



INITIATIVE ON
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The True costs of food production in Viet Nam

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Key takeaways

True cost accounting allows for the measurement of hidden impacts of food production on the environment, human health, and society.

- Our findings show that at the national level for all crop sectors:
 - Environmental externalities account for 73% and social for 27% of external cost structure.
 - Major environmental impact sources are land occupation, air pollution, and climate change.
 - Major social impact sources are underpayment of farm workers and the incidence of child labor.
- In NATURE+ sites in Sa Pa and Mai Son districts for the crop sector:
 - External costs represent about 24% of all household crop production costs.
 - Environmental externalities (61%) are greater than social (39%).
 - Land occupation is the most important external impact source, followed by soil degradation and climate change.
 - Under earning (underpayment of workers and/or low farmer profits) are significant social costs, followed by the gender wage gap and the incidence of child labor.

Introduction

The government of Viet Nam aims for food systems transformation at the economic, social, and environmental levels (Socialist Republic of Viet Nam 2023). Sustainable food systems provide food security and nutrition without compromising economic, social, and environmental objectives. However, many agrifood systems generate substantial unaccounted for environmental, social, and health costs. True cost accounting is one method that adds up direct and external costs to find the “true cost” of food production, which can inform policies to reduce externalities or adjust market prices.

The CGIAR Nature-Positive Solutions Initiative (NATURE+) used true cost accounting to understand true costs of food production in two of their focal countries, Kenya and Viet Nam. True cost accounting (TCA) is the systematic measurement and valuation of environmental, social, health, and economic costs to facilitate sustainable choices by governments and food system stakeholders (Baker et al. 2020; von Braun and Hendricks, 2023). It is grounded

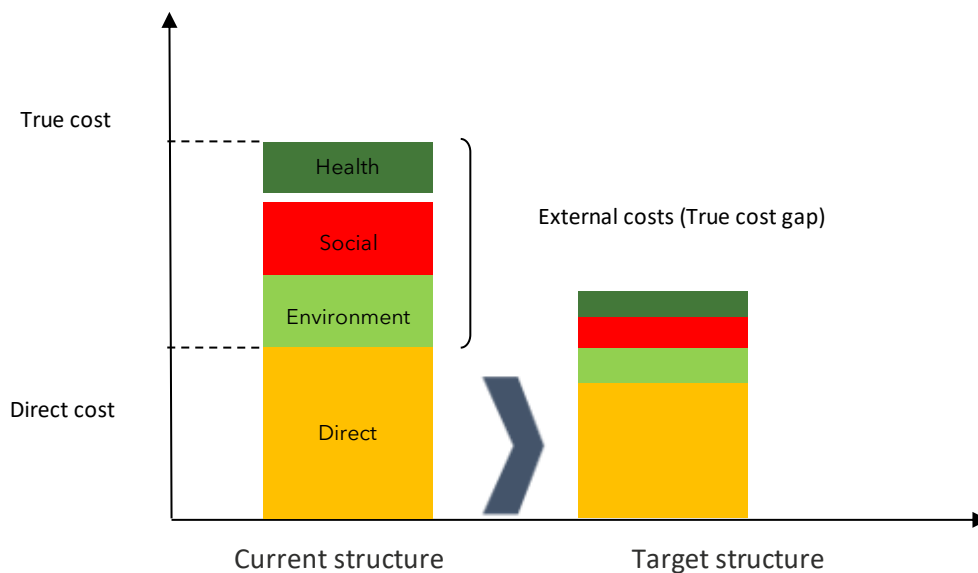
in *The Economics of Ecosystems and Biodiversity* (TEEB) agrifood evaluation framework, which accounts for externalities generated in the use of natural, human, and social capital (TEEB 2018).

By quantifying these hidden costs, the research aimed to establish a foundation for informed decision-making and development of sustainable food system policies in both countries. The study aimed to answer three critical questions. First, what is the true cost of food production systems when considering externalities related to social and environmental costs in Kenya and Viet Nam? Second, how does the cost structure differ by externality type (i.e., social, or environmental) and associated factors in each country? Finally, what policy and investment recommendations can inform decisions aimed at minimizing such external costs and promoting a more environmentally sustainable and socially equitable food system? By identifying and quantifying these hidden costs, governments and other decision makers can better consider tradeoffs and policies. This brief presents results and implications for Viet Nam.

True Cost Accounting

Figure 1 illustrates a hypothetical food system structure, showcasing the incorporation of external costs (externalities) atop direct production costs (e.g., inputs, labor). The externalities, consisting of environmental, social, and health costs, are defined as effects not reflected in the market prices of goods or services.

Figure 1. The True Costs of Food



Source: Adapted from Impact Institute/True Price (2021).

The TCA methodology links four capitals involved in the production system: natural, human, social, and produced. The first three capitals are at the core of the TCA framework, containing food system's essential externalities. The fourth one, produced capital, corresponds to the direct production costs already incorporated by current accounting standards quantified in monetary units and reflected in the product's market price. The analysis in this study is focused on the external costs related to the first three capitals (TCA Handbook 2022). We do not cover human health costs due to lack of comprehensive health-related data and the associated difficulty in collecting these data in household-level surveys. The analysis is therefore focused on environmental and social externalities. Each of these externality types is associated with several external impacts/factors that define the source of the externality. *Environmental externalities* are related to climate change, pollution (air, water, and soil), land occupation and transformation, soil degradation, and scarce water use, fossil fuel depletion and other non-renewables depletion. *Social externalities* are related to underpayment of wages, insufficient income, gender wage gaps, child labor, forced labor, excessive workload, and workplace health and safety. Further details on the TCA methodology applied in this study can be found in Benfica (2024) and Benfica et al. (2024).

Data Sources

The true cost estimates were computed separately at two levels, national and district level. The districts were the NATURE+ implementation sites: Sa Pa in Lào Cai Province and Mai Son in Sơn La Province. Data were collected

through (a) a smallholder household-level primary data survey at district level, (b) a worker-level primary data survey at district level, and (c) national-level data drawn from the Global Impact Database (GID). The household survey covered about 1,150 households in 23 villages across the two districts, using a random sampling strategy.

The worker-level survey covered aspects related to indirect costs associated with the work environment of agricultural laborers that relate to social externalities. The sample was drawn through a non-probabilistic procedure using snowball sampling where workers were recruited by exploiting the data collected in the household survey. It covered 334 agricultural workers (49 in Sa Pa and 285 in Mai Son Districts).

Findings

National-level analysis

We first look at the national level, focusing on crop sectors using the GID data. Total externalities here represent 11% of the value of output, and environmental externalities (73%) dominate social externalities (Table 1).

Table 1. Key findings from the GID analysis, crops sectors

Indicator	
External cost to output ratio (%)	11
Highest external cost by crop sectors (ranked highest to lowest)	<ol style="list-style-type: none"> 1. Paddy rice 2. Vegetables, fruits, and nuts 3. Other crops 4. Sugarcane, sugar beet 5. Cereals and grains 6. Oilseeds 7. Wheat
External cost structure (%)	
Environmental	73
Social	27
Major externality impact source *	<ol style="list-style-type: none"> 1. Land occupation (E) 2. Air pollution (E) 3. Underpayment (S) 4. Child labor (S) 5. Climate change (E)

Source: Authors' own calculation using the Global Impact Database (GID). Notes: * E=Environmental impact, S=Social impact. Crop sectors are bolded in this table.

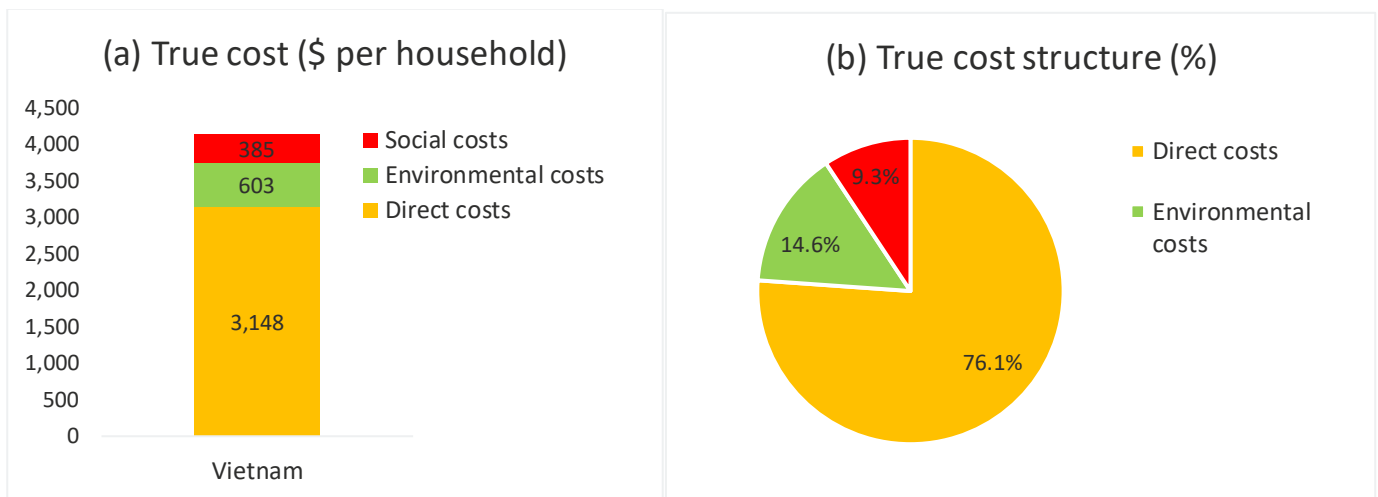
Major sources for the externalities are land occupation, air pollution and climate change (environmental) and underpayment, and child labor (social). Typically, health impacts increase the external costs considerably, but as mentioned we did not collect these data.

Farm-level analysis

We now move to the farm level analysis at the NATURE+ implementation sites, in Sa Pa and Mai Son districts. For this analysis we use the \$ sign to indicate Purchasing Power Parity dollars¹ (PPP). The true cost of crop production is estimated at \$4,136 per household, which is the sum of the direct production cost (\$3,148 per household) and the external costs estimated at \$988 per household, which represents about 24% of the true cost (Figure 2). The breakdown of externalities indicates that environmental costs (15% of true cost, and 61% of the external costs) dominate those related to social impacts that are only 9% of the true costs or 39% of the external costs.

¹Purchasing power parity (PPP) is a metric used to compare economic productivity and standards of living between countries. PPP compares different countries' currencies through a "basket of goods" approach. PPP is the exchange rate at which one country's currency would be converted into another to purchase the same amounts of a large group of products.

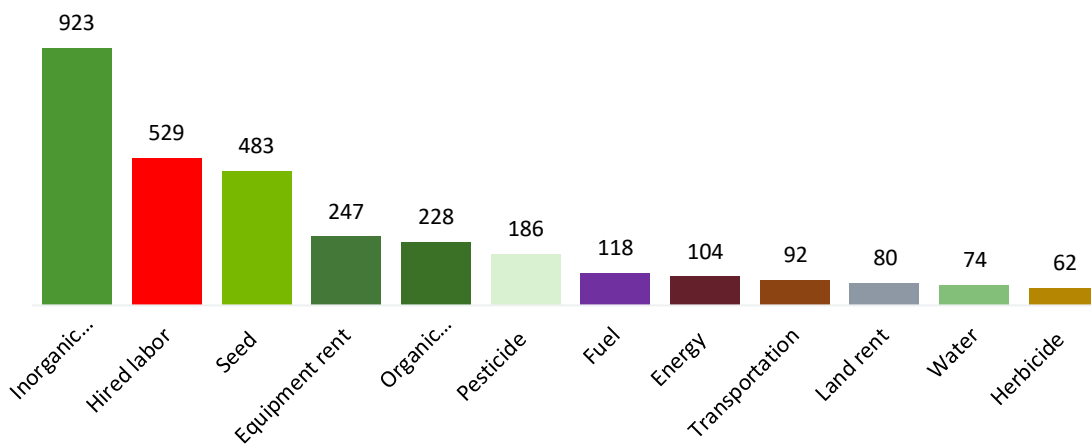
Figure 2. True costs of food production



Source: Authors' own calculation using NATURE+ Vietnam household and workers surveys, and monetization factors (Impact Institute, 2021).
 Notes: N=1,153. All the indicators are measured at the household level.

Figure 3 shows the direct costs of crop production, estimated at \$3,148 per household. This direct production cost equals 35% of gross crop income. Inorganic fertilizer is the highest direct cost, indicating a substantial investment in soil nutrients to enhance crop productivity. Hired labor is also a significant cost. Seed and equipment rental costs follow, reflecting the reliance on human resources and mechanized operations in the production process. Pesticide, organic fertilizer, and energy costs are moderate, while water, herbicide, and land rent expenses are relatively lower.

Figure 3. Direct costs of crop production (\$ per household)



Source: Authors' own calculation using NATURE+ Viet Nam household surveys. N=1,153. All the indicators measured at the household level.

We now turn attention to the relative magnitude of the external impacts for the environmental and social externalities. Figure 4 shows the structure and ranking of the external costs and Box 1 defines the impacts.

Land occupation is the single most important impact in Viet Nam (\$275 per household), representing 28% of total externalities and 46% of the environmental costs. This is an indication that the occupation of lands for cultivation—rather than the conservation in its natural state as woodlands or grassland—is imposing a cost in the food production system over time.

Box 1. Definition of impact categories

Land occupation relates to occupation of lands resulting in loss and forgone biodiversity and value of ecosystem services.

Soil degradation relates to consequences of erosion and widespread use chemical inputs.

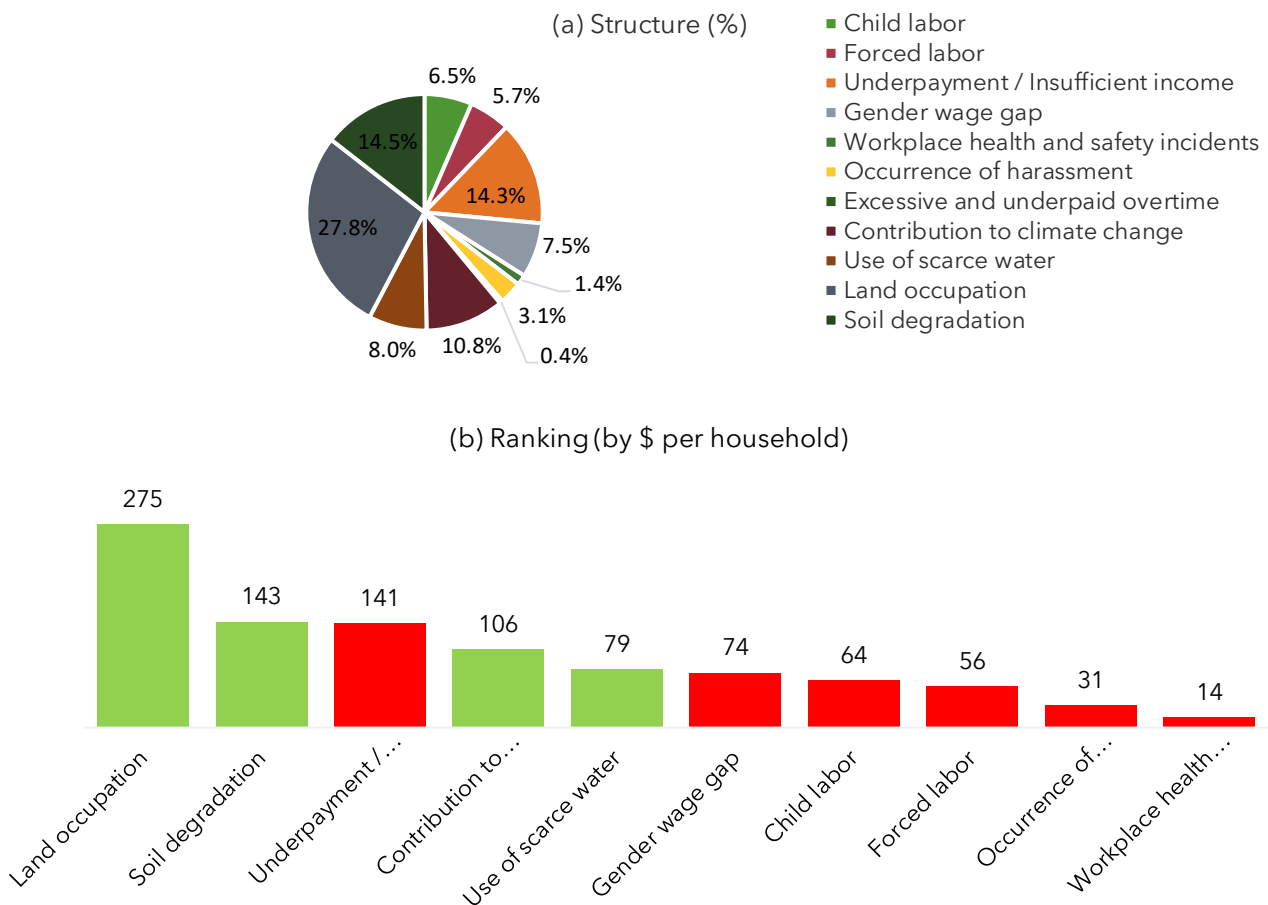
Contributions to climate change relate to emissions driven by intensive crop and livestock production, including the use of chemicals inputs, etc.

Forced labor, working against one's will, is driven by factors ranging from less severe financial coercion, including debts to employers and back wages to more severe forms of physical coercion that lead to individuals working against their free will, outside normal hours, or without being paid.

Underpayment/Insufficient income is associated with low worker wages and farmer profits. It is closely associated **gender wage gap** and the **occurrence of harassment**.

Child labor relates to the engagement of children in light, non-light and hazardous work. In Viet Nam, a child is defined as anyone below the age of 17 years. Monetization occurs through, for instance, compensation costs for loss of future earnings from not being in school, and/or harm to physical and mental development from engaging in non-light and hazardous work.

Figure 4. Structure and ranking of external costs



Source: Authors' own calculation using NATURE+ Viet Nam household and workers surveys, and monetization factors (Impact Institute, 2021).
Notes: N= 1,153. All the indicators are measured at the household level.

Soil degradation is the second most important external impact, estimated at \$143 per household (about 14% of the overall externalities and 24% of the environmental cost). The widespread use of inorganic fertilizers (98% of households), alongside significant use of pesticides (93% of households), points to an intensive approach to agricultural production management in Viet Nam. In some regions of the study area, the high usage is due to the terraced landscapes, where the difficulty of maintaining productivity on steep slopes (Tarolli and Straffelini 2020) may drive the need for such inputs (Boukaka 2024) with consequences to soil quality.

We observe that social externalities in Viet Nam are smaller than environmental. Given the relatively small sample of workers in Viet Nam, these results need to be looked at with caution. Underpayment/Insufficient income is the most significant social cost in Viet Nam. It is estimated at \$ 141 per household, representing over 14% of the total external impacts and a significant share of the social impacts (37%). Other relatively less important social costs include the prevalence of gender wage gaps (7.5%) and child labor (6.5%).

Policy recommendations

As external costs represent a significant part of the total cost of food production, policy and investments to minimize these costs are essential to an environmentally sustainable and socially equitable food system in Viet Nam. Measures to reach this goal include regulatory adjustments, investments in resource-efficient infrastructure and technologies that minimize costs, and the prudent management of environmentally impactful production inputs and factors. Those include:

Strengthen economic viability of nature positive farming

- Innovative 'land savings' technologies that minimize costs and slow down the pace of occupation of new lands with higher biodiversity value, and the promotion of environmentally 'sustainable agricultural practices' that minimize the excessive and harmful use of chemical inputs.
- Implementation can be done in the context of the National Action Plan on Food Systems Transformation in Vietnam towards Transparency, Responsibility, and Sustainability (Socialist Republic of Viet Nam 2023) that has specific targets for environmental goals, such as the ambitious plans to reduce agrochemicals, promoting organic fertilizers and biopesticides, and banning highly toxic pesticides. By 2030 organic fertilizer should make up 30% of the total used, and biopesticides make up 30% of pesticides used.
- Support branding and price premiums for more environmentally friendly and safe nature-positive products. NGOs, projects, and the private sector are better suited to support this type of activity.
- Invest in startups to invest in food processing for crops and diversified farming and create access to finance and enabling environment for MSMEs to operate.
- Allow for better input and output prices for farmer through collective action, e.g., cooperatives.

Capacitate farmers, farm workers, and farmers' groups

- Provide information and/or training to farmers and agricultural workers, preferably organized in groups, about fundamental national labor rights, including health and safety standards.
- Equip farmer groups (or cooperatives) to deal with these issues collectively. This includes efforts to brief farmer group leadership and provide printed or electronic materials.
- Empower farm workers. A key limitation of farm workers lies in their capacity to advocate and safeguard/protect their rights, particularly with respect to the violations related to forced labor, harassment, unfair remuneration, and occupational health and safety. Post relevant information in markets, radio, and provide guidance to farmer groups, churches, and other points of information dissemination.
- Promote the development and strengthening of worker associations. The opportunities arising from workers organizations are related to benefits of collective bargaining that strengthens participants positions to negotiate fair wages, better working conditions, and other benefits.

Strengthen Regulations

- Provide (and enforce) regulations around farm gate prices, assuring transparency for farmers.

- Enhance abilities of relevant bodies to enforce public and private environmental, occupational health and safety standards, and labor laws.
- Enhance reliability of existing public and private certification schemes, reinforced by participatory guarantee systems, where players come up with the rules and have internal mechanisms to ensure compliance.
- Strengthen capacities of nature-positive groups to have an effective internal inspection and sanctioning systems in place.
- Regulatory interventions to enforce minimum wage laws, and compliance of worker's rights.
- Interventions to reduce the use of child labor, the incidence of forced labor, harassment and poor working conditions.

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