (2026) Child labour in smallholder coffee systems in Uganda: prevalence, determinants and education trade-offs. (unpublished)

The research was developed within the frame of the FOOD Costing and Internalisation of Externalities for System Transition (FOODCoST) project funded by the Horizon Europe Framework Programme (project number: 101060481).

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Environmental Externalities in Coffee Production in Uganda

1. Background

Global food systems generate substantial environmental externalities that are not reflected in market prices. These include costs to the environment such as greenhouse gas emissions, biodiversity loss, soil degradation, deforestation and chemical pollution (von Braun and Hendriks 2023). Quantifying and correctly pricing these externalities can incentivise producers to adopt sustainable practices that protect the environment and help consumers to make informed choices about products.

In Uganda, two environmental externalities were addressed by our studies in the context of coffee production: land-use change and the use of chemical inputs.

In the last 5 years, the area of land used to produce coffee in Uganda has increased by about 5% (USDA Foreign Agricultural Service, 2025b) and coffee production is estimated to account only for around 6% of forest loss nationally (Pendrill et al., 2022).

More than 90% of Ugandan coffee is exported, with the European Union representing a key destination (Uganda Coffee Development Authority, 2025; USDA Foreign Agricultural Service, 2025a). In light of this, the EU has been acting to reduce environmental externalities of imported commodities. The EU Regulation on Deforestation-free Products (EUDR), adopted in 2023, will require importers to demonstrate that coffee placed on the EU market was not produced on land deforested after 2020.

KEY TAKEAWAYS

- **Only 6% of coffee plots were established on formerly forested land**, with most deforestation occurring more than six years ago.
- **85% of coffee plots have shade trees or intercrops**, showing that agroforestry and tree-based production systems are widespread.
- **21% of households use pesticides on coffee plots**, including profenofos and cypermethrin, active ingredients approved in Uganda but not authorized for use in the EU.
- **On 13% of plots pesticide spraying occurs close to homes, roads/ paths, and water bodies**, and often these lack the recommended 10-meter buffer or live fence.
- Sustainable intensification of coffee production will benefit from **safeguards to prevent environmental externalities**.

In parallel, patterns of agro-chemical applications are relevant in coffee-producing systems. In many contexts, rising production intensity has been associated with greater reliance on synthetic pesticides to manage pests and diseases such as coffee leaf rust, coffee wilt disease, and the coffee berry borer (Kansiime, M. K. et al., 2017; Kyalo et al., 2024). Where pesticide use is poorly targeted or applied preventively, this may raise concerns about potential risks to human health and the environment. Addressing this is critical

for achieving equitable and environmentally sustainable growth in line with the Sustainable Development Goals and the Comprehensive Africa Agriculture Development Programme.

The evidence in this report is based on primary data collected in October 2024 from 491 coffee-producing households (579 coffee plots) across five regions in Uganda, namely Ankole, Buganda North, Buganda South, Elgon and Toro. The brief seeks to quantify environmental externalities in smallholder coffee production and provide an evidence base for developing policies to reduce negative externalities and support sustainable coffee production. Specifically, the analysis explores the scale of land use change and the prevalence of pesticide use among smallholder coffee farmers in Uganda.

2. Land Use Change

The expansion of coffee production in Uganda has had some impact on deforestation (6%), but agroforestry practices such as shade trees and intercropping remain common.

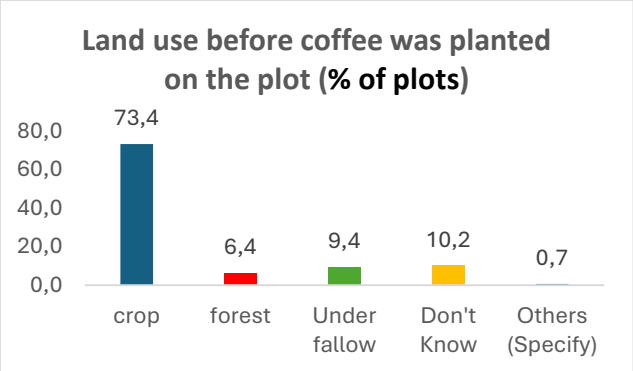

Figure 1: Land use before coffee was planted on the plot.

Source: Own data

Our results indicate that only 6% of coffee plots were established on land that was previously occupied by forest, while 13% involved tree removal more broadly, regardless of prior land use. The majority of the coffee plots were previously grown with crops other than coffee (74%), with the rest as fallow land (9%) (Figure 1).

Broken down by region, deforested plots are almost evenly split between Central (50%) and Western (47%) Uganda, with almost none located in the Eastern region (3%). Our self-reported survey information matches the general deforestation hotspots. As of 2000, 32% of Uganda's land area was covered by trees. From 2001 to 2024, Uganda lost 15% of the 2000 tree cover area, mostly in Western and Central Uganda (Global Forest Watch, 2026; Figure 2).

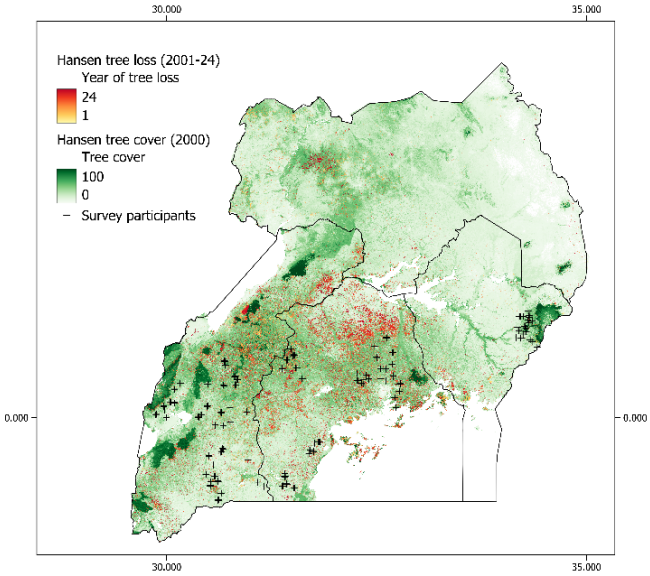

Figure 2: Map of forest loss 2000 – 2024 and sample locations

Source: Own illustration based on Hansen (2024)

Our data indicates considerable variation by the age of coffee plants, with deforestation mainly taking place in coffee plots that were between 7-10 years old and older than 21 years. This suggests that deforestation has declined over time, with only 16% occurring in coffee plots younger than 6 years.

Looking at agroforestry practices more broadly, 68% of coffee plots have shade trees and 69% are intercropped, most often with bananas. Taken together, 85% of coffee plots have either shade

trees or intercrops or both. In order to assess impacts of coffee on land use change from a biodiversity and climate mitigation perspective requires comparing coffee areas with crop land conversion rather than a narrow focus on forest loss.

3. Pesticide Use

Pesticide use among surveyed coffee farmers is limited, though the products used raise potential concerns due to their toxicity profiles.

21% of surveyed farms apply pesticides, including insecticides, herbicides and fungicides, on their coffee plots. On 13% of plots, spraying occurs in close proximity to a home, road, footpath, or water body. Of these sprayed plots, 74% (that is 10% of plots) lack an adequate 10-meter buffer zone or live fence. The primary method of pesticide application is spraying, used by 95% of farmers who applied pesticides. Although pesticide use is low, the products used tend to be toxic[1].

Pesticide use varies across the sample, but pesticides are more likely to be used on larger farms than on smaller farms. The usage rate of farms larger than 1.5 acres is 25% compared to 17% for farms of 1.5 acres or smaller. Pesticide use is higher among members of a farmer organization (36%) as opposed to those not part of a farmer organization (18%).

One method of reducing chemical use, the planting of disease-resistant coffee varieties, is still limited in our sample. Only 9% of coffee plots grow clonal robusta coffee, the lines of Robusta Coffee developed by the National Coffee Research Institute (NaCORI).

The use of fertilizer is limited. Only 10% of households use chemical fertilizers, compared to 30% that use organic fertilizer, mainly farmyard manure.

4. Discussion

The level of environmental externalities described in this brief, as well as the potential for their internalization and the pathways for sustainable intensification, depend on the structure of the underlying coffee production system.

Coffee production in our sample is predominantly smallholder-based, marked by small landholdings, low organizational membership, and limited certification. The median landholding during the last season was 2 acres. While 21% of households rented in additional land (ranging from 0.125 to 4 acres), most farmers cultivated only a single coffee plot (87%).

Farmer organization membership is relatively low. 18% of households reported that at least one member belongs to a farmer organization. Out of these 18%, 38% are affiliated with a coffee cooperative and 29% produce certified coffee. Overall, this corresponds to 6% of households (n=27) producing certified coffee. Farmers most frequently named coffee exporting companies or cooperatives, rather than independent certification bodies, as the entities responsible for certification.

[1] The most commonly used active ingredient is profenofos, which is permitted for use in Uganda, but not approved in the EU. Profenofos presents three major risks: acute neurotoxicity to humans causing convulsions and respiratory failure (FAO & WHO, 2007); extreme aquatic toxicity leading to fish kills (El-bouhy et al., 2023); and harm to pollinators like bees through high contact/oral toxicity (Lewis et al., 2016).

Most coffee is sold to village agents, whereas only 3% of farmers sold to cooperatives and 2% to a coffee export company.

Ongoing policy initiatives may substantially shape the trajectory of environmental externalities in Uganda's coffee sector.

Launched in 2017, Uganda's *Coffee Roadmap* envisions a 20% expansion in production area and a three- to fourfold increase in yields by 2030. The strategy identifies improved access to and use of quality fertilizers, herbicides, and pesticides as a key lever to achieve these targets. While such intensification may enhance productivity and farmer incomes, it also has the potential to alter the scale and nature of environmental externalities associated with smallholder coffee production.

POLICY RECOMMENDATIONS

The findings of this study point to the need for targeted policy responses:

Deforestation

- Invest in research to understand the environmental impacts of different coffee production systems. A deeper assessment of the biodiversity and greenhouse gas emission implications is needed, especially when coffee cultivation replaces forests or alternative agricultural production systems (such as maize in monoculture, or mixed cropping systems). Otherwise, deforestation patterns may be insufficiently captured.
- Scrutinize the effects of EU regulations on deforestation, assess compliance costs, and strengthen support for monitoring and regulatory uptake.

Pesticide Use

- Fund agricultural extension services to promote integrated pest management and train farmers in safe selection and use of pesticide products.
- Support the adoption of sustainable practices, including the adoption of disease-resistant coffee varieties.
- Support independent research on pesticides used in coffee production, especially those banned in the EU, to guide evidence-based regulatory action.
- Strengthen monitoring and enforcement of environmental and safety standards in the supply and use of pesticides.

Market Transparency and Regulations

- Identify and implement measures that prevent the passing on of costs related to EU coffee value chain regulations onto the primary producers, and small farmers in particular. These costs should mainly be covered by the processing and consumption side of markets.

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An assessment of negative externalities in Uganda's coffee value chain: quantification and internalisation strategies

1. Background and motivation

Uganda is Africa's second-largest coffee producer and leading exporter. Coffee is the country's most important agricultural export, contributing substantially to employment, export earnings and rural livelihoods. Approximately 90% of Uganda's coffee is supplied to international markets, making the value chain highly export-oriented.

Despite these economic benefits, the coffee value chain generates negative environmental, health and social externalities, including deforestation, biodiversity loss, child labour, insufficient income among smallholder farmers and human toxicity from agrochemical exposure. With global coffee demand currently increasing by about 2.3% annually, production pressure and associated negative externalities are likely to intensify. This underscores the need to quantify these hidden costs in physical and monetary terms and implement internalisation measures to reduce, prevent, compensate for, or mitigate their impacts.

Although the literature documents negative externalities in agricultural value chains, most studies often assess these externalities in isolation, focus on a single dimension of externality, or value chain stage and do not monetise the externalities. In Uganda's coffee value chain, no study has simultaneously estimated and monetised the environmental, health and social externalities across all stages. This study contributes to the literature by simultaneously estimating and monetising negative environmental, health and social externalities across Uganda's coffee value chain.

2. Objectives and analytical approach

The study had three main objectives:

i. To identify and quantify environmental, health and social externalities in Uganda's coffee value chain
ii. To monetise these externalities to reveal their magnitude
iii. To examine the likelihood of value chain actors adopting internalisation for the externalities

True cost accounting approaches were employed to estimate and monetise the externalities. Environmental externalities were estimated using a life-cycle assessment approach using characterisation factors. Health externality, mainly health impacts from pesticide exposure, was estimated using disability-adjusted life years. Social externalities, including insufficient income and child labour, were assessed using the living income benchmark and child labour indicators, respectively. Environmental and social externalities were monetised using the True Price methodology, while health externalities were monetised using the value of a statistical life year and the cost-of-illness approach. The system boundary encompassed production, processing and wholesale stages. The functional unit was one tonne of roasted coffee.

Finally, a force-field analysis was conducted with Uganda's coffee value chain actors, including farmers, exporters, roasters and wet processors,

to explore their likelihood of adopting internalisation options for externalities and to identify drivers and barriers to adoption.

3. The magnitude of hidden costs

The results revealed substantial physical quantities and monetised costs of environmental, health and social externalities in Uganda's coffee value chain. The total externality costs amounted to 3,665 USD (range 3,079-4,383) per tonne, nearly double the export price of 2,000 USD per tonne. Environmental externalities accounted for the largest proportion of the hidden costs at 55%, driven by greenhouse gas emissions, soil erosion and air and water pollution. Social costs accounted for 44%, mainly from child labour and insufficient income. Health costs accounted for the smallest proportion of total costs (1%), primarily from pesticide exposure. Cultivation contributed the largest proportion of the total cost (77%), followed by primary and secondary processing (8% each), wholesale (5%) and waste-related emissions (2%). As global demand for coffee rises, production pressure is likely to aggravate these hidden costs across the value chain, underscoring the need for their internalisation to support the sector's long-term sustainability and competitiveness. Currently, value chain actors responsible for generating these externalities are not accountable for their internalisation, increasing the risks of further harm to the environment, human health and social welfare.

4. Willingness of value chain actors to internalise externalities

The force field analysis revealed that actors in Uganda's coffee value chain were willing to adopt internalisation measures for externalities. Economic incentives, particularly subsidies for renewable energy sources such as solar and low-emission machinery like hybrid vehicles, were ranked highly (4 or above on a 5-point Likert scale, where 5 is highly likely and 1 is unlikely to adopt). Subsidies were perceived as beneficial for reducing initial financial barriers to adoption. However, reliance on subsidies could create dependency and adoption by actors may decline if subsidies are removed. Regulatory measures, such as laws and bans, were also ranked four or higher, indicating a willingness to comply. Farmers reported that they would adhere to mandatory regulations, including those against child labour and deforestation, because they have no choice but to comply. Similarly, all processors, roasters and exporters indicated a willingness to comply with regulations, highlighting that adherence was essential to maintain access to the international market, ensure legal operation and avoid legal and financial repercussions. By contrast, voluntary measures were consistently ranked the lowest, likely because adopting them requires value chain actors to bear the associated costs without external motivation. However, willingness to adopt voluntary measures increased when value chain actors perceived direct benefits, such as cost savings, increased productivity, or market access.

5. Policy implications and contribution

Uganda's coffee value chain generates substantial environmental, health and social externalities that are nearly double the current market value of coffee, posing significant risks to long-term sustainability and competitiveness. As production expands to meet rising global demand, these externalities will intensify unless deliberate internalisation measures are implemented. Policy interventions should prioritise internalisation measures that actors are most willing to adopt, such as subsidies for low-emission machinery, like hybrid vehicles.

Subsidies for low-emission machinery, such as hybrid vehicles can reduce financial barriers to adoption, but must be designed with clear exit strategies to avoid long-term financial burdens on the government. The cultivation stage is the most critical point for reducing externalities, given its intensive use of inputs and high externality costs. Prioritising the cultivation stage, while still considering interventions across other value chain stages, offers the greatest potential to mitigate negative externalities in Uganda's coffee value chain.

Farmers could adopt sustainable practices, such as agroforestry and certification standards, to internalise externalities. However, these internalisation measures may entail higher production costs and increased labour demand, which could limit adoption unless downstream actors, such as consumers and exporters, support these transitions by paying fair and premium prices. Effective internalisation of externalities requires a mix of economic incentives (e.g., subsidies), regulatory measures (e.g., bans on deforestation) and voluntary measures (e.g., certification standards). Economic incentives alone are insufficient; regulatory measures, particularly those involving fines, are essential to enforce compliance, while voluntary measures can succeed when linked with direct benefits such as market access.

The policy brief is based on doctoral research conducted by P. Atieno.

This policy brief was developed in preparation for the Workshop "True cost of food: policies for sustainable production of coffee and other export–oriented crops in East Africa", 25-26.02.2026, Entebbe, Uganda, organized within the frame of the FOOD Costing and Internalisation of Externalities for System Transition (FOODCoST) project funded by the Horizon Europe Framework Programme (project number: 101060481).

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Ethiopian Coffee Value Chain and Compliance with EUDR

1. Background

Agricultural trade plays a central role in economic growth and rural transformation across East Africa. Export-oriented crops such as coffee generate foreign exchange earnings, employment, and livelihood opportunities for millions of smallholder farmers. In Ethiopia, coffee is not only a leading export commodity but also a strategic sector linked to forest conservation, biodiversity, and rural welfare.

However, global agricultural value chains often generate social and environmental externalities that are not reflected in market prices. These include deforestation, biodiversity loss, greenhouse gas emissions, child labour, underpayment of workers, and health risks. These hidden costs are frequently borne by producing countries while remaining invisible to consumers and policymakers in importing regions.

The European Union Deforestation Regulation (EUDR) represents a significant policy shift aimed at internalizing environmental externalities by requiring that commodities placed on the EU market, including coffee, are deforestation-free, legally produced, and traceable to the plot of land. For Ethiopia and other East African exporters, EUDR compliance intersects directly with debates on the true cost of food, sustainability standards, and market access.

This policy brief synthesizes insights from the EUDR-related research, presentations, and reviews with a particular focus on the Ethiopian Coffee value chain. It provides policy-oriented recommendations, focusing on pathways to internalize environmental and social externalities in export-oriented coffee value chains.

KEY TAKEAWAYS

- **EU's market share is significant:** One-third of Ethiopian coffee export earnings is from European countries.
- **Compliance is not easy:** Even though there is considerable progress, Ethiopia faces "Information," "Product," "Market," & "Procedural" incompliance.
- **Some may comply early:** Relatively, forest & semi-forest coffee sold by investors/ cooperatives could comply with EUDR early.
- **Traceability systems are foundational.** Ethiopia's national digital coffee traceability platform demonstrates the feasibility of end-to-end monitoring from farm to export.
- **Non-compliance carries high risks.** These include market exclusion, reputational damage, and income loss for farmers, and macroeconomic impacts on export earnings.
- **Prioritization is important:** Alignment among forestry, trade, digital governance, and smallholder support policies, phase-based compliance, cooperative promotion, and product flow control are important for long-term compliance and competitiveness.

2. The Ethiopian forestry sector

Ethiopia's forestry sector is characterized by a mix of natural (10%), semi-forest (35%), garden (50%), and plantation (5%) coffee production systems.

Coffee production is deeply intertwined with forest ecosystems, particularly in the southwest, where wild and semi-wild coffee grows under the forest canopy.

The sector faces pressures from agricultural expansion, fuelwood extraction, and land-use change. At the same time, participatory forest management (PFM) initiatives, cooperatives and unions expansion, and community-based conservation models have demonstrated positive impacts on forest cover and livelihoods.

EUDR introduces a legal requirement that coffee (Ethiopian export commodity) exported to the EU must not originate from land deforested after 31 Dec 2020. This places forest governance, land registration, and geospatial monitoring at the centre of trade compliance. Strengthening forest monitoring systems, satellite-based deforestation detection, and legal clarity on land use is therefore both an environmental necessity and a trade imperative.

3. Coffee value chain

The Ethiopian coffee value chain is structured around a wide base of smallholder producers who account for the majority of national coffee output, linked through cooperatives, cooperative unions, private traders, suppliers, washing stations, and processing facilities to a relatively concentrated group of exporters, all operating under the oversight of regulatory authorities such as the Ethiopian Coffee and Tea Authority (ECTA).

This structure reflects a dual characteristic of fragmentation at the production level and consolidation at the export stage, with market governance shaped by a combination of strong state regulation and active private-sector participation.

Value chain conduct has increasingly been influenced by international sustainability standards, growing traceability requirements, quality differentiation between specialty and commercial coffee, and evolving contractual relationships between exporters & international buyers.

With the introduction of the European Union Deforestation Regulation (EUDR), value chain conduct must now also incorporate plot-level geolocation data, formal due diligence statements, and robust verification mechanisms, making digital traceability platforms, integrating farm mapping, mobile data collection, geospatial databases, and compliance dashboards, essential instruments for operationalizing regulatory compliance and maintaining market access.

Performance indicators include export revenue, farmer income, market diversification, and environmental sustainability. While Ethiopia maintains a strong reputation for quality coffee, challenges persist in productivity, infrastructure, and value addition.

EUDR compliance may initially increase transaction and monitoring costs. However, in the long run, it can enhance value chain transparency, reduce environmental risk, and strengthen Ethiopia's position in premium and sustainability-sensitive markets. Half of the coffee produced is consumed locally. Unprocessed row coffee export is dominant in Ethiopia. Traceability and product uniformity is high in coffee originating from forest management communities, cooperatives, and investors. These will have high probability of early and full compliance.

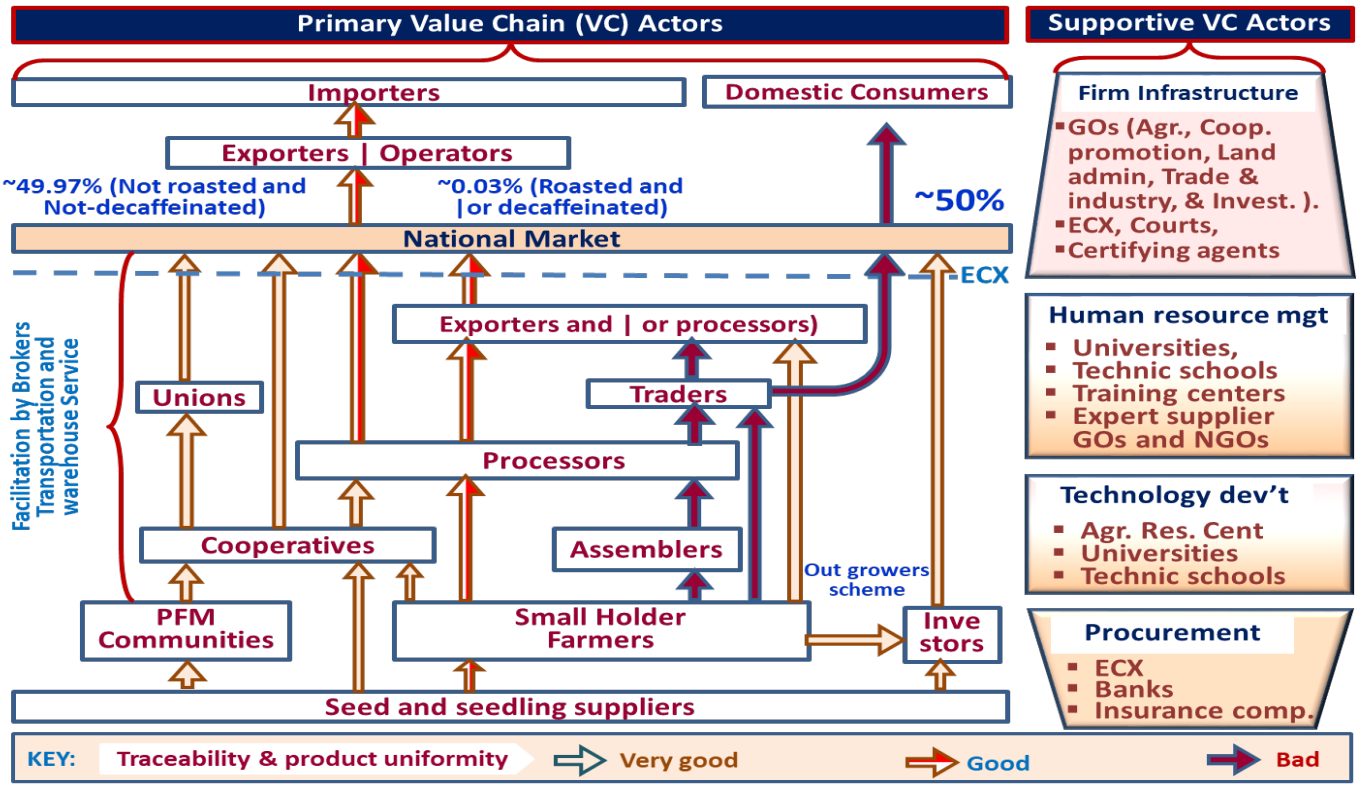

Figure 1: Value chain map of Ethiopian coffee export

4. Opportunities and challenges

Opportunities of Compliance

- **Forest Conservation Incentives:** EUDR aligns trade incentives with forest protection objectives.
- **Market Differentiation:** Compliance may position Ethiopian coffee as environmentally responsible and premium.
- **Improved Governance:** Strengthened land registration and digital monitoring systems enhance transparency.
- **Alignment with SDGs and CAADP:** Compliance contributes to climate action, life on land, and sustainable economic growth.

Challenges and Risks of Non-Compliance

Even though there is considerable progress to solve, Ethiopia faces "Information", "Product", "Market", & "Procedural" incompliance that may result:

- **Market Exclusion:** Loss of access to the EU market, a major destination for Ethiopian coffee.
- **Income Loss:** Reduced export volumes may directly affect smallholder farmers' livelihoods.
- **Trade Diversion Risks:** Shifting exports to less-regulated markets may reduce sustainability incentives.
- **Administrative Burden:** Smallholders face capacity constraints in meeting geolocation and documentation requirements.
- **Cost Implications:** Investments in mapping, digital systems, and verification increase short-term costs.

5. Prospects & Scenarios of EUDR

Full Compliance Scenario

Ethiopia successfully implements a nationwide traceability system, integrates geospatial data with forest monitoring, and aligns regulatory frameworks. This scenario leads to sustained EU market access, premium pricing opportunities, and strengthened forest governance.

Partial Compliance Scenario

Compliance is achieved through coffee from selected regions, such as Oromia and the South West Ethiopia regions, which have larger forest and semi-forest areas, and is also sourced from cooperatives/unions, and private investors, while other areas lag. This creates segmentation within the value chain and may disadvantage smaller producers without digital access.

Non-Compliance/Trade Diversion Scenario

Inability to meet EUDR requirements results in reduced EU exports & redirection toward markets with lower environmental standards. While short-term trade may continue, long-term sustainability and competitiveness are likely to decline.

Based on the recent proactive efforts of the government and value chain actors, there will be a high probability of near full compliance.

6. POLICY RECOMMENDATIONS

Strengthen National Traceability Infrastructure

- Scale up the national digital coffee traceability system to ensure universal plot-level mapping.
- Ensure interoperability between forestry databases, ECTA platforms, and customs systems.

Enhance Smallholder Support

- Provide technical assistance and training on geolocation mapping and compliance requirements.
- Offer financial support or cost-sharing mechanisms to reduce the burden of compliance on small farmers.

Integrate Forest Governance and Trade Policy

- Align forest monitoring systems with trade compliance mechanisms.
- Expand participatory forest management and agroforestry incentives in coffee-growing regions.

Adopt a True Cost Accounting Approach

- Use TCA results to inform pricing, taxation, and incentive schemes.
- Institutionalize TCA frameworks to quantify environmental and social externalities in coffee production.

Promote Regional Cooperation

- Collaborate with East African countries to harmonize traceability standards and share best practices.
- Engage in dialogue with the EU to ensure proportional and development-sensitive implementation.

Encourage Private Sector Engagement

- Incentivize exporters and cooperatives to invest in compliance systems.

- Promote public–private partnerships for digital innovation and data management.

Monitor Long-Term Impacts

- Conduct periodic impact assessments on forest cover, farmer income, and trade performance.
- Develop scenario-based planning to anticipate regulatory evolution in global markets.

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Berihun Tefera, Habtemariam Kassa, and Tigest Zelalem. 2025. Analysis of Ethiopian Coffee Value Chain for Compliance with European Union Deforestation Regulation. Trees, Forests and People, 22, 100978. https://doi.org/10.1016/j.tfp.2025.100978

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Berihun Tefera, Habtemariam Kassa, and Tigest Zelalem. 2025. Analysis of Ethiopian Coffee Value Chain for Compliance with European Union Deforestation Regulation. Trees, Forests and People, 22, 100978.

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Estimating and internalising externalities in Kenya's green bean value chain: implications for stakeholder and policy actions

1. Background

Growing international trade demand for fresh produce drives producers in the Global South to expand and intensify crop production for export, creating substantial negative externalities. Negative externalities adversely affect the environment (such as with air and water pollution) and exacerbate threats to human health and social welfare (such as child labour and low wages). The 2025 EAT-Lancet Commission identified global food systems and value chains as dominant drivers of five planetary boundary transgressions, including biodiversity loss, blue water scarcity, climate change, eutrophication and land system change. The negative impacts of food systems persist despite 196 countries adopting the 2022 Kunming-Montreal Global Biodiversity Framework, which set targets to reduce negative externalities.

Kenya's green bean value chain is a pertinent example of a fresh produce value chain that has responded to international market growth. Green beans in Kenya are primarily grown for export to Europe and the United Kingdom, generating income for farm households, packhouse operators, traders and hired workers. However, Kenya's green bean value chain relies extensively on fertilisers, pesticides, manual labour, irrigation and refrigeration that generate negative environmental, health and social externalities. Yet, no study has monetised negative externalities in the green bean value chain in Kenya or elsewhere. Estimating these externalities and identifying options for internalising them could ensure a more environmentally sustainable, health-protective and socially equitable value chain.

This study provides the first comprehensive analysis of negative externalities in Kenya's green bean value chain, in light of three objectives:

i. To identify and quantify negative environmental, health and social externalities in the green bean value chain in Kenya.
ii. To monetise these externalities to reveal their comparable magnitude.
iii. To identify internalisation options for these externalities and explore stakeholders' willingness to adopt the identified strategies.

Data were collected through a literature review, interviews and focus group discussions. Life cycle assessment, True Price methodology, the value of statistical life years and multi-criteria decision analysis were used to analyse the data, covering production (farm), packhouses, trade and consumption stages in Kenya. The environmental externalities estimated included air, soil and water pollution, greenhouse gas (GHG) emissions, land occupation, blue water use and soil degradation. Health externalities (health impacts from air pollution and pesticide exposure) and social externalities (child labour and the living income gap) were also estimated. The study provides insights to guide stakeholders, government and policymakers in developing and implementing strategies to encourage accountability, action, transparency and responsibility for externalities, ensuring planetary and human health and social welfare.

2. Costs of negative externalities in the green bean value chain

Kenya's green bean value chain creates substantial negative environmental, health and social externalities. In 2022, total costs of negative externalities were estimated at 2,242.58 USD (range 2,096.45–2,389.65) per tonne of green beans, comprising 1,367.10 USD (range 1,226.62–1,508.52) in environmental costs, 13.98 USD (range 8.33–19.63) in health costs and 861.50 USD in social costs. The total external costs were almost three times the market price of 780 USD per tonne of green beans in Kenya and slightly higher than the export price of 2,171 USD per tonne. Smallholder farmers receive even lower farmgate prices (420 USD).

Considering 69,124 tonnes of green beans produced in Kenya in 2022, the total external costs were estimated at 124.03 million USD (range 115.93–132.20), at least twice the 53.92 million USD market value of green beans in Kenya and almost three times the export value (42.15 million USD). Environmental externalities accounted for 86.87 million USD (range 79.16–94.65), driven mainly by scarce blue water use at 53.77 million USD (range 52.62–54.92). Health externalities accounted for 0.97 million USD (range 0.58–1.36), primarily from pesticide exposure at 0.95 million USD (range 0.56–1.33). Social externalities (36.20 million USD) reflected a large living income gap (35.04 million USD) among smallholder farming households and the presence of child labour (1.16 million USD). The environmental costs were highest due to more ecological externalities, particularly from input-intensive activities on green bean farms. Including the costs of GHG emissions from air-freighting green beans to the United Kingdom increased the total external costs by 39.27 million USD (range 36.40–42.14), to three times the market value of green beans in Kenya and almost four times the export value.

In 2022, the average retail price of one kilogram of fresh green beans in Europe was 4.33 USD, equivalent to 4,330 USD per tonne. A retail price of 6,572.58 USD (comprising the current retail price of 4,330 USD and an additional 2,242.58 USD in negative externality costs) per tonne of fresh green beans in Europe would make the produce unaffordable for budget-constrained, price-conscious consumers. The findings underscored the need for stakeholder and policy actions to internalise the negative externalities in Kenya's green bean value chain without making fresh green beans unaffordable for poorer consumer segments.

3. Stakeholders' willingness to adopt internalisation options

Besides validating 57 internalisation options identified from literature, value chain stakeholders (farmers, packhouse operators and traders) identified 21 additional financial incentives, mandatory strategies and voluntary actions, demonstrating the importance of co-creating solutions with stakeholders. These ranged from targeted input subsidies and grants to fines, permits, standards and voluntary certifications tailored to different externalities and stakeholders. Value chain stakeholders were willing to adopt 60 of the 78 identified internalisation options to address the negative environmental, health and social externalities. Farmers, packhouse operators and traders significantly preferred financial incentives over mandatory and voluntary internalisation measures. Farmers were more willing to adopt financial incentives than packhouse operators and traders, reflecting a preference for strategies that reduce transaction costs and risk to their profit.

Value chain stakeholders were unwilling to adopt many of the voluntary measures, especially those requiring a high initial capital investment, such as electric trucks and vacuum cooling, possibly due to risk aversion. Stakeholders are legally obligated to comply with mandatory measures, such as fees, fines, permits and taxes. Their acceptance of mandatory options could have indicated a fear of repercussions for non-compliance. Some stakeholders grudgingly accepted mandatory strategies and contemplated passing internalisation costs on to others

6. POLICY RECOMMENDATIONS

The findings of this study point to the need for a combination of tailored financial incentives, mandatory strategies and voluntary internalisation measures:

1. **Targeted financial incentives are crucial to reducing negative externalities.** Targeted grants and subsidies for sustainable inputs and technologies could incentivise value chain stakeholders to reduce GHG emissions and air, soil and water pollution. The Kenyan government's targeted subsidies for biopesticides and biofertilisers could incentivise farmers to reduce GHG emissions and air, soil and water pollution. However, subsidies pose a fiscal strain on public budgets. Grants and concessional loans from development banks could support the adoption of carbon capture and storage technology in packhouses and electric trucks among traders to reduce air pollution and GHG emissions.
2. **The Kenyan government must strengthen the capacity of public regulatory agencies to monitor and penalise value chain stakeholders who generate negative externalities.** Stakeholders in global food value chains often behave opportunistically to increase productivity and maximise profits at minimum cost, while generating negative externalities. Influential value chain stakeholders may lobby and manipulate politicians and those in authority to prevent or bias government intervention in their activities that generate externalities. Addressing these potential challenges involves increasing funding for law enforcement monitoring of value chain activities and zero tolerance to corruption. Specifically, strictly enforced and monitored pesticide regulations in line with the European Union's maximum residue limits and ban on highly toxic pesticides could reduce pesticide misuse. Likewise, stringently enforced and routinely monitored water-use permits could reduce blue water withdrawal by farmers and packhouse operators. Moreover, packhouse operators' compliance with strictly enforced and monitored limits for air pollutants could reduce human exposure to toxins from operating cold rooms.
3. **Exporters need to provide fair minimum prices for contracted farmers to increase farm households' income from green bean sales.** In addition, there is a need for contractual agreements between farmers and exporters that allow green bean prices to increase in response to rising production costs, thereby safeguarding farmers' profits.
4. **Certification schemes are critical for reducing negative externalities.** There is also a need for farmers to join certification schemes, such as Fairtrade, GlobalGAP and organic farming, to foster compliance with the European Union's sustainability standards and reduce negative externalities.
5. Short message campaigns, social media and meetings targeting farmers, packhouse operators and traders can build awareness of negative externalities and encourage the adoption of voluntary internalisation strategies.

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Odhiambo, V. O., Hendriks, S. L., Selomane, O. & von Braun, J., 2026. Internalising externalities in Kenya's green bean value chain: implications for stakeholder and policy actions. Open Agriculture, (in the press). https://doi.org/10.1515/opag-2025-0494.

The policy brief is based on two studies:

Odhiambo, V. O., Hendriks, S. L. & Selomane, O., 2026. Quantifying and monetising externalities in Kenya's green bean value chain: implications for stakeholder and policy actions. Journal of Agriculture and Food Research, 26(2026): 102639. https://doi.org/10.1016/j.jafr.2026.102639.

Odhiambo, V. O., Hendriks, S. L., Selomane, O. & von Braun, J., 2026. Internalising externalities in Kenya's green bean value chain: implications for stakeholder and policy actions. Open Agriculture, (in the press). https://doi.org/10.1515/opag-2025-0494.

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Quantifying and mitigating environmental, health and social externalities in Malawi's groundnut value chain

1. Background and motivation

Groundnut is a strategic crop in Malawi's food system, central to household nutrition, rural livelihoods and foreign exchange earnings. It is the most widely grown legume in the country, produced predominantly by smallholder farmers, who account for approximately 93% of national output. Groundnut also plays a key role in Malawi's agricultural commercialisation agenda under Vision 2063, which seeks to transform agriculture from subsistence to a productive, market-oriented and environmentally sustainable sector.

Despite its economic and nutritional importance, the groundnut value chain generates significant negative environmental, health and social externalities. These include greenhouse gas emissions, water and air pollution, aflatoxin exposure, pesticide-related health risks, child labour and persistent income gaps among producers. As demand for groundnut increases domestically and regionally, a shift toward more intensive, commercialised production is likely. Without deliberate safeguards, such a transition risks amplifying these hidden costs, undermining both sustainability and social equity. While global studies increasingly highlight the true cost of food systems, most analyses are highly aggregated and provide limited guidance for country-specific policy action. Moreover, existing value-chain studies tend to focus on single dimensions of externalities, particularly environmental impacts, with little integration of health and social dimensions. This research addressed this gap by providing a comprehensive, value-chain-level assessment of externalities in Malawi's groundnut sector.

2. Objectives and analytical approach

The study had three main objectives:

i. To identify and quantify environmental, health and social externalities along the groundnut value chain in Malawi
ii. To monetise these externalities to make hidden costs visible and comparable
iii. To assess stakeholders' willingness to adopt measures that internalise these externalities

A mixed-methods approach was applied. Environmental externalities were estimated using a life-cycle assessment (LCA) framework based on the ReCiPe methodology, covering the production, aggregation, processing, retailing and consumption stages. Externalities in the environmental dimension included air pollution, GHG emissions, water pollution, land degradation and scarce blue water use. Health externalities were quantified using disability-adjusted life years (DALYs), with a focus on aflatoxin exposure and pesticide-related health risks. Social externalities were assessed through indicators of child labour and the living income gap. All externalities were monetised using established valuation factors, including the value of statistical life for health impacts. To complement the quantitative analysis, focus group discussions and key informant interviews were conducted with farmers, traders, processors and other stakeholders to explore

perceptions of externalities and willingness to adopt internalisation measures.

3. The magnitude of hidden costs

The analysis revealed substantial hidden costs associated with Malawi's groundnut value chain. Total externality costs were estimated at approximately 2,220 USD per tonne of groundnut (range 1,570 to 3,480 USD per tonne). These hidden costs were more than double the prevailing farm-gate and market prices of groundnut, estimated at 350 and 650 USD per tonne, respectively. Environmental externalities dominate the cost structure, accounting for around 83% of total externality costs. Health externalities, particularly those associated with aflatoxin exposure, impose high societal costs through lost productivity and increased disease burden. Child labour accounted for the highest hidden cost compared to the living income gap in the social dimension, resulting from a combination of poverty, labour-intensive farming systems, limited access to education, limited access to markets and low productivity. A shift from predominantly smallholder production toward more commercialised systems could increase total hidden costs by approximately 43% per tonne of groundnut. While commercialisation may improve yields, incomes and market access, it can also intensify externalities unless accompanied by targeted measures to address negative externalities. Therefore, efforts to commercialise must put in place safeguards to ensure that commercialisation does not cause greater harm to people and the planet.

4. Stakeholder willingness to internalise externalities

The qualitative analysis shows that stakeholders across the value chain recognise the presence of negative externalities and broadly support measures to address them. There is strong consensus around incentive-based and preventive measures, such as certified groundnut seeds, mandatory grading and sorting and premium prices for graded groundnut, while compensatory and punitive measures face resistance. Furthermore, willingness to adopt internalisation measures varies by stakeholder group and externality type. Processors were the most willing to adopt measures, reflecting stronger regulatory oversight and reputational concerns, while traders were the least willing to adopt measures due to increased transaction costs. Stakeholders were more willing to adopt internalisation measures to address social externalities, followed by environmental and health externalities. This could be because these impacts are highly visible and directly affect livelihoods.

6. Policy recommendations and contribution

This study provides the first integrated quantification and monetisation of environmental, health and social externalities in Malawi's groundnut value chain. By making these hidden costs visible, it offers concrete entry points for prioritising interventions and designing policies to address negative externalities.

While commercialisation delivers economic benefits, without targeted internalisation measures, it risks intensifying environmental, health and social externalities. A one-size-fits-all approach to addressing externalities is unlikely to be effective, as actors along the groundnut value chain face different constraints, incentives and decision environments. Internalisation measures must therefore be tailored to each actor's needs, motivations and perceptions to encourage adoption. Although incentives can be effective, over-

reliance on them may promote short-term compliance rather than sustained behavioural change, disproportionately benefitting larger actors and putting pressure on public budgets. As such, incentives should be carefully designed, appropriately targeted and time-bound and complemented by preventive, mitigative, disincentive and compensatory measures. Importantly, some internalisation measures can address multiple externalities simultaneously, which is critical in resource-constrained settings where stand-alone interventions are costly. For example, integrated pest management can reduce environmental contamination while lowering health risks from pesticide exposure. Prioritising such measures allows stakeholders to maximise impact from limited resources.

At the producer level, smallholders could reduce the use of harmful pesticides, reinforced by disincentives such as taxes on hazardous alternatives and adopt improved seed varieties that require fewer agrochemicals. Mandatory grading and sorting of groundnut, incentivised through premium prices, alongside the use of certified seed, could reduce aflatoxin exposure and associated health risks. Among commercial producers, commercialisation is likely to drive land expansion and increased irrigation, generating significant environmental costs. If unaddressed, these externalities could accelerate land degradation and water depletion. Disincentives such as land expansion licences and levies on water extraction are therefore needed to promote sustainable land and water use. Investment in solar-powered drip irrigation systems would further reduce GHG emissions and pressure on scarce blue water resources.

Addressing child labour in Malawi's groundnut value chain requires collective action. Communities should strengthen and enforce bylaws prohibiting child labour, supported by penalties for violations. Processing companies must adopt child labour policies, including mandatory labour registration and contractual clauses prohibiting child labour in groundnut production. Anonymous reporting systems across the value chain could improve compliance.

The Government of Malawi plays a central role in enforcing regulations, standards and penalties to reduce, prevent and mitigate externalities. This requires clear, comprehensive guidelines, regular inspections and robust reporting systems. Establishing national certification schemes for sustainable agriculture, child labour and aflatoxin exposure, aligned with international standards, could reduce externalities while improving access to higher-value markets.

Non-governmental organisations should support these efforts by designing and implementing programmes such as solar-powered irrigation schemes, promoting drip irrigation and implementing grading and sorting initiatives to reduce aflatoxin exposure. These interventions should be complemented by capacity-building, targeted financial support and strong monitoring systems to ensure effectiveness.

The policy brief is based on doctoral research conducted by M. A. Kamenya.

This policy brief was developed in preparation for the Workshop "True cost of food: policies for sustainable production of coffee and other export–oriented crops in East Africa", 25-26.02.2026, Entebbe, Uganda, organized within the frame of the FOOD Costing and Internalisation of Externalities for System Transition (FOODCoST) project funded by the Horizon Europe Framework Programme (project number: 101060481).

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List of publications that guided the preparation of Workshop materials

Adong, A., Kornher, L., Chichaibelu, B.B., Arslan, A. (2026). The Hidden Costs of Coffee Production in Eastern Africa Value chains. Journal of Sustainable Development. 1-24, https://doi.org/10.1002/sd.70658.

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Hendriks, S., de Groot Ruiz, A., Acosta, M.H., Baumers, H., Galgani, P., Mason-D'Croz, D., Godde, C., Waha, K., Kanidou, D., Von Braun, J. and Benitez, M., 2023. The true cost of food: a preliminary assessment. Science and innovations for food systems transformation, pp.581-601. https://doi.org/10.1007/978-3-031-15703-5_32

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A comprehensive list of publications produced by consortium partners of the EU FOODCoST project can be accessed here: https://www.foodcost-project.eu/scientific-publications/

PROGRAM

DAY 1: Workshop (25 February)

Time	Topic	Speaker/ Responsible persons
08:00 – 09:30h	Arrival and Registration	Irene Nakamatte/ *Makerere University* Luisa Müting/ *ZEF*
09:30 – 11:00h	**Opening**	**Chair: Bernard Bashaasha**/ *Makerere University*
09:30 – 09:50h	Welcome Addresses and Introductions	Goretti Nabanoga/ *Principal CAES Makerere University* Joachim von Braun/ *ZEF*
09:50 – 10:00h	Welcome Address	Rose Ademun/ *Commissioner Livestock Resources, representative of the Permanent Secretary of MAAIF*
10:00 – 10:20h	Keynote speech of Guest of honour	Fred Kyakulaga/ *MAAIF*
10:20 – 10:30h	Keynote: True Cost of Food	Joachim von Braun/ *ZEF*
10:30 – 11:00h	Q&A	Taibu Azah/ *APEX*
11:00 – 11:30h	**Group Picture/Tea/ Coffee Break**	
11:30 – 13:00h	**Africa's Agricultural Export Sector: The True Costs**	**Chair: Dorothy Okello**/ *Makerere University*
	This session presents findings based on new research on environmental and social externalities of export crops in East Africa. It then discusses whether accounting for the true costs of production and processing stages would change the region's production, prices, and trade in export-oriented crops such as coffee and green beans.	
11:30 – 11:45h	Child Labor in Uganda's Coffee Sector *(10 min Presentation + 5 min Q&A)*	Rosemary Isoto/ *Makerere University*
11:45 – 12:00h	Environmental Externalities in Uganda's Coffee Sector *(10 min Presentation + 5 min Q&A)*	Friederike Schilling/ *ZEF* Patrick Shortall/ *ZEF*
12:00 – 12:15h	True Cost Accounting in Kenya's Green Bean Export Value Chain *(10 min Presentation + 5 min Q&A)*	Valiant Odhiambo/ *University of Pretoria*
12:15 – 13:00h	Panel 1: Reflections on the research and on the state and future of export crops in East Africa, with a focus on coffee	1.Alfred Dan Okwir/ *MAAIF* *2.*Joshua Okonya/ *ASARECA* *3.* Victoria Sekitoleko/ *Agribusiness Alliance*
13:00 – 14:15h	**Lunch Break**	
14:15 – 15:30h	**Innovations in sustainable Agri–Food Systems with a Focus on Export Crops**	***Chair:*** **Julius Ecuru/** *icipe*
	This session examines how technological, institutional, and financial innovation can transform export-oriented agri-food systems while strengthening ecosystem services, climate resilience, and social inclusion. It asks who shapes innovation agendas and how smallholders, women, and youth can become active agents of change.	
14:15 – 14:30h	Keynote: Technology and Innovation across export-oriented value chains	Sadik Kassim / *NARO*

14:30 – 15:30h	Panel 2: Reflections on the research and Innovations in sustainable Agri–Food Systems with a Focus on Export Crops	1. Gilbert Asasira /*MAAIF* 2. Rhoda Peace Tumusiime/ *former AUC Commissioner* 3. Denis Kabiito/ *Young Farmers' Federation of Uganda (UNYFA)* 4. Odirilwe Selomane/ *University of Pretoria* *5.* Benjamin Kennedy/ *Welthungerhilfe*
15:30 – 16:00h	**Tea/ Coffee Break**	
16:00 – 17:15h	**Research Insights and Policy Implications for African Agricultural Value Chains**	**Chair: Taibu Azah**/ *APEX*
	This session presents research findings on environmental and social externalities and strategies for their internalization across diverse agricultural export value chains in Africa.	
16:00 – 16:30h	Externalities in Malawi's groundnut value chain	Madalitso Kamenya/ *University of Pretoria*
	Ethiopian Coffee Value Chain and Compliance with EUDR	Berihun Tefera Adugna/ *Bahir Dar University*
16:30 – 17:00h	Q&A	
17:00 – 17:15h	Closing Remarks Day One	Victoria Sekitoleko/ *Agribusiness Alliance*
18:00h	**Dinner reception**	**All**

DAY 2: Workshop (26 February)

Time	**Topic**	**Speaker/ Responsible persons**
8:30 – 9:00h	Arrival and Registration	Irene Nakamatte Luisa Müting/ *ZEF*
09:00 – 10:00h	**Sustainable transformation of Uganda's Coffee Sector**	**Chair: Rosemary Isoto/** *Makerere University*
	This session addresses the distribution of environmental and social costs among actors in the Ugandan coffee value chain. It asks who currently bears these costs, whether tools such as certification effectively address externalities, and how responsibilities for a sustainable transformation of Uganda's coffee value chain can be shared.	
09:00 – 09:15h	Keynote:	Ivan Lule/ *National Planning Authority*
09:15 – 10:00h	Panel 3: Reflections on a Sustainable transformation of Uganda's Coffee Sector	1. Kenneth Magomu/ *Chief Coffee Exporter* 2. Ivan Lule/ *National Planning Authority* 3. Grace Twinamatsiko/ Fairtrade 4. Felix Karimwenda/ Ankola Coffee Producers Cooperative Union
10:00 – 10:30h	**Tea/ Coffee Break**	
10:30 – 11:30h	**Policies on Sustainable value chains and trade**	**Chair: Paul Guthiga/** *Akademiya20263*
	This session discusses the governance of international value chains. It explores how emerging trade regulations, including the EU Deforestation Regulation, are reshaping market access and responsibilities of different actors.	
10:30 – 10:45h	Keynote: Determinants of Coffee Exports in Uganda – Does Trade liberalisation matter?	Maxwell Odongo/ *National Planning Authority*
10:45- 11:00h	Keynote: Comparative Analysis of Price transmission of Cocoa and Coffee Markets in Uganda	Kelvin Joshua Luyombya/ *Makerere University*

11:00 – 12:00h	Panel 4: Policies on Sustainable value chains and trade	1. Henry Nakalet Opolot/ *MAAIF* 2. Jean-Marie Byakweli/ *FAO* 3. Sarah Ssewanyana/ *EPRC*
12:00 – 12:15h	**Closing Remarks and way forward**	Joachim von Braun/*ZEF* Bernard Bashaasha*/ Makerere University*
12:15 – 13:00h	**Lunch Break**	
13:00 – 18:00h	**Field visit to coffee farm: Heritage Kanani Farms, Bunjako Island**	

PARTICIPANTS

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5. **Bernard Bashaasha**/ *Makerere University*
6. **Blessing Ainembabazi**/ Makerere University
7. **Brian Nimwesiga**/ *Fairtrade Uganda*
8. **Denis Kabiito**/ *Young Farmers' Federation of Uganda (UNYFA)*
9. **Dorothy Okello**/ *Makerere University*
10. **Felix Karimwenda**/ *Ankole Coffee Producers Cooperative Union*
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12. **Friederike Schilling**/ *Center for Development Research (ZEF)*
13. **Gilbert Asasira**/ *Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)*
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15. **Grace Twinamatsiko** / *Fairtrade Uganda*
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17. **Irene Nakamatte**/ *Makerere University*
18. **Israel Ssebugenyi**/ *Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)*
19. **Ivan Lule**/ *National Planning Authority (NPA)*
20. **Jean Marie Byakweli**/ *Food and Agriculture Organization of the United Nations (FAO)*
21. **Jeannette Wijnants**/ *Welthungerhilfe Uganda*
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