



**HAL**  
open science

## **The journey from technological change to livelihood: Effectual behaviour and farmers' compliance with certification standards in Ghana's cocoa sector**

Francis Nana Yaw Codjoe, Syndhia Mathe, Guillaume Soullier, Genowefa Blundo  
Canto, Felix Ankomah Asante, Daniel Sarpong

### ► **To cite this version:**

Francis Nana Yaw Codjoe, Syndhia Mathe, Guillaume Soullier, Genowefa Blundo Canto, Felix Ankomah Asante, et al.. The journey from technological change to livelihood: Effectual behaviour and farmers' compliance with certification standards in Ghana's cocoa sector. *Agricultural and Food Economics*, 2025, 13, pp.20. <10.1186/s40100-025-00362-w>. <hal-05183275>

**HAL Id: hal-05183275**

**<https://hal.science/hal-05183275v1>**

Submitted on 23 Jul 2025

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.




Distributed under a Creative Commons CC BY 4.0 - Attribution - International License

RESEARCH

Open Access



# The journey from technological change to livelihood: effectual behaviour and farmers' compliance with certification standards in Ghana's cocoa sector

Francis Nana Yaw Codjoe<sup>1,2\*</sup> , Syndhia Mathe<sup>3,4,5</sup>, Guillaume Soullier<sup>1,6,7</sup>, Genowefa Blundo-Canto<sup>3,4</sup>, Felix Ankomah Asante<sup>1</sup> and Daniel Bruce Sarpong<sup>2</sup>

\*Correspondence:  
f\_codjoesa@yahoo.com

<sup>1</sup> Institute of Statistical Social and Economic Research, University of Ghana, Legon, Ghana

<sup>2</sup> Department of Agricultural Economic and Agribusiness, University of Ghana, Legon, Ghana

<sup>3</sup> UMR Innovation, CIRAD, Montpellier, France

<sup>4</sup> INNOVATION, Univ Montpellier, CIRAD, INRA, Montpellier SupAgro, Montpellier, France

<sup>5</sup> Department of Agricultural Extension, School of Agriculture, College of Basic & Applied Sciences (CBAS), University of Ghana, Accra, Ghana, Accra, Ghana

<sup>6</sup> UMR ART-DEV, CIRAD, Montpellier, France

<sup>7</sup> ART-DEV, Univ Montpellier, CIRAD, Montpellier, France

## Abstract

Third-party certification is on the rise in agrifood chains despite the obstacles farmers face in participating in—and compliance with—certification standards with rapidly evolving standards and risky markets. Yet certification schemes claim to enhance smallholder livelihoods, barriers and changing conditions notwithstanding. This study brings a new perspective on smallholder participation in certification schemes based on effectuation and capacity using the impact pathways approach. We develop the linkage between farmers' effectual behaviour and their capacities, thereby emphasising their current practices and how external interventions can expand their opportunities for improved livelihoods. Results demonstrate that effectual behaviours, i.e. making decisions under uncertainty, and capacities are key drivers of the success of certification processes which enable smallholder farmers and cooperatives to remain in schemes, overcome uncertainties, and improve their livelihoods. This suggests that the impact of certification schemes on livelihoods matters, but that effectual behaviour influences smallholder participation and has more impact in a context of uncertainty. These findings call for the development and strengthening of capacities and effectual behaviours as the central focus of certification interventions by Fairtrade International, Rainfall Alliance, Ghana Cocoa Board, and the Forestry Commission in Ghana's cocoa sector.

**Keywords:** Effectual behaviours, Capacities, Cooperatives, Certification schemes, Livelihoods, Cocoa, Ghana

## Introduction

Certification schemes have received considerable attention in recent years as a governance tool to address sustainability issues, to increase smallholder participation and improve livelihoods, particularly in global food chains (Astrid Fenger et al. 2017; Basso et al. 2012; Brako et al. 2021; Dompheh et al. 2021; Iddrisu et al. 2020; Ingram et al. 2018; Potts et al. 2014; Sellare 2022; Waarts et al. 2015). Despite this claim, the livelihoods of smallholder farmers do not appear to be reflecting the booming revenues generated

by the value of cocoa. To date, most studies have reported diverse and/or mixed evidence on the effects of certification and voluntary standards on smallholders (DeFries et al. 2017; Oya et al. 2018; Meemken 2020). Certification schemes (CS) can improve well-being, but their effects vary depending on the region, standards, crops, and producers (Traldi 2021). Some authors conclude that CS may undermine the incomes of the poorest farmers (Henson and Jaffee 2008), while others suggest CS helps raise rural incomes and reduce poverty (Maertens and Swinnen 2009; Schuster and Maertens 2016; Mitiku et al. 2017a). Yet other studies report positive impacts for some types of certification (Fort and Ruben 2008; Van Rijsbergen et al. 2016; Jaza Folefack et al. 2021) but not for others (Chiputwa et al. 2015; Mitiku et al. 2017a), while some studies suggest more research is required (Marx et al. 2022) into the governance of voluntary sustainability standards (certification programmes) and their impacts. Even though impacts remain mixed and inconclusive in the context of smallholder farmers and certification programmes, their limited impact may explain why farmers remain in certification schemes; to date, few efforts have been made to decipher the complexity of certification impact pathways and farmers' roles and behaviours along these pathways. The role of farmers' cooperatives includes information sharing, coordinating members' activities, managing cooperative operations, and facilitating capacity building. Cooperatives give their members access to information and knowledge, which reduces information asymmetry and lowers transaction costs. This leads to more negotiating power in markets and improves members' understanding and perception of various circumstances (Ferguson 2012; Fischer and Qaim 2012; Prager 2015). While cooperatives have a significant impact on individual farmer's livelihoods, farmers' own behaviours also influence compliance with certification, which, in turn, shapes their livelihood trajectories. Thus, compliance depends on farmers' willingness to adopt recommended practices, keep accurate records, and engage in ethical production. In turn, farmers who actively embrace certification standards can unlock premium markets, secure better prices, and enhance their long-term economic resilience. Cooperatives serve as institutional vehicles for policy-makers to deliver direct benefits to smallholder farmers such as inputs, usually in the form of improved seed, fertilisers, and services, particularly production and marketing services. In Ghana, most farmers join a cooperative to qualify for these inputs and services in certification schemes to enable them increase their yield, access certified markets, and improve their income.

The continued participation of smallholders in cooperatives involved in certification schemes despite their poor living conditions highlights the critical yet under-researched aspects of farmers' behaviours and roles in certification pathways.

To understand the roles and behavioural strategies of smallholders that lead them to engage in certification despite the uncertainties, we focus on cocoa production, specifically on certification schemes, not only because certified cocoa production is a risky environment and hence helps understand effectual behaviour (Stroe et al. 2018), but also because certified smallholder cocoa farmers are more likely to rely on effectual reasoning (Roach et al. 2016). The inherent risk in certified cocoa production, therefore, increases the likelihood of capturing effectual elements in the certification processes. Cocoa certification schemes offer an ideal opportunity to reflect on the numerous uncertainties facing producers, such as a vicious cycle of poor yields, low premiums, rapidly evolving

certification standards, and fluctuating markets (Valkila 2009; Beuchelt and Zeller 2011; Jena et al. 2012).

This study contributes to three strands of literature. First, it is related to the small but growing literature on effectuation and agricultural commodity certification. While effectuation remains useful for entrepreneurs in making decisions in a context of business and marketing uncertainty, this study provides insights into how smallholder farmers in cooperatives involved in certification show effectual behaviours and adjust this behaviour to overcome uncertainties and enhance their livelihood. Second, our paper sheds light on the capacities that are required to navigate the uncertainties of certified cocoa production. Third, despite the wealth of literature on farmers' impact pathways (Euler et al. 2017; Brauw et al. 2018), this study contributes to the growing literature on the impact pathways approach and certification schemes. It offers a new perspective on how certification affects smallholder farmers in cooperatives through an explicit causal chain connecting inputs, outputs, outcomes, and impacts with an emphasis on the role of farmers' behaviours and capacities. Our findings shed light on the need to continuously develop and strengthen smallholders' effectual behaviours and capacities to enable them to participate, stay in schemes, and enhance their livelihood in the face of uncertainties.

The remainder of this paper is organised as follows. The following section provides an overview of the concepts of effectuation and capacities. The "Methods" section describes the processual approach, the study area, and the data collection steps. The "Results" section presents the main results, and the Discussion and Conclusion section discusses the results and suggests directions for further research.

## Concept

### *Effectuation and farmers' effectual behaviour and capacities*

The concept of effectuation is mobilised in this study to understand farmers' effectual behaviour, and, more importantly, how capacities are mobilised or utilised in the certification process to contribute to achieving impacts. This paper develops the linkage between farmers' effectual behaviour and their capacities, emphasising their current practices and how external interventions can expand their opportunities to improve their livelihoods. As a concept, effectual behaviour describes a problem-solving approach which is particularly relevant when dealing with the uncertain and complex situations encountered in entrepreneurship and business. In contrast to causation, defined as the action of causing, and anything that produces an effect, effectuation means to cause to happen. The decision-making logic "to the extent we can predict the future, we can control it" follows causation, whereas effectuation is "to the extent we can control the future, we do not to predict it".

Effectual behaviour has recently attracted increasing attention in the literature (Mero & Haapio 2022; Stroe et al. 2018). This can be attributed to the higher levels of uncertainty in a rapidly changing environment, which makes causal planning more challenging. Empirically, effectual behaviour has been examined using both qualitative methods such as case studies, narratives, interviews, action research, and experimentation (Sarasvathy 2001; Dew et al. 2009; Eberz et al. 2017; Mathé et al. 2021; Mero and Haapio 2022) and quantitative approaches (Osuigwe & Eresia-Eke, 2022) across different regions, countries, and disciplines. Effectuation is a normative and multidimensional construct

that has four dimensions: (1) experimentation, (2) affordable loss, (3) flexibility, and (4) pre-commitments and strategic alliances (Chandler et al. 2011; Fisher 2012) (Table 1). In agricultural commodity certification, capacity building through training and other forms of support to producers and their organisations helps to improve the sustainability, competitiveness, and inclusivity of their production systems (Oya et al. 2018). Capacity building is defined “as *activities that strengthen the knowledge, abilities, skills, and behaviour of individuals, and improve institutional structure and processes so that the organisation can efficiently meet its goals in a sustainable way*” (Ku and Yuen-Tsang, 2013, p. 1). Therefore, capacity building entails initiatives aimed at enhancing a partner’s capacity to execute, maintain, and self-renew over time.

In this study, we utilise technical, cognitive, relational, and organisational capacities that individual farmers who are members of a cooperative mobilise during the certification process that contribute to achieving impacts and demonstrate the linkage between these capacities and the four different dimensions of effectual behaviours. These capacities are adapted from the work of Codjoe et al. (2024) and also draw on other works in the literature (Feder et al. 1985; Dillon & Hardaker 1993; Klerkx & Leeuwis 2008; Hashemi et al. 2009). Their capacities enable farmers in cooperatives to make informed decisions, adopt best practices, and collaborate effectively, which can increase productivity, improve market access, enhance financial stability, and lead to greater resilience to economic and environmental uncertainties. Table 1 defines and explains the many key constructs used in the rest of this paper to examine the dimensions of effectual behaviour and capacities mobilised. The dimensions of effectuation theory are consistent with key innovation capacities, i.e. being open to new ways of doing things, building and sustaining relationships with a variety of actors, experimenting, and establishing effective partnerships (both formal and informal) to accomplish shared objectives. Capacity building sustains effectual behaviours because access to training, knowledge, and services enable cocoa farmers to deal with the uncertainties that arise in during their production of certified cocoa. As a result, they develop and apply their unique capacities dynamically and adaptively.

Smallholder cocoa farmers operating in a risky certified cocoa environment adopt effectual behaviour to navigate uncertainties. By organising, planning, and coordinating production—often through cooperatives—they adapt dynamically to the challenges raised by certification. Certification outputs drive behavioural changes, such as diversified farming, farm expansion and rehabilitation, and strengthened group cohesion, which help them manage uncertainty. Rather than solely maximising profit, their primary goal is minimising risk to maintain their enterprise and household. Effectual actors, as described by Sarasvathy (2001), leverage contingent opportunities and available resources to shape their aspirations through economic decision-making. Smallholder cocoa farmers exhibit effectual behaviour in response to various interconnected factors that shape their decision-making in complex and uncertain environments. This is particularly evident in certified cocoa production, where climate variability, pests, diseases, fluctuating market prices, and certification requirements create significant risks and uncertainties for their cocoa enterprises. Thus, exhibiting effectual behaviour enables smallholder farmers to overcome obstacles, utilise local knowledge, and enhance the sustainability of their cocoa enterprises.

**Table 1** Description of the dimension of effectuation and associated capacities. Source: Authors based on (Feder et al. 1985; Dillon et al. 1993; Klerkx and Leeuwis 2008; Hashemi et al. 2009; Chandler et al. 2011; Fisher 2012)

S/No	Dimensions of effectuation	Description	Associated capacity	Description
1	Experimentation	The experimentation dimension describes the process of testing several products and business models to identify one or more that have a high probability of success	Cognitive	It encompasses the farmer's mental abilities, including decision-making, problem-solving, and adaptability, which are crucial for optimising agricultural practices
2	Affordable loss	Behaviour that strives for a cautious and risk-averse commitment of resources, especially money, is described by the affordable loss construct	Technical	It refers to the knowledge, skills, and resources that farmers possess to effectively manage their agricultural practices
3	Flexibility	A conduct that is deemed adaptable and consistent with seizing new opportunities is characterised by the flexibility dimension	Organisational	It pertains to the ability of farmers or cooperatives to manage their farm operations efficiently, including planning, resource allocation, and coordination of activities
4	Pre-commitment and Strategic alliances	Behaviour that aligns with pre-commitments and strategies ultimately emphasises partnerships and pre-commitments and obtaining competitive resources from external stakeholders (suppliers and customers)	Relational	It involves the ability of farmers or cooperatives to establish and maintain relationships with stakeholders, such as buyers, suppliers, government agencies, and other members of their community

## Methods

### A processual approach to reveal farmers' effectual behaviour: the impact pathway approach

In this study, we aimed to reconstruct certification stories and to develop impact pathways. The innovation story is interwoven with its associated impact pathway, providing a historical perspective on the certification process and insights into causal mechanisms and effectual behaviours. The impact pathway describes the process leading from inputs to outputs to outcomes to impacts, thereby explaining the causal mechanisms.

The impact pathway approach, also termed Impact of Research in the South (ImpresS) (Temple et al. 2018; Faure et al. 2020), was adapted for this study from a variety of qualitative methods used for ex post programme evaluation in the research literature including outcome harvesting and outcome mapping (Earl et al. 2001). The ImpresS approach has recently gained prominence in the agricultural research literature due to increased attention being paid to accountability in the context of scarce financial resources for public research in the agriculture sector. Unlike other qualitative impact approaches, ImpresS is based on a comprehensive and participatory approach (Douthwaite et al. 2003; Alvarez et al. 2010) to assessing the impacts of research on society. We chose this approach because of its suitability for qualitative impact analysis, given its participatory nature (Temple et al. 2018; Faure et al. 2020; Blundo-Canto et al. 2020). The participatory approach, which involves multiple data sources including interviews with key informants, focus group discussions, and desk reviews, strengthens the reliability of findings by triangulating diverse perspectives and sources of information. Additionally, it improves the understanding of linkages between outputs, outcomes, and impacts.

Given the dynamic and complex nature of certification processes, the use of the impact pathway approach enabled us to reconstruct the innovation pathway, to identify and assess the effects of certification in terms of outputs, outcomes, and impacts on livelihoods, with a particular focus on the roles played by other stakeholders, projects, and contextual factors. This focus helped clarify and understand the effectual behaviours and capacities developed to address uncertainties that arise during the process of certification. This is because causal behaviour, as opposed to effectual behaviour, is hypothesised to only focus on the effects (outputs and impacts), rather than deconstructing the mechanisms that lead to impacts.

Here inputs are defined as the resources required to implement the certification programme, including funding, human resources, and technical advice, and that are mobilised by the farmers. These resources encompass agronomic or technical advice, training and practical instructions for the use of fertilisers, plant protection products, and other training received by the farmers. The term outputs refer to the immediate results of specific activities undertaken based on using the inputs (the tangible effects of their efforts). In other words, the word outputs refers to the results and benefits obtained by the farmers based on the training they received and the practices they adopted and effectively implemented. Our definition of outcome is slightly different from the one used in the ImpresS approach. Our definition of outcomes is based on that of Earl et al. (2001) because we focus on effectual behaviours. Earl et al. (2001) argue that "outcomes" stand for changes in the behaviour, relationships, activities, and actions of a boundary partner that can be logically linked to certification. In our case, inputs and outputs generate

changes in behaviour or attitudes that are referred to as outcomes, i.e. the overall result of the outputs achieved by the farmer, and it showcases the broader effects and changes brought about by certification and sustainable practices.

As such, this outcome has a significant effect on diverse aspects. Outcomes have first-level impacts on the farmers who are involved directly, potentially improving their personal livelihood and well-being. Second-level impacts extend to the cooperatives or societies to which the farmers belong, fostering sustainable development and better practices within the community. Third-level impacts positively influence the farmers' environment, as sustainable agricultural practices benefit biodiversity, soil health, and ecosystem resilience.

### **Study area and case studies**

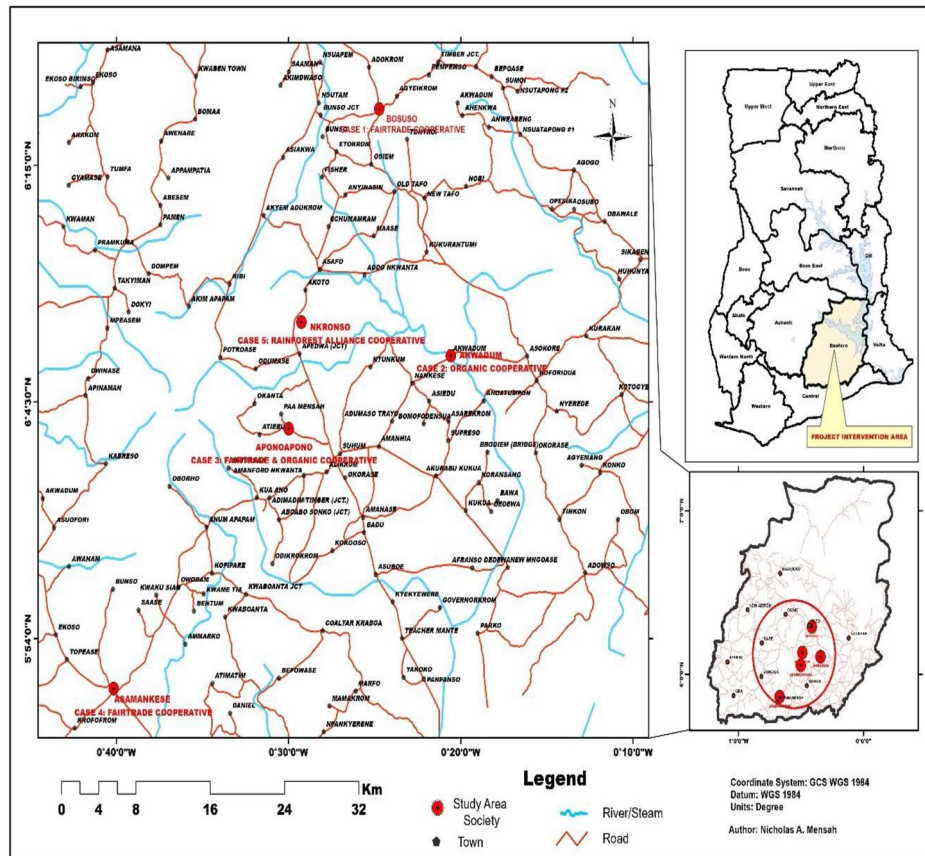
We chose to implement a case study approach (Yin 1994, 2009) as applied in the ImpresS approach. Our analysis was based on five case studies of certification schemes: Rainforest Alliance (RA), Organic (Org), and Fairtrade (FT), located in the Eastern Region of Ghana. The region was purposively chosen for the study due to its historical significance in sustainable cocoa production. The cooperatives (here termed "cases") include Case 1 (Bosuso) and Case 4 (Asamankese) both of which began operations in 2012 and grow and sell Fairtrade-certified cocoa beans. Case 5 (Nkronso), RA certified, Case 2 (Akwadum), Organic certified, were the first cooperatives to receive Organic certification in Ghana, and Case 3 (Aponoapono), a certified cooperative combining Fairtrade (FT) and Organic (Org), was the first FT & Org cooperative in West Africa (Fig. 1).

### **Data collection**

Our data collection process used a participatory approach, which included interviews with key informants, focus groups, and desk reviews to analyse impact pathways. The first step of the process involved gathering secondary data through a review of the scientific literature, the analysis of documents, and interviews with key informants. We interviewed 12 key informants including two standard owners, three managers of certified cooperatives, three cocoa traders, two focal farmers, one technical manager employed by the Cocoa Health and Extension Division of the Ghana Cocoa Board (CHED-COCO-BOD), and one researcher from the Cocoa Research Institute of Ghana (CRIG). Key informants were purposefully selected according to the role (major, influential, and impacted) they play in the certification process. This step enabled the development of materials such as trajectory templates with timelines and impact pathways for each case.

Cooperatives were selected as cases following a purposive sampling strategy focussed on their engagement in Fairtrade, Rainforest Alliance, and Organic cocoa certification schemes. To capture variations in effectual behaviour and compliance and to enable analysis of how size and organisational structure influence these dynamics, both large and small cooperatives were selected. Additionally, cooperatives with several years of certification experience were chosen to facilitate examination of behavioural changes over time.

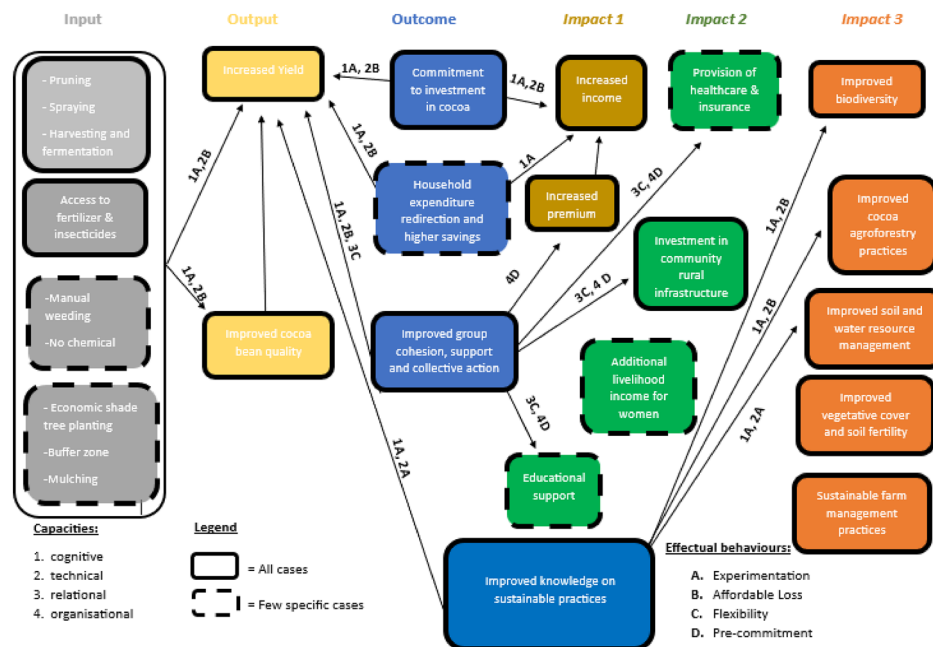
In the second step, through focus group discussions (FGDs), farmers actively involved in the certification process described their own impact pathway and its causal mechanisms. FGDs were conducted with 60 participants (25% women and 75% men). Cocoa



**Fig. 1** Map of study area

farming is male-dominated due to inheritance systems and the labour-intensive nature of the activity, which requires considerable physical strength (Abdul-Rahman & Donkoh, 2015; Addo-Fordjour et al., 2013).

To ensure diverse perspectives, participants were chosen from various socioeconomic and educational backgrounds. More than 70% of the selected farmers do not hold leadership positions in their cooperatives. The FGDs included small-scale cocoa producers (who typically cultivated less than 5 ha), cocoa being their main source of income. These farmers have been marketing certified cocoa beans: Fairtrade (FT), Organic (Org), and Rainforest Alliance (RA) since 2012. Farmers were purposively selected to align with the study’s objectives. The one-day FGDs were conducted in the local language (Twi) and were facilitated by a researcher, with a research assistant taking discussion notes. During the FGDs, participants updated the information we had gathered from the literature, the documentary analysis, and interviews with the key informants. The participants described the causal mechanisms that enabled the certification process to move from generating outputs supported by actors who changed their behaviours, and practices, ultimately leading to the attributed impacts. This process of reconstructing the certification story provided both a historical perspective and insights into the causal mechanisms, effectual behaviours, and capacities mobilised and utilised that contribute to impacts.



**Fig. 2** A generic truncated impact pathway of the certification process showing areas of effectual behaviours and associated capacities utilised or mobilised

In step three, we consolidated the data collected during the interviews with key informants and focus group discussions. Step four consisted of organising focus groups and conducting further interviews with purposeful selected participants who had been involved in the second step to validate the certification stories and impact pathways. Data obtained using the participatory approach were processed using Canva (a graphic design tool) to identify, map, and visualise the impact pathways. The diagram in Fig. 2 shows the linkage between the inputs and their impacts, emphasising the effectual behaviours and associated capacities that were mobilised and utilised during the certification processes. This diagram consisted of coloured boxes and arrows with numbers (i.e. the capacities) linking the impact pathways (e.g. input, output, outcome, with the corresponding impacts). Data collection lasted between June and August 2023. In this study, behaviours and capacities were analysed at different levels: technical and cognitive aspects were examined at the farmer level, while relational and organisational aspects were assessed at the cooperative level.

## Results

### Trajectory of certification processes, effectual behaviours, and associated capacities

#### Effectual behaviours

Our results show that as an innovation, certification is a dynamic process. The processes involved in smallholder participation in certification schemes consequently do not represent a one-off event but a long process characterised by both individual and collective dynamics. In the trajectory of the certification process, our findings are linked to the four dimensions of effectuation theory: experimentation, affordable loss, flexibility, pre-commitments, and strategic alliances.

Given the unpredictable changes in consumer demand for emerging sustainable cocoa, our results concerning all five cases included experimentation. Through awareness, sensitisation, farmer registration, and training on standards as the process of engagement by cooperatives, non-governmental organisations (NGOs), International organisations, private investors, and service providers for business purposes, farmers gained knowledge, experimented, and tested certification ideas by establishing standard compliant farms. They previously knew nothing about cocoa certification since, at the time, the sustainable market did not exist in Ghana. The certification process started around the same time as certification schemes and sustainability initiatives rose to prominence in the global cocoa landscape in the mid-2000s (Ingram et al. 2018) when the market was unpredictable.

Findings based on the affordable loss to invest their resources, time, and money indicate that farmers in the cooperatives willingly took the risk by dedicating their agricultural land, a minimum of two acres in all five cases, to experiment with certification ideas. Cases 1, 4, and 5 invested in approved inputs and agronomic practices, while Cases 2 and 3 demonstrated their willingness by making individual and collective decisions to forgo the use of chemicals on the dedicated farms, a decision that involved increased cost.

Furthermore, our results demonstrate that flexibility to embrace changes and seize opportunities enabled one of the cooperatives to behave better than others in the marketplace. In addressing issues of single buyer dependency, a controversy that caused some members to leave the cooperative in the certification process associated with low and irregular premiums (Table 2), Case 5 was an exception. Through internet searches, and information obtained from a network of partners, Case 5 embraced change by adding Fairtrade to Organic. In another example, Case 3 began with organic certification in 2007 and added Fairtrade to Organic in 2011 to capitalise on the expanding certified market and to address concerns linked to reliance on a single buyer. In Case 5, sales to one buyer in 2007 had increased to sales to three buyers in 2023. In Case 3, competition between two partners who sought to establish sustainable cocoa production by engaging farmers and surveying farms, particularly those not yet affiliated with any particular group, led to controversies over farmer group recruitment. This issue also reduced membership at the initial stage of the certification process. However, it was ultimately resolved by the community chiefs and CHED-COCOBOD, who decided on the appropriate allocation of partners. As a result, one partner, who had already engaged many farmers in a different community, focussed his efforts on that community, while the other partner continued working with the Case 3 farmers.

In Case 5, the cooperative's default on input credit payments to suppliers led to significant controversy, resulting in legal action against leaders of the cooperative and prompting some members to leave. To address this issue, the cooperative revised its input credit arrangement. Instead of providing full credit, they introduced a new system requiring farmers to pay 30% of the total input cost upon registration, with the remaining 70% due at the end of the cocoa production season.

Our findings emphasise the role of pre-commitment and strategic alliances for the cooperatives in that, by obtaining pre-commitment from buyers such as chocolate companies, the cooperatives can sell some volumes of certified beans. In most cases,

dependency on a single buyer has resulted in the sale of less than 70% of the total annual certified volumes to the market (Table 2). While Cases 1, 2, and 4 had difficulty establishing and maintaining direct trading relations with buyers, as demonstrated by the few direct trading relations with external actors (chocolate manufacturers and processors) (Table 2), from 2007 on, Cases 3 and 5 established and maintained partnerships with buyers through contract arrangement ranging from one to about 10 chocolate companies. For instance, since 2008, Cases 1 and 4 have maintained their contractual connection with Taloca (buyer), but have not been able to form new trade partnerships. Case 3 has steadily acquired new partners (manufacturers and processors) since 2007; Case 5 has retained two more buyers since 2007; but Case 2 has been unable to form any new trading relationship after its previous contract with a buyer ended in 2010 under a project partnership arrangement. Case 3 has a direct trading partnership with five cocoa exporters and an average of 10 chocolate companies. These chocolate companies include Tony Chocolonely (the Netherlands), Dr Browy (USA), Tcho (USA), Kaoka (France), Daar n Houwer (the Netherlands), Uncommon (USA), Failclin (Switzerland), Crafting Markets (the Netherlands), Tradin (Belgium), and Taza (USA). Furthermore, the strategic alliance with these companies in different markets allows them to acquire new competitive advantages thanks to new knowledge of the markets and risk reduction in the case of uncertainties.

#### ***Capacities mobilised and utilised***

Our case study analysis produced evidence of cognitive technical, organisational, and relational capacities associated with the effectual behaviours identified during the course of the certification process. Across all the cases, cognitive capacities were displayed at the farmer level in the form of the farmers' decision to access government and cooperative support programmes for agricultural inputs such as fertilisers and insecticides. Farmers participate in training and skills development through meetings and workshops to improve their knowledge of good agricultural practices and standards. Across all the cases, individual farmers manage cash or income and use it to pay for farm-related services, to hire labour, and to assign tasks based on the skills and abilities of family labour. They voluntarily respect certification requirements and use good agricultural practices, both of which are essential to maximising outputs that have an impact.

Our results concerning technical capacities revealed varied levels of support and training approaches across cases at the farmer level. Three cases (Cases 2, 3, and 5) provide training support for good agricultural practices (pruning, spraying, harvesting, mulching) and standards (cocoa agroforestry practices, the creation of buffer zones, farm sanitation practices) to members using their own internal training and field inspection while others (Cases 1 and 4) rely on the support of state service providers such as CHED for such training support.

At the cooperative level, our findings demonstrated organisational capacities when groups joined registered cooperatives, increased membership led to improved production management, and to group sales of certified cocoa. Each of the cases applies different membership selection criteria; through education and sensitisation, the cooperatives have been able to bring together individual farmers who previously did not belong to any farmers' group to pursue collective interest by registering. Over the years, Case 5

**Table 2** Trajectory of certification processes in the 5 case studies. Source: Field data 2023

	Fairtrade cooperative (Case 1)	Organic cooperative (Case 2)	Organic and Fairtrade cooperative (Case 3)	Fairtrade cooperative (Case 4)	Rainforest Alliance cooperative (Case 5)
Start year of the certification process	2008	2003	2007	2008	2007
Process of engagement	Community sensitisation, followed by farmer registration and training on standards and GAPs. Farmers already belonged to farmers' groups but not for cocoa	Community sensitisation, followed by registration, measurement, and demarcation of all farms and subsequent declaration of the areas concerned as organic zones. Cocoa production did not previously make intensive use of inputs in the area and the farmers were not members of any group	Meetings with authorities in the area and community sensitisation, followed by farmer registration. There was previously no cooperative in the area	Community sensitisation, followed by farmer registration and training on standards and GAPs. Farmers did not belong to any farmers' group	Community sensitisation, followed by farmer registration, farm measurement, and training on standards and GAPs. Farmers did not belong to any farmers' group
Evolution of membership	Membership over the years has increased from 92 to 208 (i.e. by more than 126%) since starting, with an average annual increase of 4.3%	Membership has increased from 70 to 130 (i.e. by more than 86%) since starting, with an average annual increase of 4.3%	Membership over the years has increased from 275 to 1 063 (i.e. by more than 286%) since starting, with an average annual increase of 20%	Membership over the years has increased from 525 to 4 032 (i.e. by more than 668%) since starting, with an average annual increase of 33%	Membership over the years has increased from 20 to 28 (i.e. by 29%) with an average annual increase of 1.8%
Volumes absorbed by the market (buyers)	Between 50 and 70% of volumes produced annually are sold. The remainder is sold as conventional cocoa due to the lack of sufficient buyers	Between 50 and 70% of volumes produced annually are sold. The remainder is sold as conventional due to dependency on a single buyer	> 70% of volumes produced annually are absorbed by buyers. The remainder is not sold due to poor quality attributes (small bean size) not to the lack of a market	Between 50 and 70% of volumes produced annually are sold. The remainder is sold as conventional due to the lack of sufficient buyers	> 70% of volumes produced annually are absorbed by buyers. The remainder is not sold due to the lack of sufficient buyers
Membership selection criteria	Members must be adult cocoa farmers (more than 18 years old), duly registered with the group	Farmers can register free of charge, but must be willing to pay dues and attend meetings. The entrance form contains applicants' production records, farm size, and age of farms and must be filled in	Farmers can register free of charge, but must be willing to pay dues and attend meetings	Farmers can register free of charge, but must be willing to pay dues and attend meetings	Minimum farm size of 2 acres hectares required plus guaranteed minimum yield of 1 metric tonne of cocoa per annum (16 kg bags) in addition to free registration

**Table 2** (continued)

	<b>Fairtrade cooperative (Case 1)</b>	<b>Organic cooperative (Case 2)</b>	<b>Organic and Fairtrade cooperative (Case 3)</b>	<b>Fairtrade cooperative (Case 4)</b>	<b>Rainforest Alliance cooperative (Case 5)</b>
Main support received by farmers	Training support services (spraying and pruning services, supply of inputs on credit (access to fertilisers and insecticides)	Training support services (spraying and pruning services), supply of inputs on credit (access to fertilisers and insecticides)	Training support services (spraying and pruning services), supply of inputs on credit (access to fertilisers and insecticides)	Training support services (spraying and pruning services, supply of inputs on credit (access to fertilisers and insecticides)	Training support services (spraying and pruning services, supply of inputs on credit (access to fertilisers and insecticides)
Diversity of support providers	Diverse with medium intensity support activities	Diverse actors with medium intensity support activities	Diverse actors with high-intensity support activities	Diverse with low-intensity support activities	Diverse with high-intensity support activities
Controversies	Dependence of the group on one buyer and group supply exceeds the buyer's demand	Dependence of the group on one buyer and group supply exceeds the buyer's demand	Competition of standards to capture communities and farmers' groups	Dependence of the group on one buyer and group supply exceeds the buyer's demand	Group defaulted on payment of input credit to supplier
Regularity and period premium received	Regular and at the end of the season	Irregular and beyond the end of the season	Regular and at the end of the season	Regular and at the end of the season	Regular and at the end of the season
Amount of premium received compared to expectation	Reduced	Reduced	Improved or better	Reduced	Improved or better
Link to external actors	Few direct trading relationships with external actors (chocolate manufacturers and processors)	Few direct trading relationships with external actors (chocolate manufacturers and processors)	More direct trading relationships with external actors (chocolate manufacturers and processors)	Few direct trading relationships with external actors (chocolate manufacturers and processors)	More direct trading relationships with external actors (chocolate manufacturers and processors)

registered only 29% additional membership, due to its restricted membership selection strategy, while Cases 1, 2, 3, and 4 recorded significant enrolment (86%–668%). Cases 1, 2, 3, and 4 have open membership, i.e. the number of farmers who can join the cooperative is not limited; in contrast, Case 5 requires applicants to have a minimum 2-acre productive cocoa farm before they can become members. In Case 5, the cooperative supports production activities by providing spraying and pruning services to members at reduced fees, GHC 120 (USD 10.32) through its spraying (45) and pruning (25) teams. Through better negotiation with support actors such as CHED and SPD, Case 5 also supplies the appropriate quantity of inputs and seedlings to increase production. Again, Case 5 has a warehouse at the harbour where aggregated beans are stored before shipment to clients. There have been no issues of side-selling because the local buyer paid cash and farmers received better premiums from diversified markets. However, Cases 1, 2, 4, and 5 do not provide pruning and spraying services to members and rarely organise the group purchase of inputs for members.

Again, our findings concerning relational capacities revealed that the case studies emphasise how the cooperatives establish and maintain relationships with a variety of actors (NGOs, development partners, government ministries, state extension providers). In all the cases, the Ghana Cocoa Board and its divisions such as the Cocoa Health and Extension Division, Seed Production Division, Cocoa Research Institute of Ghana, and Licensed Buying Companies were shown to be socially connected to the cooperatives, and to share knowledge. These actors facilitate the cooperatives' access to outside resources, like credit or inputs, and knowledge acquisition through training. All five cases are linked to diverse actors with different levels of relationship and support (see Table 2).

Our findings concerning relational capacities also demonstrate the ability of the cooperatives to establish and maintain relationships with stakeholders including buyers. Cases 3 and 5 are a good illustration. For instance, the Case 3 strategy includes investing in attending annual international cocoa trade fairs and shows. This is made possible by the premium included in their annual budget dedicated to international fairs and exhibitions. During these events, members of the Case 3 cooperative establish new trade partnerships with buyers while maintaining their relationships with their existing buyers. They exhibit their cocoa beans, including dried fermented beans and pods, at trade fairs that bring together processors, manufacturers, and consumers from all over the world on one platform, alongside some pictures of developmental projects funded by the premium they receive annually and the impacts achieved. The Case 3 cooperative has established and maintained direct relationships with five cocoa exporters and an average of ten chocolate companies as a result of such fairs.

#### ***Effectual behaviours and capacities as drivers of perceived impact***

Our results demonstrate that the interconnection of technical, cognitive, relational, and organisational capacities that individual farmers and the cooperative mobilised along their pathways is the effectual behaviour which is key to driving impact (Fig. 2).

Our findings highlight the significance of relational and organisational capacities at the outcome related to impact at the cooperative impact level (impact 2). Again, these

capacities are strongly linked with flexibility, pre-commitment, and strategic alliance dimensions of effectuation at the cooperative level along the pathway (Fig. 2).

Again, our evidence demonstrates that along the impact pathways of outcomes leading to impacts as well as outcomes with feedback on outputs among all five cases, smallholder farmers and the cooperative mobilise and utilise cognitive, technical, and relational capacities and exhibit effectual behaviours of experimentation, affordable loss and flexibility which are crucial to achieving impacts and enhancing livelihoods. Outputs generate changes in behaviour or attitudes, here referred to as outcomes. Our results point to output diversity across all cases, with higher yields and improved cocoa bean quality as key outputs based on varying levels of adoption and farmer decisions. Outcome results show a combination of inputs and outputs that result in a diversity of outcomes, which in turn contribute to diverse perceived impacts. Table 2 shows how certain outcomes can have a feedback effect on the outputs generated. Findings across all cases reveal that redirection or prioritisation of farm household expenditure leads to key outcomes. One such outcome is increased commitment to household savings, which can be reinvested in farm improvements such as better inputs, labour, and technology. These investments can increase cocoa yields and bean quality, and ultimately, household income. Outcomes centred on increased knowledge of sustainable agricultural practices such as investing in cocoa rehabilitation (i.e. replacing old cocoa trees with new), committing to expanding their cocoa farm by diversifying into food crops and livestock, and adopting farm sanitation practices through training, which were the main drivers of perceived impacts. These impacts included higher farmer income and environmental benefits such as improved biodiversity, enhanced cocoa agroforestry, and better soil fertility. These behavioural changes were driven by the adoption of standards and technologies gained through certification programmes. For example, the premiums enabled farmers to invest in rural development projects, such as constructing health facilities, libraries, ICT centres, boreholes, and schools, with a particular focus on children's education. While farmers recognised the importance of the environment in supporting certified cocoa production, the adoption of certification standards and technologies significantly enhanced their commitment to sustainable agricultural practices. Likewise, across all cases, cooperatives strengthened coordination through shared interests and regular interactions in meetings, workshops, and annual general meetings.

The outcome of commitment to cocoa farm expansion and diversified farming (Fig. 2) demonstrates the effectual behaviour of taking small, affordable steps and of experiential learning. This is evidence of starting small and adapting as they go, to manage risk more effectively in their cocoa production activities. Again, we underscore commitment to sustainable practices as an effectual behaviour that the cocoa farmers adapt and experiment with eco-friendly techniques that fit their own specific circumstances. These practices are key to addressing unforeseen climatic challenges to their cocoa production. Our findings revealed strong group cohesion along the impact pathways in all five cases, as an outcome of certification. Through group cohesion, the members of the cooperatives demonstrate effectual behaviour by providing for one another in such areas as working together on farms, provision of inputs, and provision of health insurance and student credit loans for their wards. Staying together enables them to deal with challenges concerning their cocoa production activities.

*Perceived impacts* At the cooperative level, cooperatives oversee and coordinate their members' production activities, while at the farmer level, the adoption of farming practices varies among individuals. To support their members, cooperatives provide services such as spraying, pruning, and weeding. At the farmer level, investments are made in farm activities, including purchasing additional inputs to supplement those provided by the cooperative and hiring labourers. This ensures that farm operations are completed on time, thereby maximising productivity. Findings from focus group discussions with cooperative executives further validate their role as coordinators.

An executive member of a cooperative stated:

"We provide training support to members using our own internal training and field inspection team. Additionally, we support production activities by providing spraying and pruning services to members at reduced fees, GHC 120 through its spraying (45) and pruning (25) teams" (Cooperative Executive, FGD, October 2023).

In addition to these activities, the cooperatives organise the supply of inputs (fertilisers and pesticides) for their members. Again, the same focus group discussion, a cooperative executive stated:

"Our cooperative provides financial, input, and training support for members. Through written proposals and thanks to the support from our partners, we source funds to support training, production activities and additional livelihood programmes" (Cooperative Executive, FGD, October 2023).

Because the farm gate price is fixed irrespective of quality, the higher yield obtained by certified household farms gives them more income. Again, the premium (between GHS50 and GHS 110 per bag; USD 4.3 – USD 13) obtained from the sale of cocoa to certified markets makes a difference in cocoa income. The cooperative provides various support services to its members, including labour, farm inputs, and supervision by field inspectors to ensure the production of high-quality and ethically sourced cocoa. Through the cooperative, farmers gain access to certified markets and receive higher premiums for their cocoa. However, not all cocoa produced qualifies for a premium, as some beans are sold as non-certified due to limited buyer demand. Typically, only 50% to 70% of the cocoa produced is absorbed by the certified market. Additionally, delays and reductions in premium payments occur at both the buyer and cooperative levels, and sometimes affect payments to farmers. The additional income generated from cocoa sales and premiums is often reinvested in farm expansion, in both cocoa and food crops. Some of this income is spent on the education of their wards and communities leading to improvements in school infrastructure and educational resources. Similarly, extra income is allocated to healthcare initiatives such as payment of health insurance for aged members, funding for medical facilities, which improves farmers' access to health care. With support from external buyers, farmers also diversify into other livelihood activities such as snail rearing, grasscutter farming, and beekeeping, which serve as alternative sources of income during the minor cocoa season. Furthermore, a portion of their earnings is allocated to household expenses, including food as well as investments in rural community infrastructure facilities, thereby improving the farmers' livelihoods (Tables 3, 4).

### **Linkage between behaviours/capacities and impacts Discussion**

This study, which used empirical data from case studies, produced two critical findings: regarding (1) effectual behaviours and capacities as drivers of the success of certification processes and (2) effective behaviours and capacities that contribute to the diversity of impacts which improve farmers' livelihoods. Despite facing social, economic, and environmental challenges, certified smallholder cocoa farmers manage to cope with the high uncertainty and complexity caused by certification schemes.

#### **Effectual behaviours and capacities as key drivers of the success of certification processes**

Firstly, our case studies highlight the significance of relational and organisational capacities alongside the functional and technical capabilities required for successful smallholder certification. This implies that weaknesses in organisational and relational cooperative capacities poses a threat to reaping the benefits of certification programmes. This finding is consistent with previous studies by Brandi et al. (2015), Lee et al. (2011), and Oosterveer et al. (2014), highlighting organisational capacity as a major challenge faced by independent smallholder cocoa farmers in the certification process. These organisational and relational capacities enable smallholder cocoa farmers to harness resources (to access external support, such as credit or inputs), to access knowledge (learn from others in their community or network), manage risks (through mutual support networks), and navigate complex markets (establish connections with markets, buyers, and value chain actors). Ultimately, these capacities enable smallholder cocoa farmers in cooperatives to collectively access markets effectively and to negotiate better terms with buyers.

The literature further emphasises the central role of these capacities. Farmers in cooperatives can profit from collective action facilitated by strong organisational and relational capacities, and collective action helps reduce transaction costs and improves quality standards and bargaining power, thereby connecting smallholder farmers to the market (Moustier et al. 2010; Deng et al. 2010; Abebaw and Haile 2013; Ma and Abdulai 2017). What is more, these improved capacities have implications and are closely linked to effectual behaviours. Our case studies revealed that at both the individual (smallholder farmer) and collective (cooperative) levels, these actors use their capacities to navigate the uncertainties of certified cocoa production. Our results also show that these capacities are closely linked with the principles of effectuation: experimentation, affordable loss, flexibility, pre-commitments, and strategic alliance. They make it possible to seize opportunities based on the availability of these capacities, to ensure long-term viability and improved livelihoods. The development of organisational and relational capacities in certified cocoa cooperatives thus holds clear potential. This potential goes beyond merely responding to changing conditions; it extends to driving varied impacts that enable farmers in cooperatives to maintain their certification status.

#### ***Livelihoods do matter: effectual behaviour provides a systemic vision of certification to farmers***

Secondly, this study shows that the impact of certification schemes on livelihoods does matter and that effectual behaviour contributes both to increased participation and to

**Table 3** Variations in organisational and relational capacities at the cooperative level that result in differences in outcomes and in perceived impacts among cooperatives. *Source:* Field data, 2023

Capacities	Empirical evidence: differences among the cases
Organisational capacities that transform the formation of a group into the formation of a registered cooperative, increasing membership drives, managing production activities and group sale of certified cocoa	<p>Different membership selection criteria are used in each case; through education and sensitisation, the cooperatives have been able to bring together individual farmers who hitherto did not belong to a farmer group to pursue collective interest by registering. Over the years, Case 5 only recorded a 29% increase in membership due to their restricted membership selection strategy, whereas Cases 1, 2, 3, and 4 enrolled a significant number of new members (86–668%)</p> <p>Cases 1, 2, 3, and 4 operate on an open membership basis, meaning there is no limit to the number of farmers who can join; in contrast, Case 5 requires applicants to have a minimum 2-acre productive cocoa farm before they can become members. In Case 5, the cooperative supports production activities by providing spraying and pruning services to members at reduced fees (GHC 120 or USD 10.32) thanks to its spraying (45) and pruning (25) teams. Through better negotiation with support actors such as CHED and SPD, they also supply good quality inputs and seedlings to enhance production. Case 5 also has a warehouse at the harbour where members' beans are stored before shipment to clients. There are no problems concerning side-selling as the local buyer pays in cash plus the better premiums obtained thanks to diversified markets. However, Cases 1, 2, 4, and 5 do not provide pruning and spraying services to members and rarely organise the supply of inputs for members</p>
Relational capacities through building relationships with a diversity of support actors	<p>The case studies demonstrate how relationships with a variety of actors (NGOs, development partners, government ministries, state extension providers) are established and maintained by the cooperatives. In all the cases, the Ghana Cocoa Board and its divisions—such as CHED, SPD, CRIG, and LBCs—were seen to be socially connected to the cooperatives, and to share knowledge. These actors facilitate cooperative access to outside resources, like credit or inputs, and knowledge acquisition through training. All five cases are linked to diverse actors at different levels of relationship and support (see Table 2)</p>

ensuring impacts in a context of uncertainty. Smallholders rely on agriculture for their livelihood, and certification schemes offer premiums for certified products and can thus improve their well-being through better incomes. However, challenges can hinder the improvement in their livelihoods. Therefore, balancing the benefits and challenges is crucial to ensure that certification contributes positively to the livelihoods of smallholder farmers. Our study shows that the participation of smallholder farmers in cooperatives in certification schemes remains high despite concerns about unreliable and low premiums. This finding is in line with that of Saadun et al. (2018), who stressed the important role of premiums and the affordable cost of certification in maintaining smallholder participation, regardless of concerns about the reliability of premiums. The authors further argued that while financial incentives may be weak, certification offers several non-financial benefits, such as better management and more resilient cooperatives, particularly when the farmers are supported by stakeholders (Jena et al. 2012; Snider et al. 2017; Saadun et al. 2018). Our results support this claim, which shows that commitment to certification is most influenced by the support received, showcasing strong social cohesion. This cohesion is central to enhancing collective decisions and capacities, fostering cooperation among stakeholders, buyers, and the market. Indeed, such social

**Table 4** Connection between farmers' effectual behaviours and capacities that promote compliance with certification standards, ultimately enhancing productivity, expanding market access, and improving livelihoods. *Source:* Field work, 2023

Behaviour/capacities	Impact on compliance	Impact/livelihood outcomes
<i>Learning and adaptation:</i> Farmers acquire a shared understanding of the standards required by their respective certification schemes and acquire knowledge on the effective use of inputs, such as fertilisers (Cases 1, 4, and 5). This knowledge, which is gained through training courses and workshops, is then translated into good agricultural practices, including cocoa agroforestry, pruning, and spraying	Enhances the understanding of certification requirements and enables the efficient use of inputs and sustainable practices	Higher yield, improved cocoa quality, and access to premium markets
<i>Group support, cohesion and collaboration:</i> Member-to-member support in production activities as well as collaboration with diverse actor (NGOs, development partners, government ministries, and state extension officers) to access essential training and support services such as spraying and pruning, as well as credit for input supply services (All 5 cases)	Influence of farmer colleagues on adherence to standards	Adoption of sustainable farm management practices by the cooperative
<i>Financial literacy and resource management:</i> Farmers reinvest income in cocoa farming activities (labour and new establishments) and undertake to make household savings (Cases 1, 3, and 4)	Better management of certification expenses	Increased household income, investment in education/health and community rural infrastructure
<i>Risk-taking and innovation:</i> Farmers in cooperatives willingly took risks by dedicating portions of their agricultural land (minimum of 2 acres in all cases) to experiment with certification practices. Some invested in approved inputs and agronomic techniques (Cases 1, 4, and 5), while others (Cases 2 and 3) demonstrated their commitment by making individual and collective decisions to forgo the use of chemicals on these dedicated farms, despite the increased production costs this implies	Experimenting with new techniques (certification practices)	Better sustainable management practices and increased income

cohesion opens the way to new opportunities and helps navigate the uncertainties inherent to certified cocoa production.

Examining the pathways of the certification schemes revealed a historical perspective that is essential to understanding the causal mechanisms, the capacities mobilised and the effectual behaviours developed over time. The support received, favourable and unfavourable conditions, and the contextual factors involved in the evolution of these certification processes provide insights for the cooperative to adapt in response to changing conditions (effectual behaviour) in the risky cocoa business environment. This finding emphasises the significance of the past histories and of certification stories for cooperatives. Such historical awareness is critical for building trust, improving operations,

accessing markets, and ultimately ensuring the profitability of certification schemes. By leveraging this knowledge, cooperatives can fortify their position in the market, and meet the growing demand for certified products through sustainable growth. For example, knowledge about cooperatives with successful certification histories is more likely to encourage the establishment of relationships with actors and organisations that support sustainable and responsible practices. This, in turn, opens up new opportunities for adaptability and flexibility in the face of uncertainty.

## Conclusion

Certification schemes can improve the livelihoods of smallholder farmers in cooperatives, but the impacts of livelihood are often diverse and mixed in different contexts. Despite the limited economic benefits of producing certified cocoa, there has been more implementation of such schemes with an increase in farmers' participation in a rapidly evolving and risky certified cocoa production environment (Gneiting and Arhin 2023), and despite this fact, expected impacts remained unmet. Effectual behaviours and capacities are two important strategies. However, to date, the potential of these strategies to decipher the complexity of impact pathways of certification and the role that farmers play in these pathways remains unexplored.

Our case studies demonstrate that farmers who belong to certified cooperatives integrate the elements of effectual behaviour (experimentation, affordable loss, flexibility, and strategic alliances) and capacities at both individual and cooperative level. Cooperatives involved in different certification schemes have developed a range of capacities and effectual behaviours through their impact pathways to overcome uncertainty, remain in schemes, and enhance their livelihoods. The results of this study suggest that future research should compare the different certification schemes in the cocoa value chain in Ghana and beyond to determine which scheme is most effective in increasing participation in the face of uncertainty.

Furthermore, this study stresses the role of farmers' capacities along the impact pathways and highlights the interconnection of the technical, cognitive, relational, and organisational capacities mobilised by individual farmers and the cooperative along the pathways that drive inputs towards outputs, outcomes, and impacts. It also advances our understanding of the diversity of impact pathways of certification schemes and emphasises changes in behavioural mechanisms that could produce impacts. This could prove useful for buyers, manufacturers, retailers, and for the owners of standards such as Fairtrade International, Rainforest Alliance, and together with policymakers such as the Ghana Forestry Commission and Ghana Cocoa Board to determine which combinations of capacities to pursue to achieve impacts as well as to develop initiatives not only aimed at enhancing and sustaining these behavioural changes but also building and strengthening these capacities to enhance members' livelihoods.

## Acknowledgements

This study about "The Journey from Technological Change to Livelihood : Effectual Behaviour and Farmers' Compliance with Certification Standard in Ghana's Cocoa Sector" was conducted within the framework of the Cocoa4Future (C4F) project, which is funded by the European DeSIRA Initiative under grant agreement No. FOOD/2019/412-132 and by the French Development Agency. We are grateful to all the cocoa farmers and the cooperatives that participated in this study.

### Author contributions

Francis Nana Yaw Codjoe was responsible for conceptualisation, methodology, formal analysis, and writing—original draft. Syndhia Mathe was involved in conceptualisation, methodology, formal analysis, and supervision. Genowefa Blundo-Canto helped with methodology. Guillaume Soullier took part in writing—reviewing and editing, and supervision. Felix Ankomah Asante and Daniel Bruce Sarpong participated in project administration and supervision. The authors read and approved the manuscript prior to submission.

### Funding

Francis Nana Yaw Codjoe received funding from the European DeSIRA Initiative under grant agreement No. FOOD/2019/412-132 and by the French Development Agency. This funding is in support of his PhD work.

### Availability of data and materials

The datasets generated during and/or analysed during the current study are available from the corresponding author upon reasonable request.

### Declarations

#### Ethics approval and consent to participate

Not applicable.

#### Competing interests

The authors declare no competing interests.

Received: 27 September 2024 Revised: 26 April 2025 Accepted: 28 April 2025

Published online: 02 June 2025

### References

- Abdul-Rahman F, Donkoh S (2015) Analysis of the Maize Value Chain Development in the Northern Region, the case of the Association of Church Development Programme (ACDEP). *UDS J Sci Technol Dev* 3:47–62
- Abeba D, Haile MG (2013) The impact of cooperatives on agricultural technology adoption: empirical evidence from Ethiopia. *Food Policy* 38:82–91. <https://doi.org/10.1016/j.foodpol.2012.10.003>
- Addo-Fordjour P, Gyimah Gyamfi H, Fei-Baffoe B, Akrofi AY (2013) Impact of copper-based fungicide application on copper contamination of cocoa plants and soils in the Ahafo Ano North District, Ashanti region, Ghana. *Ecol Environ Conserv* 19:303–310
- Alvarez S, Douthwaite B, Thiele G et al (2010) Participatory Impact Pathways Analysis: a practical method for project planning and evaluation. *Dev Pract* 20:946–958. <https://doi.org/10.1080/09614524.2010.513723>
- Astrid Fenger N, Skovmand Bosselmann A, Asare R, de Neergaard A (2017) The impact of certification on the natural and financial capitals of Ghanaian cocoa farmers. *Agroecol Sustain Food Syst* 41:143–166. <https://doi.org/10.1080/21683565.2016.1258606>
- Basso VM, Jacovine LAG, Alves RR, Nardelli ÁMB (2012) Contribuição da certificação florestal ao atendimento da legislação ambiental e social no estado de Minas Gerais. *Rev Árvore* 36:747–757. <https://doi.org/10.1590/S0100-6762012000400016>
- Beuchelt TD, Zeller M (2011) Profits and poverty: Certification's troubled link for Nicaragua's organic and fairtrade coffee producers. *Ecol Econ* 70:1316–1324. <https://doi.org/10.1016/j.ecolecon.2011.01.005>
- Blundo-Canto G, Devaux-Spatarakis A, Mathé S et al (2020) Using a participatory theory driven evaluation approach to identify causal mechanisms in innovation processes. *N Dir Eval* 2020:59–72. <https://doi.org/10.1002/ev.20429>
- Brako DE, Richard A, Alexandros G (2021) Do voluntary certification standards improve yields and wellbeing? Evidence from oil palm and cocoa smallholders in Ghana. *Int J Agric Sustain* 19:16–39. <https://doi.org/10.1080/14735903.2020.1807893>
- Brandi C, Cabani T, Hosang C et al (2015) Sustainability standards for palm oil: challenges for smallholder certification under the RSPO. *J Environ Dev* 24:292–314. <https://doi.org/10.1177/1070496515593775>
- Brauw A, Eozenou P, Gilligan DO et al (2018) Biofortification, crop adoption and health information: impact pathways in Mozambique and Uganda. *Am J Agr Econ* 100:906–930. <https://doi.org/10.1093/ajae/aay005>
- Chandler GN, DeTienne DR, McKelvie A, Mumford TV (2011) Causation and effectuation processes: a validation study. *J Bus Ventur* 26:375–390. <https://doi.org/10.1016/j.jbusvent.2009.10.006>
- Chiputwa B, Spielman D, Qaim M (2015) Food standards, certification, and poverty among coffee farmers in Uganda. *World Dev* 66:400–412. <https://doi.org/10.1016/j.worlddev.2014.09.006>
- Codjoe FNY, Mathe S, Blundo-Canto G, Soullier G, Asante FA, Sarpong DB (2024) Impact of certification schemes on farmer livelihoods in Ghana's cocoa sector: The role of cooperative and farmers' capacities along the impact pathways. In *Proceedings of the 15th IFSA Conference – Systemic Change for Sustainable Futures*, Trapani, Italy: International Farming Systems Association (IFSA) 335–342
- DeFries RS, Fanzo J, Mondal P et al (2017) Is voluntary certification of tropical agricultural commodities achieving sustainability goals for small-scale producers? A review of the evidence. *Environ Res Lett* 12:033001. <https://doi.org/10.1088/1748-9326/aa625e>
- Deng H, Huang J, Xu Z, Rozelle S (2010) Policy support and emerging farmer professional cooperatives in rural China. *China Econ Rev* 21:495–507. <https://doi.org/10.1016/j.chieco.2010.04.009>
- Dew N, Read S, Sarasvathy SD, Wiltbank R (2009) Effectual versus predictive logics in entrepreneurial decision-making: Differences between experts and novices. *J Bus Ventur* 24:287–309. <https://doi.org/10.1016/j.jbusvent.2008.02.002>

- Dillon JL, Hardaker JB, Food and Agriculture Organization of the United Nations (1993) Farm Management Research for Small Farmer Development. FAO
- Dompreh EB, Asare R, Gasparatos A (2021) Sustainable but hungry? Food security outcomes of certification for cocoa and oil palm smallholders in Ghana. *Environ Res Lett* 16:055001. <https://doi.org/10.1088/1748-9326/abdf88>
- Douthwaite B, Kuby T, Van De Fliert E, Schulz S (2003) Impact pathway evaluation: an approach for achieving and attributing impact in complex systems. *Agric Syst* 78:243–265. [https://doi.org/10.1016/S0308-521X\(03\)00128-8](https://doi.org/10.1016/S0308-521X(03)00128-8)
- Earl S, Carden F, Patton MQ, Smutylo T (2001) Outcome mapping: building learning and reflection into development programs. International Development Research Centre, Ottawa
- Eberz S, Zerwas C, von Kortzfleisch H (2017) Effectual and causal behaviors of novice entrepreneurs: a Simulation-based Approach
- Euler M, Krishna V, Schwarze S et al (2017) Oil palm adoption, household welfare, and nutrition among smallholder farmers in Indonesia. *World Dev* 93:219–235. <https://doi.org/10.1016/j.worlddev.2016.12.019>
- Faure G, Blundo-Canto G, Devaux-Spatarakis A et al (2020) A participatory method to assess the contribution of agricultural research to societal changes in developing countries. *Res Eval* 29:158–170. <https://doi.org/10.1093/reseval/rvz036>
- Feder G, Just RE, Zilberman D (1985) Adoption of agricultural innovations in developing countries: a survey. *Econ Dev Cult Change* 33:255–298. <https://doi.org/10.1086/451461>
- Ferguson J (2012) Generating sustainable livelihoods; the role of co-operativeS
- Fischer E, Qaim M (2012) Linking smallholders to markets: determinants and impacts of farmer collective action in Kenya. *World Dev* 40:1255–1268. <https://doi.org/10.1016/j.worlddev.2011.11.018>
- Fisher G (2012) Effectuation, causation, and bricolage: a behavioral comparison of emerging theories in entrepreneurship research. *Entrep Theory Pract* 36:1019–1051. <https://doi.org/10.1111/j.1540-6520.2012.00537.x>
- Fort R, Ruben R (2008) The impact of Fair Trade on banana producers in Northern Peru. In: Ruben R (ed) *The impact of fair trade*. Brill | Wageningen Academic, Wageningen, pp 49–73. [https://doi.org/10.3920/9789086866472\\_006](https://doi.org/10.3920/9789086866472_006)
- Gneiting U, Arhin A (2023) Towards a Living Income for Cocoa Farmers in Ghana: Assessing companies' efforts to date. Oxfam, Nairobi
- Hashemi SM, Hosseini SM, Damalas CA (2009) Farmers' competence and training needs on pest management practices: participation in extension workshops. *Crop Prot* 28:934–939. <https://doi.org/10.1016/j.cropro.2009.07.007>
- Henson S, Jaffee S (2008) Understanding developing country strategic responses to the enhancement of food safety standards. *World Econ* 31:548–568. <https://doi.org/10.1111/j.1467-9701.2007.01034.x>
- Iddrisu M, Aidoo R, Abawiera Wongnaa C (2020) Participation in UTZ-RA voluntary cocoa certification scheme and its impact on smallholder welfare: evidence from Ghana. *World Dev Perspect* 20:100244. <https://doi.org/10.1016/j.wdp.2020.100244>
- Ingram V, van Rijn F, Waarts Y, Gilhuis H (2018) The Impacts of Cocoa Sustainability Initiatives in West Africa. *Sustainability* 10:4249. <https://doi.org/10.3390/su10114249>
- Jaza Folefack AJ, Ngwack FS, Muluh GA, et al (2021) A comparative cost-benefit analysis between fairtrade certified and non-certified cocoa production in the South-West region of Cameroon. <https://doi.org/10.17170/KOBRA-202112035151>
- Jena PR, Chichaibelu BB, Stellmacher T, Grote U (2012) The impact of coffee certification on small-scale producers' livelihoods: a case study from the Jimma Zone, Ethiopia: P. R. Jena et al./Agricultural Economics 43 (2012) 427–438. *Agric Econ* 43:429–440. <https://doi.org/10.1111/j.1574-0862.2012.00594.x>
- Klerkx L, Leeuwis C (2008) Matching demand and supply in the agricultural knowledge infrastructure: experiences with innovation intermediaries. *Food Policy* 33:260–276. <https://doi.org/10.1016/j.foodpol.2007.10.001>
- Lee JSH, Rist L, Obidzinski K et al (2011) No farmer left behind in sustainable biofuel production. *Biol Cons* 144:2512–2516. <https://doi.org/10.1016/j.biocon.2011.07.006>
- Ma W, Abdulai A (2017) The economic impacts of agricultural cooperatives on smallholder farmers in rural China. *Agribusiness* 33:537–551. <https://doi.org/10.1002/agr.21522>
- Maertens M, Swinnen JFM (2009) Trade, standards, and poverty: evidence from senegal. *World Dev* 37:161–178. <https://doi.org/10.1016/j.worlddev.2008.04.006>
- Marx A, Depoorter C, Vanhaecht R (2022) Voluntary sustainability standards: state of the art and future research. *Standards* 2:14–31. <https://doi.org/10.3390/standards2010002>
- Mathé S, Geitznauer M, Boutillier S (2021) Effectual behaviour and frugal innovations: learning from women cocoa farmers in South West Cameroon. *IJESB* 1:1. <https://doi.org/10.1504/IJESB.2021.10046869>
- Meemken E (2020) Do smallholder farmers benefit from sustainability standards? a systematic review and meta-analysis. *Global Food Sec-Agric Policy Econ Environ* 26:100373. <https://doi.org/10.1016/j.gfs.2020.100373>
- Mero J, Haapio H (2022) An effectual approach to executing dynamic capabilities under unexpected uncertainty. *Ind Mark Manage* 107:82–91. <https://doi.org/10.1016/j.indmarman.2022.09.021>
- Mitiku F, Mey Y, Nyssen J, Maertens M (2017a) Do private sustainability standards contribute to income growth and poverty alleviation? a comparison of different coffee certification schemes in Ethiopia. *Sustainability (Switzerland)* 9:246–267. <https://doi.org/10.3390/su9020246>
- Moustier P, Tam PTG, Anh DT et al (2010) The role of farmer organizations in supplying supermarkets with quality food in Vietnam. *Food Policy* 35:69–78. <https://doi.org/10.1016/j.foodpol.2009.08.003>
- Oosterveer P, Adjei BE, Vellema S, Slingerland M (2014) Global sustainability standards and food security: exploring unintended effects of voluntary certification in palm oil. *Glob Food Sec* 3:220–226. <https://doi.org/10.1016/j.gfs.2014.09.006>
- Oya C, Schaefer F, Skalidou D (2018) The effectiveness of agricultural certification in developing countries: a systematic review. *World Dev* 112:282–312. <https://doi.org/10.1016/j.worlddev.2018.08.001>
- Potts J, Lynch M, Wilkings A, Huppe, G, Cunningham M, Voora V (2014) *The state of sustainability initiatives review 2014: Standards and the green economy*. International Institute for Sustainable Development, Manitoba, Canada
- Prager K (2015) Agri-environmental collaboratives for landscape management in Europe. *Curr Opin Environ Sust* 12:59–66. <https://doi.org/10.1016/j.cosust.2014.10.009>

- Roach DC, Ryman JA, Makani J (2016) Effectuation, innovation and performance in SMEs: an empirical study. *Eur J Innov Manag* 19:214–238. <https://doi.org/10.1108/EJIM-12-2014-0119>
- Saadun N, Lim EAL, Esa SM et al (2018) Socio-ecological perspectives of engaging smallholders in environmental-friendly palm oil certification schemes. *Land Use Policy* 72:333–340. <https://doi.org/10.1016/j.landusepol.2017.12.057>
- Sarasvathy SD (2001) Causation and effectuation: toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Acad Manag Rev* 26:243. <https://doi.org/10.2307/259121>
- Schuster M, Maertens M (2016) Do private standards benefit workers in horticultural export chains in Peru? *J Clean Prod* 112:2392–2406. <https://doi.org/10.1016/j.jclepro.2015.10.038>
- Sellare J (2022) New insights on the use of the Fairtrade social premium and its implications for child education. *J Rural Stud* 94:418–428. <https://doi.org/10.1016/j.jrurstud.2022.07.015>
- Snider A, Gutierrez I, Sibelet N, Faure G (2017) Small farmer cooperatives and voluntary coffee certifications: rewarding progressive farmers of engendering widespread change in Costa Rica? *Food Policy* 69:231–242. <https://doi.org/10.1016/j.foodpol.2017.04.009>
- Stroe S, Parida V, Wincent J (2018) Effectuation or causation: an fsQCA analysis of entrepreneurial passion, risk perception, and self-efficacy. *J Bus Res* 89:265–272. <https://doi.org/10.1016/j.jbusres.2018.01.035>
- Temple L, Barret D, Blundo Canto G et al (2018) Assessing impacts of agricultural research for development: a systemic model focusing on outcomes. *Res Eval* 27:157–170. <https://doi.org/10.1093/reseval/rvy005>
- Traldi R (2021) Progress and pitfalls: a systematic review of the evidence for agricultural sustainability standards. *Ecol Indic* 125:107490. <https://doi.org/10.1016/j.ecolind.2021.107490>
- Valkila J (2009) Fair Trade organic coffee production in Nicaragua—Sustainable development or a poverty trap? *Ecol Econ* 68:3018–3025. <https://doi.org/10.1016/j.ecolecon.2009.07.002>
- Van Rijsbergen B, Elbers W, Ruben R, Njuguna S (2016) The ambivalent impact of coffee certification on farmers' welfare: a matched panel approach for cooperatives in central Kenya. *World Dev* 77:277–292. <https://doi.org/10.1016/j.worlddev.2015.08.021>
- Waarts Y, Ingram V, Linderhof V, et al. (2015) Impact of UTZ certification on cocoa producers in Ghana, 2011 to 2014
- Yin RK (2009) *Case study research: design and methods*, 4th edn. Sage Publications, Los Angeles, Calif
- Yin RK (1994) *Case study research: design and methods*, 2nd edition. Sage, Newbury Park, CA. Available at: <https://api.semanticscholar.org/CorpusID:165492201>.

## Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.