



Ground Truths to Written Rules: Bridging On-Farm Practices and Certification Standards

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Executive Summary

Ground Truths to Written Rules: Bridging On-Farm Practices and Certification Standards, by Ingrid Graziano, 2024 Nuffield Brazil Scholar

This report explores how sustainability certifications and good agricultural practice standards influence agricultural systems, particularly in the coffee, soy and cotton sectors. Through the Nuffield Global Agri-Research Program, countries across Latin America, Europe, Asia and North America were visited to understand the impact of these frameworks on farmers, supply chains and consumers. The focus was to assess whether certifications serve as effective tools for promoting sustainability, bridging the gap between production and consumption, and empowering farmers to adopt improved practices.

Key findings highlight that while certification systems can support responsible sourcing, market differentiation, and traceability, their impact varies significantly depending on local conditions, implementation models, and the level of farmer engagement. Certifications can act as a roadmap for improving farm practices and building consumer trust. However, challenges such as cost, administrative complexity, and questions around credibility persist—particularly for smallholder farmers who often bear a disproportionate burden in complying with evolving standards.

The current certification landscape is highly fragmented, with multiple overlapping schemes that can lead to duplication, inefficiencies, and confusion for producers and consumers alike. In many cases, certification processes focus heavily on box-checking and compliance rather than demonstrating measurable outcomes or long-term improvements in environmental or social performance. Despite this, certifications can be powerful when integrated into broader strategies focused on resilience, regenerative practices, and transparent supply chains.

Globally, the role of certification is being reshaped by growing expectations from consumers, regulatory developments, and the increasing integration of sustainability into corporate and government agendas. Companies are relying on certified products to meet ESG and climate targets, while governments are beginning to use certification as a tool to monitor and enforce environmental regulations. New technologies, such as blockchain and satellite monitoring, are enhancing transparency but may inadvertently exclude smallholders unless they are accompanied by targeted support and inclusive implementation models.

In light of these findings, the report offers the following key recommendations:

1. **Put farmers at the center** of certification design and execution, ensuring that systems are accessible, locally relevant, and supportive of smallholder inclusion through tools like group certification and technical assistance.
2. **Simplify and harmonize certification systems** to reduce overlap, align requirements across schemes, and build clarity and confidence among producers, buyers and consumers.
3. **Integrate certification into broader sustainability strategies** that go beyond compliance to support long-term resilience, regenerative agriculture, and inclusive rural development.

4. **Prioritize outcomes over procedures** by shifting focus toward measurable environmental and social impact, supported by reliable data and continuous improvement frameworks.

In conclusion, sustainability certifications can serve as valuable tools to align market incentives with good agricultural practices and ethical production. To reach their full potential, these systems must evolve to be more inclusive, outcome-oriented, and integrated with broader sustainability efforts. This report presents insights and practical recommendations to help farmers, companies and stakeholders enhance the effectiveness and impact of their sustainability initiatives in agriculture.

Keywords: Sustainability certifications; good agricultural practices; traceability; consumer transparency; responsible sourcing; environmental impact; agricultural standards; sustainable development; farmers.

Foreword

Agriculture today is no longer just about the production of food and fiber, it is increasingly about how these are produced. The demand for transparency and sustainability across supply chains is reshaping how farmers, consumers and markets are and will interact in the future. Certifications and standards for sustainable and good agricultural practices have emerged as important tools in this space, aiming to promote more responsible production by setting standards of what sustainable production would mean, while providing consumers with assurances about the origins of their food. This evolving dynamic inspired the core focus of my Nuffield Global Agri-research Research Program study topic.

My Nuffield journey explored the role of sustainability and good agricultural practices certifications in raising awareness among farmers about sustainable practices, while simultaneously acting as a communication bridge to consumers. I focused on three major global commodities (coffee, soy and cotton) each of which faces unique sustainability challenges and opportunities. These crops are deeply embedded in international trade and consumer markets, making them ideal case studies for evaluating the broader impact of certification systems.

The motivation for choosing this topic also connects with a growing concern both within farmers and the broader public: the disconnect between what happens on the farm and what the consumer perceives. I was increasingly curious about whether certification systems genuinely lead to better outcomes on the ground or if they are more effective as marketing tools than as instruments for real change. I wanted to understand if, and how, these frameworks can empower farmers, enhance their practices and allow them to be more visible participants in global conversations around sustainability and closer to consumers.

This research builds on over a decade of personal, hands-on and strategic experience in sustainable agriculture. My professional journey began with a degree in Agricultural Engineering from the University of São Paulo (ESALQ), complemented by an international exchange program to the Landscape Ecology department at Cranfield University in the United Kingdom and an internship in a biodynamic farm in the Netherlands. Since then, I have worked across different segments of the agricultural supply chain, from certification bodies to a global agribusiness company. Currently, I serve as Sustainability Product Line Manager for South America at a

trading multinational, where I lead the development of green finance initiatives, regenerative agriculture strategies and technical solutions designed to support farmers in adopting sustainable practices.

Prior to this, I ran a certification services company, training field teams and farmers, and managing the process of assuring compliance with sustainability standards. My perspective is further enriched by my ongoing work as a beef cattle farmer in Goiás, where I am developing a cow-calf operation promoting genetic enhancement adapted to the Cerrado for 9 years. These combined experiences have given me a deep appreciation of both the opportunities and the limitations of certification systems, insights that became central to my Nuffield research.

In pursuit of answers, I traveled to Australia, Costa Rica, Germany, Belgium, Singapore, Japan, Netherlands, Israel and the United States. Each destination offered a unique perspective on agriculture, livestock, certification systems and sustainability, from the regulatory frameworks of Europe, to the innovative farming methods of Israel, to the consumer-driven markets of Japan and the U.S. Along the way, I engaged with farmers, certification bodies, supply chain actors and retailers, all of whom shared important insights and experiences.

Beyond the academic and professional learning, this journey has been one of profound personal growth. The Nuffield experience pushed me far outside my comfort zone, exposing me to new cultures, commodities, languages and different ways of thinking. I listened to the stories of people from all walks of life, farmers facing harsh climate realities, consumers demanding traceability and innovators working to bridge the gap between ethics and economics. This journey expanded my worldview and deepened my appreciation for the diversity and complexity of global agriculture.

Ultimately, this report is not just a summary of findings, it is a reflection of a journey that challenged my assumptions, sharpened my understanding and reaffirmed my belief in the power of agriculture to drive meaningful, sustainable change. Agriculture can indeed be part of the solution to the climate challenges we have ahead. I hope the insights shared here contribute to ongoing conversations about how we can build more transparent, inclusive and effective systems that benefit farmers, consumers and the planet alike.

Acknowledgments

This report, and the journey behind it, would not have been possible without the support, generosity and encouragement of many people and institutions to whom I am deeply grateful.

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A very special thanks goes to Henrique Americano, who provided much more than guidance during this journey. His mentorship, insight and unwavering encouragement were instrumental in helping me navigate the challenges and opportunities of this journey and beyond. Henrique, your role extended far beyond advisor, you were a mentor in every sense.

I am profoundly grateful to all the farmers, organizations, researchers and institutions who opened their doors and shared their time, experiences and reflections with me across the many countries I visited. This report exists because of your openness, your honesty and your willingness to share both successes and struggles. Your contributions were the foundation of this research.

To my family, thank you for your patience, love and support. Your understanding during the long periods of travel and absence meant the world to me.

And to my husband, Filipe, there are no words strong enough to express my gratitude. You have always been my greatest supporter and motivator. During this journey, you not only stood by me emotionally, but you also ensured that our farm remained on track in my absence. Your belief in me and in this journey made all the difference.

Thank you all for being part of this life-changing journey.

Abbreviations

BBB - Boer Burger Beweging

BCI - Better Cotton Initiative

ESALQ - Escola Superior de Agricultura Luiz de Queiroz

ESG - Environmental, Social and Governance

EU - European Union

EU27 - 27 EU country members states post-Brexit

EUDR – European Union Deforestation Regulation

FEFAC - European Feed Manufacturers' Federation

FSA - Farm Sustainability Assessment

GAP - Good Agricultural Practices

GHG - Greenhouse Gas

GMO - Genetically Modified Organism

GOTS - Global Organic Textile Standard

ICAFFE - Instituto del Café de Costa Rica (Costa Rican Coffee Institute)

IICA - Inter-American Institute for Cooperation on Agriculture

ISCC - International Sustainability and Carbon Certification

ISEAL - International Social and Environmental Accreditation and Labelling

ISO - International Organization for Standardization

JGAP - Japan Good Agricultural Practice

NGO - Non-Governmental Organization

RTRS - Round Table on Responsible Soy

SAI - Sustainable Agriculture Initiative

UK - United Kingdom

UN - United Nations

USDA - United States Department of Agriculture

VSS - Voluntary Sustainability Standards

Objectives

The primary target of this research is to assess the role of sustainability certification systems in transforming agricultural practices from the farm to the consumer and communicate this change. the following three main objectives/questions guided this research:

1. **Supply chain impacts** – What is known about whether standards and certification systems are effective tools for promoting sustainability, and if so, under what conditions?
2. **Reducing the communication gap between consumers and farmers** – Does sustainability certifications play a meaningful role in communicating on-farm practices to consumers?
3. **Farmer-centric solutions** – Can farmers truly benefit from certification standards and how can these systems be designed or improved to serve them better?

Introduction: Understanding Sustainable Certifications

Sustainable certifications emerged in response to increasing global awareness of the environmental, social and economic impacts of agriculture. The roots of these systems can be traced back to the late 1980s and early 1990s, a period marked by a rising consumer concern over deforestation, labor rights, biodiversity loss and the long-term health of farming systems. The first certifications were largely driven by civil society and non-governmental organizations aiming to offer alternatives to unsustainable practices, particularly in tropical commodities. Rainforest Alliance and Fairtrade were among the earliest initiatives, launching certification programs for coffee and other crops that aimed to ensure better conditions for farmers while conserving natural resources and giving transparency from the origin to consumers. Notable early examples include Rainforest Alliance and Fairtrade International, which launched certification programs for coffee and other commodities to promote improved farmer livelihoods, conservation of ecosystems and traceability from farm to consumer.

Since then, the landscape of sustainability standards and certification systems has grown very quickly in both scope and complexity. By 2024, over 440 ecolabels are tracked globally, spanning more than 25 industry sectors and 199 countries (Ecolabel Index, 2024). This proliferation reflects both rising consumer expectations and the integration of sustainability into mainstream supply chains. Certifications now serve not only as voluntary tools for ethical consumption, but also as strategic mechanisms for risk management, supply chain transparency and corporate sustainability performance. Increasingly, they are being used to align with frameworks such as the UN Sustainable Development Goals (SDGs), the Paris Agreement and company-specific ESG targets.

Certification programs typically assess compliance with a set of environmental, social and sometimes economic criteria. These may include soil health, biodiversity conservation, water efficiency, greenhouse gas (GHG) emissions, pesticide use, workers' rights and land use practices. While some certifications rely on third-party audits, others are based on self-assessment tools or hybrid approaches. They are often benchmarked or harmonized with international norms such as the ISEAL Code of Good Practice or ISO standards, adding credibility and comparability across schemes.

Figure 1 below shows the growth in the number of ecolabels worldwide over the past five decades. From just a handful of labels in the 1970s, there has been a dramatic increase since the 1990s, driven by increased demand for sustainability in agricultural production and trade.

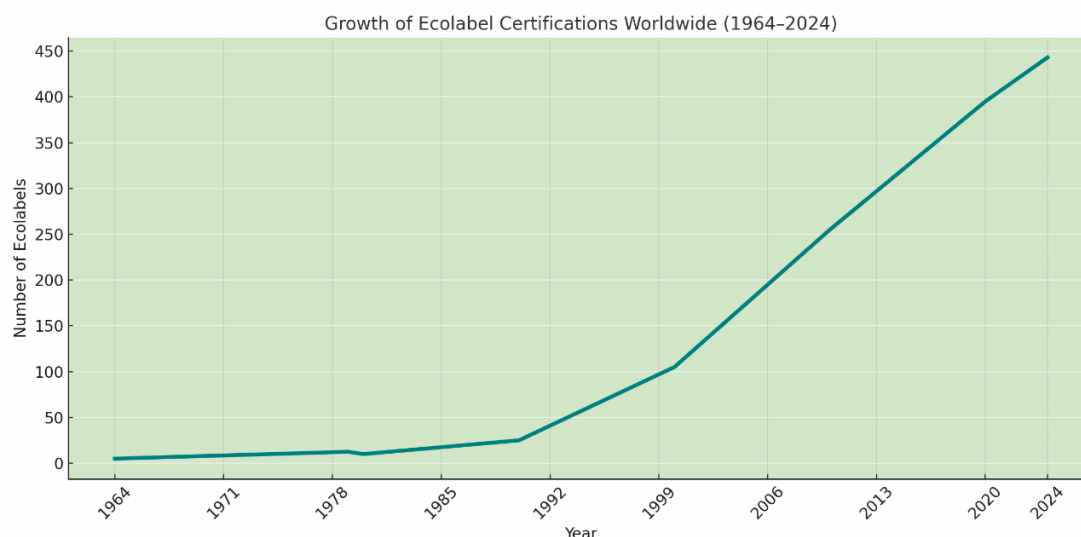


Figure 1: Growth of ecolabel certifications worldwide (1964–2024)

Source: Ecolabel Index, 2024

For producers, certifications can offer multiple benefits, including access to new markets, price premiums, technical support, better recordkeeping and recognition for sustainable efforts. These benefits will be discussed further in this report.

A 2020 meta-analysis by Meemken & Qaim found that certified farmers often experience modest improvements in income, although impacts vary significantly by crop, region and certification type. For companies and traders, certification systems help manage reputational risks, meet sourcing commitments and respond to increasing demand from institutional buyers, regulators and investors. For consumers, ecolabels and sustainability claims offer transparency, allowing purchasing decisions to reflect values related to ethics, health and environmental protection.

Within this diverse certification-landscape, several programs stand out for their influence and maturity, particularly in the coffee, soy, and cotton sectors. Below we have a brief summary on the main certification programs for each sector:

- **Coffee:**

- Rainforest Alliance: Focuses on biodiversity conservation, improved farm productivity, and farmer livelihoods. In 2020, it merged with UTZ to create a more robust and unified program emphasizing climate resilience, traceability, and community development.
- Fairtrade International: Prioritizes fair prices for smallholder farmers, collective organization, and social development. It is particularly influential in empowering producers through guaranteed minimum prices and community premiums.

- Organic Certifications (e.g., USDA Organic, EU Organic): Certify that crops are grown without synthetic fertilizers, GMOs, or prohibited pesticides, using ecological farming methods.
- Farm Sustainability Assessment (FSA) by the SAI Platform: A cross-commodity benchmarking framework widely used in coffee and other crops. It enables producers to assess and improve their sustainability performance across social, environmental, and economic dimensions. The FSA's tiered performance levels (bronze, silver, gold) offer flexibility for continuous improvement and are recognized by major food and beverage companies.

• **Soy:**

- Round Table on Responsible Soy (RTRS): Established in 2006 aiming to promote responsible soy production with zero deforestation and responsible labor and land practices. By 2021, RTRS covered approximately 1.3 million hectares, producing 4.4 million tonnes of soy across nearly 9,600 farms. In 2018, certified soy made up about 4% of global trade volume, though globally it remains under 2–3% of total production. RTRS also launched a certification scheme for corn.
- ProTerra: Focused on non-GMO production, biodiversity and traceability. Supply a niche market of non-GMO.
- ISCC (International Sustainability & Carbon Certification): Certifies crops and biomass for low-carbon and deforestation-free use, especially relevant for soy feed and biofuel markets.
- Private Trader Certifications Programs: Programs like Cargill's Triple S and Bunge's ProS emphasize traceability, no-deforestation sourcing and supplier compliance. These initiatives are rapidly expanding within corporate sustainability strategies.

In the EU, around 40% of soy consumed by the EU27 countries is compliant with FEFAC (European Feed Manufacturers' Federation) Soy Sourcing Guidelines, with 24% deforestation and conversion-free soy, split between segregated supply, mass-balance or credits.

Soy's global production stands at an estimated USD 155 billion, with less than 3% VSS (Voluntary Sustainability Standard) compliance in 2021. Premium prices can be an incentive, but they are still limited to a few markets. Organic soy has a different level of premium prices, reaching up to 64% higher prices, but also very limited volume.

• **Cotton:**

- Better Cotton Initiative (BCI): Represents around 22% of global cotton production, involving over 2.2 million certified farmers and 5.4 million

tonnes of cotton annually across 22 countries. Field-level data shows a range of 15–31% reductions in fertilizer and pesticide use and 11–25% on yield and profit improvements, depending on country. This is an example where a certification scheme is leading to the implementation of better agricultural practices with material impact.

- Organic Cotton / GOTS (Global Organic Textile Standard): Though under 1% of total cotton supply, Organic and GOTS-certified cotton commands premium markets and stringent traceability and labour standards.

These certification systems operate under different governance models, some are multi-stakeholder, others corporate-led or NGO-driven, but they share the common goal of pushing agriculture toward a more transparent, sustainable and equitable future. Evaluating their real impact requires understanding their design, enforcement mechanisms, scalability and accessibility, especially from the farmer's perspective. As certification continues to evolve, especially with growing interest in regenerative agriculture and digital traceability, it is critical to ensure that these tools remain both credible and farmer-centric.

Main Drivers for Sustainable Certification Adoption

The adoption of sustainable certifications in agriculture and food supply chains is driven by a range of interconnected motivations across all actors, from producers to consumers. These drivers reflect not only the growing awareness of environmental and social challenges, but also strategic business goals tied to market positioning, efficiency, and trust. Findings from this research related to motivation to adopt sustainable certification across the supply chain are below:

i. Producers

For producers, certifications programs can often offer intangible benefits and sometimes enhanced market opportunities. Besides a requirement from buyers, the key motivations for producers to adopt a certification program include:

- Improved net income through access to price premiums and more stable markets.
- Greater on-farm efficiency, facilitated by the implementation of sustainability standards.
- Access to preferred customers and long-term market relationships.
- Improved product quality, environmental practices, and working conditions.
- Enhanced support through training and resources that accompany certification programs.
- Better financing opportunities.

ii. Manufacturers and Processors

These stakeholders focus on securing a reliable and sustainable supply of raw materials while also responding to regulatory and consumer demands. Their main motivation includes:

- Assured sustainable supply and improved quality of inputs.
- Compliance with customer demands for traceability and socioenvironmental responsibility.
- Improved brand reputation and alignment with internal corporate values and sustainability goals.
- Enhanced supply chain transparency and efficiency, a growing necessity in global trade.



Figure 2: Mayonnaise bottle in a supermarket in the UK highlighting sustainability commitments on-pack, including the use of 100% free-range eggs and sustainably sourced vegetable oils. Such labels reflect growing consumer interest in ethical sourcing and brand's efforts to communicate environmental values to consumers.

iii. Retailers

Retailers react directly to consumer expectations, risk management and in some cases corporate responsibility values:

- Certification programs help secure a social license to operate in increasingly regulated and value-driven markets.
- It enhances company and brand reputation and contributes to increased market access.
- There's a strong focus and interest on supply chain transparency and traceability, seeking reduced reputational risks.
- Loyalty among ethically minded consumers grows when sustainability is evident on the shelf.



Figure 3: Pork meat sold under Tesco's private label, featuring the Red Tractor certification, one of the UK's most recognized assurance schemes. The label highlights compliance with standards for food safety, environmental protection and animal welfare, reflecting how retailers are communicating trust and sustainability to consumers.

iv. Consumers

Consumer demand plays a critical role in shaping market trends and pushing certifications forward:

- People are seeking healthier, higher-quality products (usually higher purchasing power markets).
- Many consumers look for options that align with personal values on environmental protection, labour rights, and animal welfare.
- Certifications provide assurance and visibility on these issues, building trust and influencing purchase decisions.

In summary, while motivations vary, the overarching drivers for certification adoption converge around improved quality, market access, brand strength, and operational efficiency within a framework of growing accountability and sustainability.

Unlocking Value: The Strengths and Benefits of Sustainability Certification in Agriculture

In the face of accelerating climate change, growing supply chain scrutiny, and increasing consumer demand for transparency, sustainability certification programs have emerged as powerful tools in transforming agricultural systems.

Originally designed to fill governance gaps, certification frameworks like Rainforest Alliance, Fairtrade, USDA Organic, EU Organic, and the Round Table on Responsible Soy (RTRS) now shape production practices, trade flows, and policy alignment worldwide. These certifications define and verify standards related to environmental conservation, social responsibility, and economic fairness. This section examines their strengths and potential benefits, particularly in the production of coffee, soy, and cotton, with examples and insights from my findings during my Nuffield journey.

i. Improved Agricultural Practices and Legal Compliance

Certification programs often require producers to meet a range of good agricultural practices (GAP), covering areas such as soil conservation, water management, pest control, and safe chemical use. These frameworks also encourage better recordkeeping and internal monitoring systems that help producers comply with domestic laws and international trade regulations.

In Costa Rica, coffee farmers working with the Rainforest Alliance must plant native tree species and reduce agrochemical use, leading to improved soil health and ecosystem preservation, contributing aligning their production with international legal regulations, such as the MRLs (Maximum Residues Level) of agrochemicals.

Japanese sweet potato growers pursuing JGAP certification have integrated pest management techniques, while U.S. soy growers use conservation tillage to meet both organic certification and federal climate incentives. Such practices not only improve productivity and resilience but also foster a culture of continuous improvement and risk mitigation.

ii. Access to Markets and Side Economic Benefits

One of the strongest incentives for certification is market access. While direct premiums may be limited and often apply only to niche products like specialty coffee, certifications can help producers tap into more secure and differentiated markets. Certifications also boost business reputation, open doors to sustainability-linked loans, and align operations with the expectations of multinational buyers.

During a visit to Germany, stakeholders emphasized how soy certification (especially RTRS) is becoming essential for compliance with the EU Deforestation Regulation (EUDR). In the U.S., organic soy farmers receive support through USDA programs and gain access to specialty processors and retailers. Meanwhile, Costa Rican coffee cooperatives use certifications not only to enter European markets but also to negotiate better terms with local exporters.

These indirect economic benefits, from branding to financing — can outweigh the direct price premium for many producers.

iii. Enabling Traceability and Transparency Across Supply Chains

Traceability is central to the credibility of sustainability claims. Certification programs require documentation at every step of the value chain — from planting and harvesting to processing, transport, and retail. This traceability infrastructure not only meets consumer and regulatory demands but also mitigates risks for buyers and strengthens supply chain relationships.

In Costa Rica, traceability platforms track certified coffee from farm to exporter, giving roasters confidence in origin and compliance. U.S. soy operations are experimenting with blockchain technology to track carbon reduction metrics, often aligned with organic and regenerative certifications. In Israel, integration of Netafim's precision irrigation with data dashboards enables real-time monitoring, supporting compliance with both certification standards and national water regulations.

These systems offer dual benefits: operational efficiency and enhanced market credibility.

iv. Supporting Environmental and Social Outcomes

Certification standards are increasingly comprehensive, covering not only environmental performance but also social well-being. Requirements often include safe working conditions, fair wages, gender equity, community engagement, and protection of indigenous rights. These aspects are especially important in contexts where public governance is weak or uneven.

In the Netherlands, care farms like Wiard integrate social inclusion by providing employment opportunities for people with disabilities while also practicing agroecological methods. In cotton-producing regions of the U.S., Fair Trade and Better Cotton Initiative (BCI) programs promote equitable labor practices and community development. Israeli kibbutzim, structured around collective labor and community ownership, reflect many of the social principles enshrined in modern certification systems.

Through audits and stakeholder engagement, certifications can build accountability and inclusiveness into agricultural systems.



Figure 4: Juan Valdez “Mujeres Cafeteras” coffee highlights beans grown by Colombian women farmers, combining value addition with social impact. Even though it is not a certification program, it is a good example of specific label communication, fostering rural development and empowerment of women in the coffee sector while appealing to socially conscious consumers.

v. Building Climate Resilience and Adaptive Capacity

Sustainability certifications often promote climate-smart agriculture by encouraging adaptive practices such as crop rotation, agroforestry, organic matter enhancement, and efficient water use. In doing so, they help producers build resilience to extreme weather, shifting rainfall patterns, and pest outbreaks.

Japanese farmers facing increased heat stress are developing disease-resistant varieties, which, besides helping to secure yields, also contributes to meet GAP requirements. In Israel, date plantations are integrating fertigation and compost use, practices encouraged by EU organic certification for example, to optimize yield under saline and dry conditions. These practices also support those plantations to increase soil water-holding capacity, bringing more resilience to the system. U.S. soy producers are incorporating cover crops and carbon sequestration strategies, also contributing to more resilient and adaptive agricultural systems, as well as aligning with regenerative agricultural certifications like Regenagri.

Certification can also act as a gateway to climate finance and public adaptation funds, reinforcing its role as a strategic investment in resilience.

Sustainability certification programs can be more than labels, they are frameworks for improvement, transparency and resilience. In sectors like coffee, soy, and cotton, certification adoption is proving to be a catalyst for raising the bar for

sustainability standards, improving farm management, and unlocking new opportunities for producers.

Although challenges remain, such as inconsistent premiums, complex audits, and limited consumer recognition, the long-term benefits are significant.

Certifications can:

- Elevate agricultural practices
- Enable compliance and traceability
- Expand access to markets and finance
- Promote social and environmental sustainability
- Enhance climate adaptation and system resilience

For both smallholders and large-scale operations, sustainability certifications are becoming essential tools to compete, comply and contribute to a more resilient global food system.

Navigating Challenges: Limitations of Sustainability Certification Programs in Agriculture

Despite their growing role in promoting responsible production and trade, sustainability certification programs face several limitations that affect their efficacy, inclusiveness, and scalability. These limitations are particularly evident in globally traded crops like coffee, soy, and cotton, which are produced across diverse geographies and socio-economic contexts. Drawing from fieldwork across Costa Rica, Belgium, Germany, the United States, Japan, Israel, Singapore, and the Netherlands, this section explores the structural, economic, and practical constraints of certification schemes.

i. Limited Market Recognition and Consumer Confusion

One of the most cited concerns in both academic literature and producer interviews is the limited recognition of certification labels by end consumers. In many cases, consumers are unaware of the meaning, standards, or value of ecolabels such as Rainforest Alliance, Fair Trade, or Organic.

This confusion reduces the potential for certifications to command a price premium or influence purchasing decisions. In Costa Rica and the Netherlands, producers shared frustrations that their certified products were often mixed with non-certified goods or sold without proper labelling, eroding the credibility and value of the certification process.

With more than 450 ecolabels tracked globally (Ecolabel Index), oversaturation contributes to mistrust or indifference from consumers.

ii. Premiums Are Inconsistent or Insufficient

While certifications are often associated with economic benefits, direct price premiums are rare or inconsistent. Research shows that only niche markets like specialty coffee or organic cotton offer significant price differentials. For mainstream commodities such as soy and conventional cotton, certifications typically do not result in higher farmgate prices.

This issue was also raised during visits in Germany and the U.S., where farmers indicated that certifications were often required to maintain market access but did not guarantee financial rewards.

In Japan, producers aiming to certify under JGAP noted the bureaucratic effort and costs involved without clear short-term financial returns.

Without adequate premiums, certifications can become an economic burden, especially for smallholders who must bear the cost of compliance.

iii. High Compliance and Audit Costs

Certification programs can be expensive to implement and maintain. Costs include initial audits, annual inspections, documentation, infrastructure upgrades, and personnel training. These costs are disproportionately high for smallholder farmers and cooperatives with limited resources.

In Costa Rica, small coffee producers often rely on cooperatives to absorb these costs, while in Israel, farmers must meet EU organic standards to export, involving complex audits and documentation. In the U.S., even with access to grants, certified operations must dedicate significant time and labour to remain compliant.

This financial and administrative burden can discourage adoption and lead to dropouts over time.

iv. One-Size-Fits-All Standards in Diverse Contexts

Many certification schemes apply global standards with limited flexibility for local conditions, which can create disconnects between certification criteria and practical realities on the ground. For instance, what works for coffee producers in Costa Rica may not be feasible for cotton growers in Texas or soy producers in Brazil.

During interviews in the U.S and Japan, farmers expressed resistance to organic certifications due to rigid input restrictions that did not align with their crop rotations or pest pressures. In some cases, regional ecological dynamics or labour models were at odds with global certification templates.

This highlights the need for regionally adapted standards that retain credibility without sacrificing practicality.

Sustainability certification has brought valuable improvements in transparency, traceability, and good agricultural practices. However, its limitations, including consumer confusion, sometimes high compliance costs and limited financial rewards, must be acknowledged and addressed.

For certifications to remain relevant, they should evolve toward:

- More outcome-based approaches
- Regionally adapted standards
- Support systems for smallholders
- Greater integration with government and market incentives

As climate and regulatory pressures intensify, the next generation of certification must move beyond checklists and logos to deliver measurable, inclusive, and resilient outcomes.

Emerging Trends and Global Shifts in Sustainability Certification

The global sustainability landscape is rapidly evolving, driven by climate change, consumer demand, trade regulations, and technological innovation. Certification programs, once designed primarily as tools for transparency and responsible sourcing, now face increasing pressure to become more dynamic, outcomes-focused, and regionally relevant. This section explores the key global trends and emerging elements reshaping the future of sustainability certifications in the investigated scope.

i. Shift from Practice-Based to Outcome-Based Standards

There is growing consensus that sustainability efforts should focus less on compliance checklists and more on measurable impacts. Certifications are increasingly expected to report on tangible outcomes such as carbon reduction, biodiversity conservation, water efficiency, and social equity.

During visits to the U.S., several soy producers participating in climate-smart initiatives highlighted the transition from practices (e.g., cover cropping) to tracked outcomes (e.g., soil organic carbon levels). Netafim's smart irrigation tools in Israel exemplify how technology enables this shift by collecting real-time data to monitor water use and crop health.

Farmers in Belgium are combining sustainability certifications such as the Farm Sustainability Assessment (FSA) from the SAI Platform with tools that allow them to measure greenhouse gas emissions directly. Rather than treating certification as a box-checking exercise, they are using data to prove impact, making themselves eligible for performance-based incentives and carbon market participation. This mindset of a commitment to not just doing the right thing, but showing how well it is working is impressive. This evolution toward outcome-based standards feels like a necessary next step in scaling regenerative agriculture and making sustainability not just a philosophy, but a verified reality.



Figure 5: Soil structure analysis to determine good agricultural practices implementation efficiency in Belgium.

ii. Integration with Governmental Regulation and Climate Policy

Environmental regulations are increasingly intersecting with certification. The European Union Deforestation Regulation (EUDR) and the UK Soy Manifesto, are examples of policy frameworks that mandate traceability and deforestation-free sourcing — often building on or replacing voluntary certifications.

In Germany and Belgium, stakeholders emphasized the need for certification programs to evolve into verification tools for regulatory compliance. The RTRS is now closely tied to EUDR criteria for soy imports. Similarly, in Israel, EU organic standards dictate production systems for exporters.

This trend raises important questions:

Will certifications complement regulations, or become redundant?

Can they be tools for policy implementation and monitoring?

iii. Technological Innovation and Digital Traceability

Digital tools are transforming certification systems by enabling data-driven verification, remote audits, and real-time supply chain monitoring. From blockchain and QR-code product tracking to satellite imagery and AI-based soil sensors, the integration of technology enhances transparency, accuracy, and scalability.

Examples from the Netherlands (microgreens logistics and energy tracking), Israel (soil moisture sensors and irrigation dashboards), and U.S. cotton (blockchain

traceability pilots) illustrate how farms and supply chains are adopting digital innovations to align with certification and sustainability requirements.

However, as noted in Japan and Costa Rica, digital literacy and infrastructure gaps may hinder smallholder participation. Equitable digital inclusion remains a key challenge.

iv. Growing Role of Corporate ESG and Supply Chain Accountability

Private-sector commitments to ESG (Environmental, Social, and Governance) standards are driving demand for verified sustainable sourcing. Certifications are now being used not only for marketing but as tools for reporting to investors, regulators, and stakeholders.

Multinational traders and brands are increasingly requiring certified commodities (like cotton and soy) to meet Scope 3 emission targets and human rights due diligence obligations. In Costa Rica, coffee exporters described how global roasters are integrating certification data into corporate sustainability dashboards.

This trend may strengthen certification demand but also places pressure on schemes to offer high-integrity data and simplified reporting interfaces, which can be a challenge considering the actual certification report structures.

v. Regionalization and Context-Specific Frameworks

There is rising momentum toward designing regionally tailored certification models that respect local socio-ecological conditions while aligning with global goals. This was evident in the Netherlands, where biodiversity-focused payment schemes offered alternatives to rigid organic certification, and in Japan, where JGAP attempts to adapt global GAP standards to local realities.

Farmers in multiple countries expressed the need for flexibility — particularly regarding pest management, labour availability, and input access — indicating that localized approaches may drive wider adoption.

Such systems may build upon international standards but allow for national indicators, cultural relevance, and lower compliance burdens.

Sustainability certifications are at a critical juncture. As global priorities shift toward outcomes, equity, and climate impact, certification models must adapt to remain credible, inclusive, and effective.

Key directions for the future may include:

- A transition to data-backed, outcome-based reporting
- Deeper integration with government and ESG frameworks
- Regional flexibility and producer-driven models
- Wider inclusion of social, cultural, and environmental dimensions

Field-Based Reflections on Global Agricultural Systems

Throughout the Nuffield journey, the author had the opportunity to engage directly with very diverse agricultural systems across several countries and this is one of “the beauties” of being a Nuffield scholar. While each nation has its own unique context, challenges and strengths, certain insights are valuable for understanding the broader landscape of global agriculture. In this section, a selection of key observations from some of the countries visited are shared, not as long case studies, but as reflections that highlight contrasts in policy frameworks, technological adoption, sustainability priorities and farmer engagement. These reflections provide context for understanding how some agricultural systems are evolving in response to global pressures and how local realities shape the implementation and impact of sustainability initiatives.

Singapore: Innovation in a Land-Sparse Future

Singapore’s approach to agriculture exemplifies how necessity breeds innovation. With over 90% of its food supply imported as of 2023, the city-state faces immense pressure to boost local production. High-tech urban farming solutions, such as vertical farms and climate-controlled greenhouses, are leading the charge toward food resilience. Companies like Sustenir and Sky Greens showcased sophisticated, sustainable systems that deliver fresh produce from within the urban core. These efforts align with the government’s “30 by 30” goal: to locally produce 30% of nutritional needs by 2030. The partnership between public policy, private enterprise and research is paving the way for rapid innovation and scale.

Singapore’s commitment to integrating agriculture into its society goes beyond technology. Educational initiatives and community-based farming are helping shape a new culture of food consciousness, reinforcing the notion that food production is everyone’s concern. While challenges persist, including high energy costs, limited land and a shortage of skilled labor, the country’s determination to overcome these obstacles through strategic collaboration and planning left a lasting impression, a small country in geography but bold in ambition.

Japan: Tradition Meets Innovation in Agricultural Practice

Japan’s agricultural landscape showcases a blend of ancestral wisdom and cutting-edge technology. From the rice farm of Mr. Tanaka, which processes 480 tons of rice annually, to community-driven dairy operations like Koske’s farm near Hiroshima, farmers demonstrate impressive adaptability. Koske’s initiative not only supplies dairy products to consumers, but is a showcase on rural tourism, attracting more than 100,000 people each year to visit the farm.

Circular practices are deeply embedded in Japan’s farming ethos. At Seven Foods, pigs are fed with food-waste and their manure is used to grow vegetables, creating a closed-loop system that balances ecology and economy. There is also mushroom cultivation in Sugimoto, that takes social inclusion further by hiring people with disabilities, while maintaining rigorous standards of quality. In regions like

Kushima and among networks such as AoiFarm and Sakaue Co., growers are experimenting with crop rotation, biochar and greenhouse technology to face labor shortages, disease pressures and climate challenges.

It is impressive how Japanese farmers embrace their role as stewards of both land and community. A strong highlight from these visits was their ability to sustain tradition while actively innovating, a testament to the resilience and intentionality that define Japan's approach to agricultural systems.



Figure 6 and 7: Koske's dairy farm, receiving more than 100,000 people each year for visits. Sugimoto's mushroom farm.

Israel: Resilience Through Innovation and Community

Israel's predominantly arid landscape (60% desert) brings a unique challenge for thriving in agriculture and food supply. In regions like the Arava Valley, which receives just 50 mm of annual rainfall, communities like Kibbutz Ketura have pioneered integrated systems that combine organic farming, renewable energy and water-efficient practices. Their 8 MWh solar farm produces 100 times more energy than consumed locally, while date cultivation, goat dairy, olive groves and grape production thrive under drip fertigation and composting techniques using manure and biomass. These practices allow high yields despite salinity and limited resources, supported by advanced soil biology analysis and regenerative inputs like humic acids.

Water is both a legal and technological important pillar of Israel's strategy. Farmers receive regulated quotas and often irrigate with desalinated or treated wastewater, 70% of agricultural water comes from reused sources. Precision irrigation, developed by companies like Netafim, is transforming the landscape with AI-powered systems, sensors and climate-adapted crop management. Innovations

extend beyond food: algae and seaweed farms, such as Seakura, create pharmaceuticals and sustainable materials; cannabis farms operate under strict medical standards with environmental controls and automation.

From avocado nurseries using volcanic substrates to kosher wine production adhering to religious laws, Israeli agriculture is deeply intertwined with its cultural fabric. Despite challenging conditions, Israel's ability to harmonize resource limitations with visionary practices makes it a leading example of adaptive agriculture in a challenging environment.



Figure 8 and 9: Grapes grown in the Avara desert in Israel, only possible due to high tech irrigation systems. Dates production in a kibbutz (irrigation of 1000 liters of water per plant per day).





Figure 10: Avara Valley desert. The “green spots” in the distance (circled here) are kibbutzim plantations.

Netherlands: Agriculture at the Crossroads of Innovation and Politics

The Netherlands is struggling with deep political and environmental tensions that may shape its farming future.

Wiard Farm stood out as a beacon of inclusive farm system, attracting people from the city to visit the countryside. The farm is an 18 hectare care-farm that supports 45 people with mental disabilities, counts on 130 volunteers and 11 staff, to receive 70,000 annual visitors. They blend traditional crop production with biodiversity initiatives, such as growing mixed cover crops to attract birds, an initiative supported by a €2,000/year ecological stewardship payment from the Dutch government.

Piggy’s Palace is another example of actively working to reshape public perceptions of pig farming through transparency, guided tours and community engagement – while raising 12,000 pigs annually.

These efforts unfold against a backdrop of political upheaval. The rise of the Boer Burger Beweging (BBB), a farmers’ protest party founded in 2019, has shaken Dutch politics. In 2023, BBB won the most seats in provincial elections and now plays a major role in shaping agricultural policy. The party emerged in response to government plans to drastically reduce nitrogen use and greenhouse gas emissions, which include controversial proposals to cut livestock numbers and potentially reduce thousands of farms. Farmers are arguing that these measures threaten their livelihoods and rural identity, while the government insists, they are necessary to meet EU environmental standards and goals.

On the other hand, the Netherlands is very well known for its innovation and technology, especially in glasshouse food-production. At Koppert Cress, innovation is taking center stage with internationally acclaimed geothermal systems and a high-tech automated microgreen production.



Figure 11: Farm shop in the Netherlands, to connect consumers to food and agricultural experience.

Figure 12: Koppert Cress high-tech glass houses.

United States: Scale, Sustainability and Shifting Paradigms

United States revealed a vast and complex agricultural landscape, where scale and specialization dominate, but innovation is steadily reshaping the narrative. Some farms are focusing on regenerative grazing systems that integrate cattle, poultry and crop production to restore soil health and biodiversity. In California, many operations have precision irrigation and data-driven crop management across thousands of acres. These examples reflect a growing movement toward climate-smart agriculture, supported by federal programs such as the USDA's Climate-Smart Agriculture and Farm Loan Programs, which offer financing for conservation practices, renewable energy systems and sustainable technologies.

The U.S. is rapidly expanding its carbon farming initiatives, with both public and private sectors investing in soil carbon sequestration. The USDA's Partnerships for Climate-Smart Commodities program and the Inflation Reduction Act have allocated billions of dollars to improve measurement and verification of greenhouse gas reductions. Farmers can now participate in carbon markets by adopting practices like no-till, cover cropping and rotational grazing, though challenges remain around data accuracy and economic viability. Alongside this, biological crop inputs such as biopesticides, biofertilizers, and biostimulants, are gaining traction. The U.S. agricultural biologicals market is projected to grow from \$4.5 billion in 2024 to \$12.7 billion by 2033, driven by demand for more sustainable and profitable systems.

The U.S. agricultural landscape is thriving by harnessing its combination of technological prowess, expansive scale and robust government support. At the heart of this transformation lies the Farm Bill, a \$1.5 trillion legislative framework that fuels everything from crop insurance and conservation to nutrition assistance. Programs within the USDA, such as Climate-Smart Agriculture, renewable energy grants, and the Inflation Reduction Act, are directing billions toward sustainable practices and rural resilience. While commodity crops like corn and soybeans continue to receive over \$9 billion in subsidies, there is a growing pressure to switch the funding to also prioritize regenerative systems, biological inputs and carbon sequestration practices.



Figure 13: Our Global Focus Program (GFP) group in the USDA.

Costa Rica: Agricultural Innovation for Smallholder Resilience

Costa Rica raised the flag to be an example of how agriculture can be developed in harmony with environmental and social priorities. The Inter-American Institute for Cooperation on Agriculture (IICA), which supports food security and rural development across Latin America, is a key change-agent in Costa Rica. Here, IICA is advancing integrated production models that prioritize climate resilience, crop diversification and smallholder inclusion; approaches that are increasingly critical in the middle of global environmental and economic pressures.

A highlight of Costa Rica's agricultural identity is its globally renowned coffee sector. The country has earned a reputation for producing high-quality, traceable and sustainably grown coffee, supported by a robust institutional framework led by Costa Rican Coffee Institute (ICAFFE). Smallholders play a central role in this value chain, often organized in cooperatives or operating micro-mills that allow them to control processing and capture more value for their products. Environmental stewardship is deeply embedded in the system, with strong policies on deforestation and payment for ecosystem services supporting sustainable practices in coffee-growing regions.

Beyond coffee, innovation in diversified farming models was also evident and an example is the Nortico Cacao Farm, which combines sustainable cacao production with agrotourism and direct-to-consumer engagement. By building a premium brand and sharing their farming practices with visitors, they add value and

foster consumer connection. These efforts reflect a broader national strategy focused on empowering small-scale farmers, strengthening local food systems and positioning agriculture as a tool for sustainable economic development.



Figure 14 and 15: Agricultural models designed for small holders in Costa Rica, seeking food security. Agroforestry and goats raised to produce compost.

Certification Landscape in Brazil: Insights from Soy, Coffee and Cotton

Brazil stands as a global powerhouse in agricultural exports, with soy, coffee, and cotton among its most prominent commodities. These sectors are deeply integrated into international markets, making sustainability certifications not just optional tools but strategic necessities. Certifications serve as a bridge between Brazilian producers and global consumers, offering assurances about the origin, environmental stewardship and ethical conditions under which these products are cultivated.

i. Brazil's Export Orientation and the Role of Certification

Brazil's agricultural economy is highly export-driven. In 2024, over 70% of soy and 60% of coffee production were destined for international markets, while cotton exports reached record volumes as well. This global orientation places Brazilian producers under increasing scrutiny from buyers, regulators and consumers abroad.

Certifications have become essential tools for:

- Demonstrating compliance with international sustainability standards

- Ensuring market access in regions with strict environmental regulations (e.g., EU's EUDR)
- Building trust through traceability and transparency
- Aligning with corporate ESG goals and climate commitments

ii. **Deforestation: A Central Focus of Certification Programs**

Deforestation remains one of the most pressing environmental challenges in Brazil, particularly in the Amazon and Cerrado biomes, regions that are both ecologically rich and agriculturally productive. In response to international pressure and regulatory developments such as the EU Deforestation Regulation (EUDR), certification programs have increasingly embedded deforestation-free criteria into their standards.

This emphasis is especially pronounced in the soy and cotton sectors, which are often grown in areas vulnerable to land conversion. Programs like RTRS, ISCC, and ProTerra have made zero-deforestation a cornerstone of their certification frameworks. Similarly, corporate-led initiatives such as Triple S (Cargill) and ProS (Bunge) prioritize traceability and deforestation-free sourcing to meet buyers' expectations and ESG commitments.

While this focus has helped reduce land conversion and improve transparency, it has also led to a narrow interpretation of sustainability. In many cases, certification is used primarily as a compliance tool to demonstrate deforestation-free status, rather than as a holistic framework for improving agricultural practices, social outcomes or long-term resilience.

This trend has some implications:

- Environmental sustainability is reduced to land-use compliance, overlooking other critical aspects such as soil health, water management, biodiversity and climate adaptation
- Deforestation-free requirements may unintentionally constrain agricultural expansion in underdeveloped regions, particularly in areas like Maranhão, Tocantins, Piauí and Bahia (MATOPIBA), where communities face limited infrastructure and economic opportunities. By restricting the expansion of new agricultural lands, zero deforestation initiatives can hinder local development, deepening vulnerabilities and limiting the potential for inclusive growth
- Producers may adopt certification only to meet market access requirements, without internalizing the broader principles of sustainability or investing in continuous improvement.

In some cases, Brazilian farmers express frustration that certification audits focused almost exclusively on land documentation and satellite imagery, with little attention paid to actual on-farm practices or socio-environmental outcomes. This box-checking approach risks undermining the credibility and transformative potential of certification systems, the same way we see in other parts of the world.

To address these issues, certification programs must evolve beyond deforestation metrics and embrace a more integrated, outcome-oriented model, one that reflects the full spectrum of sustainability and supports producers in making meaningful improvements across environmental, social and economic dimensions, highlighting the robust and modern sustainable agriculture we have in Brazil.

iii. Conclusion

In Brazil, some sustainability certifications have evolved beyond mere compliance mechanisms, they now serve as strategic instruments for market access, environmental stewardship and rural development. As global expectations around traceability, smart climate and ethical sourcing intensify, certifications are becoming essential tools for Brazilian farmers to remain competitive and credible in the international context.

However, the current landscape reveals a tension between certification as a gateway to global trade and its potential to drive meaningful change on the ground. While deforestation-free criteria have brought visibility and accountability to land use practices, they have also narrowed the scope of sustainability, sometimes sidelining critical dimensions such as soil health, water efficiency, labour conditions and inclusive economic development.

To unlock the full potential of certification systems, Brazil must lead the way in redefining what sustainability means in practice. This should include:

- Shifting from compliance-based models to outcome-oriented frameworks that measure real environmental and social impact, an area where Brazil holds significant promise, particularly in showcasing its vast carbon sink potential through native vegetation, integrated systems and regenerative practices
- Ensuring that certification supports, not hinders, the responsible development of under-resourced regions, particularly in areas like MATOPIBA
- Promoting farmer-centric approaches that recognize the diversity of production systems and empower producers through technical support, financial inclusion, and policy alignment

Brazil has the opportunity to showcase a model of certification that is not only rigorous and transparent but also adaptive, inclusive, and regenerative. By doing so, it can reinforce its leadership in sustainable agriculture and demonstrate that economic growth and environmental integrity are not mutually exclusive—but mutually reinforcing.

Conclusions

This study has shown that sustainability certification systems, while not a universal solution or a 'silver bullet', play an increasingly important role in shaping agricultural practices, supply chains and consumer trust. Through my global Nuffield journey, it became evident that certification programs can create value when thoughtfully implemented, especially when they are adapted to local contexts and actively involve farmers as partners rather than simply subjects of compliance. Their ability to promote traceability, build credibility and link farmers to markets cannot be ignored, particularly in relevant crops like coffee, soy and cotton.

One of the most powerful insights of this research was the diversity of motivations behind certification adoption. For some farmers, certification provides access to premium markets or fulfills corporate supply chain demands. For others, it serves as a roadmap for implementing better agricultural practices. However, the cost and complexity of certification remain major barriers, especially for smallholders, raising important questions about equity and inclusiveness. Programs that succeed tend to be those that provide clear technical support, align with national or regional policy and deliver tangible economic and agronomic benefits.

It is also important how certifications are increasingly intertwined with broader sustainability agendas. Many of the organizations visited by the author are aligning certifications with goals such as regenerative agriculture, low-carbon farming and climate resilience. In some regions, particularly in Europe and parts of Latin America, certification is no longer just a market tool, it is becoming an instrument for meeting regulatory and environmental commitments. Meanwhile, the rise of company-owned private standards points to a shift in how certification is being used, not only for verification but also for brand positioning and internal risk management.

Yet, one of the challenges that emerged across conversations was the growing fragmentation of certification schemes. The large number of labels and standards in the market today has made it increasingly difficult for consumers to recognize and understand their meaning. This confusion weakens the perceived value of certification and undermines the visibility of farmer's efforts. A more harmonized, transparent, and unified approach to sustainability labelling would help restore trust and enable consumers to make more informed decisions, increasing the impact of certification systems.

Certifications alone are not enough to transform agricultural systems. Real change requires multi-stakeholder collaboration, investment in capacity-building and alignment between incentives and impact. Certifications must evolve to better reflect on-the-ground realities, leverage digital technologies for transparency and integrate farmer feedback. Without these improvements, they risk being seen as burdensome checklists rather than tools for transformation.

Ultimately, the value of certification lies not just in what it demands, but in how it empowers. When designed with farmer engagement and continuous improvement at their core, certifications can accelerate the transition toward more resilient, inclusive and sustainable food systems, benefiting producers, companies, consumers and the planet.

Recommendations

1. Set a place at the table for farmers

Sustainability certifications are most effective when farmers are actively engaged in their design, implementation and evaluation. Programs that prioritize training, field-level technical assistance, accessible tools and are adapted to the context that they are being implemented, are more likely to deliver long-term benefits and ensure that certification becomes a driver of real improvement, not just administrative compliance, a “check the box” tool. Smallholders, in particular, need collaborative structures such as cooperatives or group certifications to reduce the burden of cost and bureaucracy. Engaging farmers as co-creators rather than end-users of standards is essential to ensure both credibility and adoption.

2. Simplify and Align Certification Schemes for Greater Impact

The current proliferation of certification programs, many of which use overlapping or unclear criteria, has led to market confusion and weakened consumer trust. Companies, NGOs and standard developers should invest in harmonizing frameworks, encouraging mutual recognition where possible and developing simpler, outcome-oriented metrics. Reducing fragmentation will not only help consumers make informed choices but also enhance the visibility and value of farmer’s sustainability efforts across the supply chain.

3. Companies Should Lead with Purpose, Not Just Compliance

For companies sourcing agricultural commodities, certification should be more than a “box-ticking” exercise. Leading organizations are now integrating certification into broader sustainability strategies that include regenerative agriculture, decarbonization goals and farmer livelihoods commitments. Businesses should foster long-term relationships with farmers, supporting the development of capacity-building and use data to demonstrate the real-world outcomes of certified sourcing. Transparency, traceability and farmer-centric innovation must be at the heart of these efforts. Corporate sustainability programs should make sense and bring benefits across the whole supply chain.

4. Shift from Practice-Oriented to Outcome-Oriented Approaches

One of the key lessons from this study is the need for certification systems to evolve beyond verifying whether a specific practice was implemented and toward measuring whether that practice was effective. Monitoring and reporting frameworks must focus on outcomes such as improvements in soil health, biodiversity, water use or greenhouse gas emissions. This shift requires better data systems, aligned indicators and participatory evaluation. Only by tracking impact, not just activities, can the sector ensure that certifications are truly driving progress toward sustainable agriculture.

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