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a self-directed learning approach to agricultural extension programmes

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COCREATE: a self-directed learning approach to agricultural extension programmes

K. Kusnandar , O. van Kooten  and F. M. Brazier 

ABSTRACT

Participation has been proposed to improve agricultural extension programmes in developing countries. This paper reports on experience with COCREATE, an approach to agricultural extension programmes that supports agricultural chain actors in self-directed learning in action research with smallholder farmers and local traders in Indonesia. This approach resulted in the changes in relation and task division between farmers and their local traders in the agricultural production and supply and chains, improved their market position and in new institutions.

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Self-directed learning; co-creation approach; agricultural extension programmes; value chain management

Introduction

In improving quality of farmers' produce, including lowering pesticide residues, many governments in developing countries have relied on agricultural extension programmes to improve their farmers' knowledge and skills. These programmes focus primarily on production without focusing on local context. Engagement of local actors in extension activities (e.g. identifying problems and needs, developing solutions) has been proposed to improve these agricultural extension programmes (Baloch and Thapa 2019; World Bank 2010) to encourage farmers to improve their produce quality. The notion of market-driven extensions (MDE) has been developed (World Bank 2010) for farmers to be: (1) involved in identifying their initial situations; (2) organised into groups; (3) encouraged to grow high-value crops; (4) supported to improve produce quality; and (5) facilitated to markets (directly).

The MDE approach has embraced improvement of production and knowledge of the market. However, it overlooks the context of agricultural supply chain governance in developing countries. Traditionally in many developing countries, most farmers are connected to the local traders (local market players who connect farmers to markets) through agreed chain governance (Natawidjaja et al. 2007; Subervie and Vagneron 2013): local traders provide credit to farmers with the condition that the farmers are obliged to sell all of their produce only to them. Although they are fully dependent on each other, there is often little awareness of the challenges with which they are each faced (Kusnandar, van Kooten, and Brazier 2019). Self-directed learning (SDL) characterised by active participation of actors to identify their problems and set their learning needs, and to learn from their experience and others' experience and knowledge is the approach this paper embraces (Zoundji et al. 2016). This paper proposes a practical SDL approach to extension programmes, extending initial results reported in Kusnandar, van Kooten, and Brazier (2019), to improve value chain management between farmers and their local traders.

More specifically, this paper addresses the question "Can COCREATE support farmers and their local traders in developing countries in SDL activities to improve their own value chain

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management?" Action research with multiple farmers–local trader groups in a horticultural production centre in Indonesia has been performed to this purpose.

Agricultural extension programmes in developing countries

Different approaches have been developed and deployed by agricultural extension programmes in developing countries for decades. Broadly speaking, four categories of agricultural extension programmes can be distinguished: Training and Visiting, Farmer-to-Farmer Extension Programmes, Farmer Field Schools and Extension Programmes through information and communication technologies (ICT).

Training and visiting

Training and visiting is an approach developed by World Bank in the mid-1970s (Rocha 2017). This approach is still commonly used in developing countries to transfer knowledge from agricultural extension officers as senders to farmers as receivers (Benson and Jafry 2013).

Lack of participation of farmers in applying knowledge taught by agricultural extension officers is one of the challenges this approach faces. Agricultural extension officers determine the knowledge to be transferred, design and conduct training and visiting activities, and monitor and evaluate the outcomes (Benson and Jafry 2013; Rocha 2017). Local context is not always taken into account, making it often difficult for farmers to apply the knowledge acquired.

Farmer-to-farmer extension programmes

Farmer-to-Farmer extension programmes, also called Farmer-to-Farmer training or Volunteer-Farmer-Trainer, is an approach that involves trained farmers (as senders) to transfer knowledge to other farmers (as receivers) (Fisher et al. 2018; Kiptot and Franzel 2015). In this approach, selected farmers in a farming area are trained by agricultural extension officers or external parties to conduct field experiments (with support and packages of production input by agricultural extension officers). The trained farmers are then obliged to transfer the knowledge they obtained to other farmers in their area (Fisher et al. 2018; Kiptot and Franzel 2015).

Involving local farmers in transferring knowledge targets the challenge of including local context. However, often trained farmers lack the necessary technical skills needed, and motivation required (Fisher et al. 2018) to integrate this knowledge in the programmes they host.

Farmers Field School

Since the 1990s the Farmers Field School approach has been developed by the Food and Agriculture Organization of the United Nations explicitly to improve participation of local farmers to improve farming activities (Rocha 2017; Settle et al. 2014). In this approach, farmers are organised into groups consisting of about 25 persons per group. Each group is facilitated by one field agent who is usually an agricultural extension officer or by a farmer who has been trained in advance. These field agents train groups of farmers in standard procedures of farming, and provide packages (good quality seeds and other production inputs) to conduct field experiments. Facilitated by the field agents, groups of farmers meet periodically in the field to analyse the condition of crops in every stage of growth (Rocha 2017).

Despite some successful cases, this approach still faces major challenges in the sustainability of farmer participation (Scheba 2017). Lack of other chain actors' involvement (e.g. market actors) is believed to be one of main factors for farmers to discontinue their participation in the programmes (Scheba 2017). In addition, even though this approach uses a participatory approach to some extent, the initiatives themselves (e.g. field experiments, production inputs) are organised by the field

agents for the farmers, and knowledge transfer activities are most often still linear (from sender to receiver).

Extension programmes through information and communication technology

The relative recent development of ICT has encouraged scholars, governments, industries and non-profit organisations to develop ICT-based applications for agricultural extension programmes or so-called e-extension programmes (Kelly, Bennett, and Starasts 2017; Verma and Sinha 2018; Witteveen et al. 2017). Some e-extension programmes have been developed and tested in developing countries to, for example, facilitate interaction between cocoa farmers and agricultural extension officers in Sierra Leone on farming activities (Witteveen et al. 2017), between farmers and agricultural extension officers in India on farming methods (Verma and Sinha 2018), in Ghana on farm planning (Munthali et al. 2018), and in India to facilitate learning among and between farmers, agricultural extension officers, and scientists on farming practice (Kelly, Bennett, and Starasts 2017).

E-extension programmes are believed to have the potential to provide a means for effective and efficient knowledge sharing. However, in developing countries, this approach is often challenged by farmers' limited digital skills and poor ICT infrastructure in many rural farming areas (Kelly, Bennett, and Starasts 2017; Munthali et al. 2018).

Self-directed learning

SDL, introduced by (Knowles 1975), is defined as

a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. (Knowles 1975, 18)

Based on Knowles (1975), three elements of SDL are distinguished: (1) the learners; (2) the educators; and (3) the learning process.

With respect to learners, in SDL, learners take control and responsibility in the learning process (Garrison 1992). Control is related to decision making, while responsibility is related to participation of learners in every step of the learning process (Garrison 1992). With respect to educators, in SDL, educators are facilitators (Bosch, Mentz, and Goede 2019). Facilitators encourage learners to engage, and facilitate access to information resources needed (Bosch, Mentz, and Goede 2019). In the process of SDL, knowledge is constructed not only individually, but also collaboratively through sharing knowledge, experience and information between learners, and between learners and facilitators (Bolhuis 2003; Garrison 1992; Knowles 1975).

The main goal of SDL is to increase learners' capacity to find ways to solve their problems by themselves through collaboration with others: learning-to-learn (Garrison 1992; Knowles 1975).

A practical SDL approach to agricultural extension programmes based on co-creation: COCREATE

COCREATE is an SDL approach to agricultural extension programmes in which farmers and their local traders together not only identify the challenges with which they are confronted and explore potential solutions (Kusnandar, van Kooten, and Brazier 2019) but also implement these solutions, reflect on their success/barriers encountered, and adapt their plans. This last phase, namely implementation and adaptation, is the focus of this paper. Facilitators play a role in: (1) organising meetings with external parties, e.g. extension officers, markets, government (on request); (2) visiting participants periodically (1–2 times a week) and inviting experts (when needed) to answer participants' specific knowledge questions.

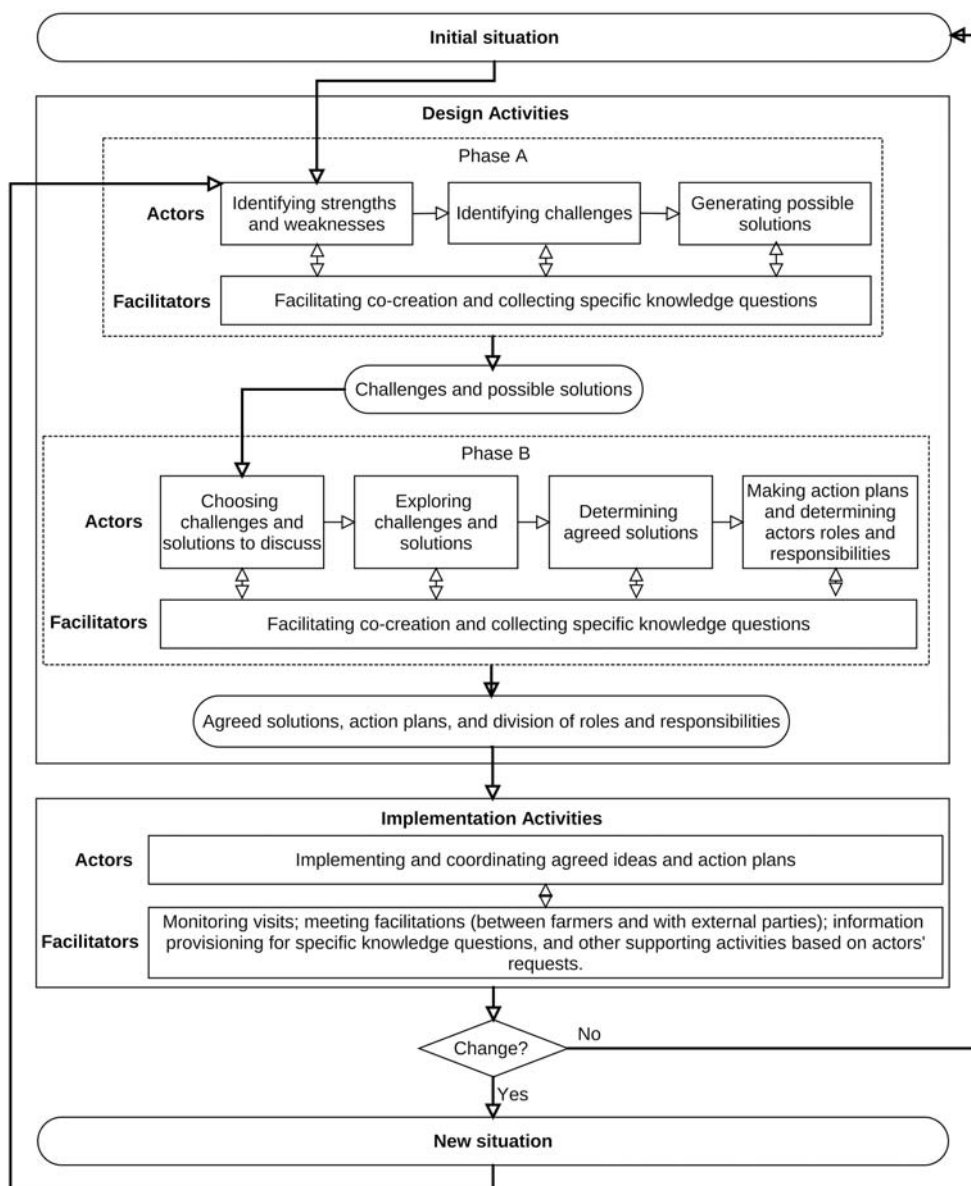


Figure 1. COCREATE: a practical approach to agricultural extension programmes.

Note: Extending the approach presented in Kusnandar, van Kooten, and Brazier (2019).

In COCREATE, there is no fixed line between design activities and implementation activities – the approach is cyclic with continuous feedback between the two types of activities, both in co-creation (Figure 1).

Method

This study is performed as action research, in particular participatory action research (Kidd and Kral 2005), in which the COCREATE approach was implemented and evaluated in cases with local trader–farmer groups in a horticultural production centre in Indonesia, extending initial results reported in (Kusnandar, van Kooten, and Brazier 2019).

Table 1. Number of farmers in each local trader–farmers group.

	Number of farmers
Group 1	15
Group 2	34
Group 3	25

Case study

This case study took place in Ciwidey, a subdistrict in the Bandung District, representative of horticultural production centres in Indonesia in terms of value chain management (Natawidjaja et al. 2007).

This case study represents a single context situation (supply chain situation in a farming area in Indonesia) with multiple cases of local trader–farmers groups (Yin 2003). A local trader–farmers group is a group of farmers whom are connected to a local trader in an agricultural production and supply chain system through agreed chain governance between themselves (discussed in more detail below). The unit of analysis of this case study is the relationship between local trader and farmers in each local trader–farmers group.

Three local trader–farmers groups who participated in the initial design activities reported in (Kusnandar, van Kooten, and Brazier (2019) continued their participation in the implementation and follow-up design activities.¹ The number of farmers in each local trader–farmers group in this case study is provided in Table 1.

Setting

The traditional division of tasks when this programme started was that local traders are the intermediary between the farmers and the market. In the local trader–farmers groups, there were informal (verbal) contracts in which local traders provide credit (in cash or kind of input production, e.g. seed, fertilisers, pesticides) to farmers with the condition that the farmers were obliged to sell all their produce only to them. With respect to selling systems, farmers delivered ungraded produce and local traders evaluated the quality of the produce, took care of all post-harvest activities (cleaning, sorting and grading) and decided on the most appropriate market. The price farmers were paid by their local traders was based on the price in the traditional market and farmers had little access to market information. This relationship provided few incentives for farmers to increase their produce quality and often lead to lack of commitment by farmers to the agreements in place (Natawidjaja et al. 2007).

Participants of COCREATE

The division of participants of COCREATE in the implementation and follow-up design activities are shown in Table 2.² In the follow-up design activities, Groups 1 and 2 consist of local traders and farmers who work with these local traders, while Group 3 only consists of farmers.

Table 2. Number of participants in the implementation and follow-up design.

	Implementation activities	Follow-up design meetings	
		First meeting	Second meeting
Group 1	13	7	6
Group 2	22	9	8
Group 3	11	3	7
Total	46	19	21

COCREATE implementation

The implementation of solutions and action plans agreed between April and June 2017 (see Kusnandar, van Kooten, and Brazier 2019) were performed between July 2017 and April 2018. Two facilitators³ visited the three groups in the case study area, at least, 1–2 times a week for a period of 5 months, from August to December, after which from January to March, less-frequent visits, 1–2 times a month, were held plus additional meetings with extension officers and other experts to address specific needs and desires of local traders and farmers. After that, two follow-up design meetings were held in April 2018 supported by five facilitators⁴ and a researcher from TU Delft (to support the three groups).

Results

The results of COCREATE implementation are presented in chronological order following the activities in COCREATE: the initial design activities; implementation and follow-up design activities. With respect to value chain management, the results are categorised into: (1) production; (2) market; (3) finance; (4) logistics; and (5) institutions, i.e. governance, aspects (Kusnandar, Brazier, and van Kooten 2019).

The initial design activities: challenges, agreed solutions and action plans

The challenges, agreed solutions and action plans resulted from the initial design activities are provided in Table 3.

Implementation activities and follow-up plans

During implementation activities the groups: (1) held informal meetings among themselves to discuss farming methods; (2) contacted supermarkets to acquire access to these markets; and (3) held meetings with extension officers and local government to form formal farmers groups. As indicated above, follow-up design meetings were held after approximately 10 months supported by facilitators and an agricultural extension officer was invited to a meeting on specific request of farmers and the local traders.

The results of implementation activities and follow-up design are described below for value chain management in relation to production, market, logistics, finance and institutions.

Production

Farmers and local traders were mostly successful in implementing their plans and discovered limitations during the process (Table 4). The plans were then adapted (during the follow-up design meetings) based on their experience (during implementation activities) and new technical knowledge gained from interaction with an agricultural extension officer.

Market

With respect to the market, all groups pursued the option to supply produce to supermarkets. Initially, all groups were unsuccessful. Groups 1 and 2 pursued and were successful, while Group 3 did not pursue this any further. As of November 2018, Groups 1 and 2 are working with a supermarket supplier to supply produce to two supermarkets with a total of 11 outlets. Farmers are involved in post-harvest activities and have access to market information⁵ that affected their awareness on produce quality and the implications for market value. In the follow-up design, Groups 1 and 2 have plans to increase their supply to supermarkets, while Group 3 is pursuing opportunities to expand their market.

Table 3. Challenges, agreed solutions and action plans (Kusnandar, van Kooten, and Brazier 2019 adapted).

Challenges	Agreed solutions and action plans
Production	
<i>Group 1</i>	
(1) Pests and diseases	(1) Using <i>kipahit</i> ^a leaves
(2) Cost and availability of fertilisers	(2) Acquiring access to subsidy programmes (linked to institutions)
(3) Water shortage in dry season	(3) Group provides and manages water pump • The local trader will provide water pump • Farmers will be responsible for operational and maintenance costs
<i>Group 2</i>	
(1) Low yield and quality of produce	(1) Conducting field experiments • Farmers will provide land and labour • The local trader will provide good-quality production inputs (with credit scheme) and technical assistance
(2) Pests and diseases	(2) Improving spraying method (part of field experiments)
(3) Water shortage in dry season	(3) Working together to maintain irrigation channels
<i>Group 3</i>	
(1) Low quality of produce	(1) Improving farming method
(2) Unknown soil pH	(2) Using turmeric
(3) Water shortage in dry season	(3) Working together to maintain irrigation channels
(4) Labour shortage in rainy season	(4) Changing schedule of farming activities
Market	
<i>Group 1</i>	
(1) Low price of produce	(1) Supplying packaged produce to supermarkets • Farmers will be involved in post-harvest activities^b • The local trader will be responsible for market and transportation
<i>Group 2</i>	
(1) Price fluctuation	(1) Supplying packaged produce to supermarkets • Farmers will be responsible for supplying good quality produce • The local trader will be responsible for post-harvest activities, market and transportation
(2) No planning in planting crops	(2) Making a planting schedule • The local trader will make a planting schedule • Farmers will follow the schedule
<i>Group 3</i>	
(1) Price fluctuation	(1) Supplying packaged produce to supermarkets
(2) No planning in planting crops	(2) Making a planting schedule
Logistics and transportation	
<i>Group 2</i>	
(1) Bad condition of roads	(1) Working together to maintain roads
<i>Group 3</i>	
(2) Bad condition of roads	(1) Working together to maintain roads
Financial	
<i>Group 2</i>	
(1) Lack of access to formal funding institutions	(1) The local trader will continue to provide credit
(2) Managing money for farming and living	(2) Separating money for farming and living
<i>Group 3</i>	
(1) Lack of capital	(1) Finding access to credit • Trying to acquire credit from family, neighbours/friends and the government

(Continued)

Table 3. Continued.

Table 3. Continued.	
Challenges	Agreed solutions and action plans
Institutions	
Group 1	
(1) Lack of access to government programmes	(1) Establishing a formal farmer group • Further group meetings • One farmer is appointed to collect data and documents required in the process of formalisation • Farmers and the local trader will contribute to administrative cost
(2) Lack of means for sharing information	
Group 2	
(1) Lack of access to government programmes	(1) Establishing a formal farmer group • Further group meetings • The local trader will collect data and documents required for the process of formalisation • Farmers and the local trader will contribute to administrative cost
(2) The absence of a formal farmer group	
Group 3	
(1) Lack of access to government programmes	(1) Establishing a formal farmer group • One farmer is appointed to organise further group meetings, and to collect data and documents required in the process of formalisation • Farmers will contribute to administrative cost
(2) The absence of a formal farmer group	

^aA local name for *Thitonia difersivolia*.

^bCleaning, sorting, grading and packaging.

Table 5 shows how agreed solutions and action plans have been implemented, and the follow-up plans of all groups with respect to the market.

Logistics

With respect to logistics, farmers continue to work together to fix roads connecting their land. However, because most roads are not paved, they are easily damaged. For this, they came up with follow-up plans to pave the roads and to ask for support from the local government (Table 6).

Finance

Little has changed for all three groups with respect to finance (Table 7). In the follow-up design, Group 3 agreed to try to acquire access to finance from the government. This requires the status of a formal farmer group (discussed in the next section).

Institutions

With respect to institutions, all groups pursued formalisation of their group. As of November 2019, Groups 1 and 2 have been registered in the database of the Ministry of Agriculture and have acquired a formal organisational structure. Meanwhile, due to regulations⁶ farmers in Group 3 needed to re-join an established farmer group of coffee growers (of which they were previously members). Negotiations to this purpose were successful.⁷

Implementation of agreed solutions and action plans and follow-up plans with respect to institutions are shown in Table 8.

Table 4. Implementation of agreed solutions and actions plans, and follow-up plans with respect to production.

Agreed solutions and action plans	Implementation	Follow-up plans
<i>Group 1</i>		
(1) Using <i>kipahit</i> leaves	(1) Farmers applied the <i>kipahit</i> method, but the availability of the leaves was limited	(1) Using bamboo to deal with snails ^a
(2) Acquiring access to subsidy programmes	(2) The group has established a formal farmer group to acquire access to subsidy programmes	(2) Accessing a fertiliser subsidy programme from the government
(3) Using water pump - The local trader will provide a water pump - Farmers will be responsible for operational and maintenance costs	(3) The group cancelled the plan because the flow of water from the sources is very limited	(3) Planting crops that need less water
<i>Group 2</i>		
(1) Conducting field experiments - Farmers will provide land and labour - The local trader will provide good-quality production inputs (with a credit scheme) and technical assistance	(1) Farmers and the local trader had informal discussions to improve farming practices, then farmers applied a new method, but the result was under expectation (2) Farmers applied a new spraying method, but it was not successful (3) Farmers continue to work together to maintain irrigation channels	(1) Accessing training from agricultural extension programmes ^b (2) Using bamboo to deal with snails (3) Keeping up the activity
(2) Improving spraying method (part of field experiments)		
(3) Working together to maintain irrigation channels		
<i>Group 3</i>		
(1) Improving farming method	(1) Farmers tried to improve their farming method, but it was not successful	(1) Using better quality of production inputs (seeds, fertilisers, pesticides)
(2) Using turmeric	(2) Farmers applied the turmeric method successfully, and the pH of their soil is still in the normal range	(2) Keeping up the activity
(3) Working together to maintain irrigation channels	(3) Farmers continue to work together to maintain irrigation channels	(3) Keeping up the activity
(4) Changing schedule of farming activities	(4) Farmers adjusted the schedule of farming activities and managed to do some activities by themselves	(4) Keeping up the activity

^aOne of the traditional methods informed by the agricultural extension officer.

^bRelated to their farmer group status that is discussed in institutions.

Discussion and conclusion

This paper explores the potential of supporting agricultural chain actors in self-directed learning, through the COCREATE approach, to improve actors' awareness of their own and each other's situation, to work together to design and implement plans to deal with challenges in term of value chain management, extending initial results reported in (Kusnandar, van Kooten, and Brazier 2019).

Experience with COCREATE in the cases of farmers and local traders in Indonesia shows the potential of SDL for agricultural extension programmes to facilitate to enable agricultural chain actors to work together to learn how to improve their value chain management by themselves supported by facilitators. From the cases, it can be seen that farmers and local traders were able to: (1) improve their common understanding of their chain situation that can be seen from the plans designed and agreed by them (in the first design activities); (2) work together to implement the agreed plans (in the implementation activities); and (3) evaluate the results and to adapt the solutions (in the follow-up design). In this approach, facilitators played roles in: (1) supporting farmers and local traders to follow COCREATE procedure and structure appropriately; (2) answering participants' knowledge questions in terms of value chain management (including production questions) and involving experts when needed; (3) facilitating participants to access external parties (e.g. government, market,

Table 5. Implementation of agreed solutions and action plans, and follow-up plans with respect to the market.

Agreed solutions and action plans	Implementation	Follow-up plans
<i>Group 1</i>		
(1) Supplying packaged produce to supermarkets - Farmers will be involved in post-harvest activities - The local trader will be responsible for market and transportation	(1) The group has supplied produce to supermarkets Farmers have been involved in post-harvest activities, and the local trader is responsible for market and transportation	(1) Two plans - Farmers will improve produce quality - The local trader will acquire up-to-date market information from supermarkets
<i>Group 2</i>		
(1) Supplying packaged produce to supermarkets - Farmers will be responsible for supplying good-quality produce - The local trader will be responsible for post-harvest activities, market and transportation	(1) The group has supplied produce to supermarkets Farmers have been involved in post-harvest activities, and the local trader is responsible for market and transportation	(1) Expanding their market, both for high-grade and low-grade produce (2) Implementing a planting schedule when market demand has increased - The local trader will make a planting schedule - Farmers will follow the schedule
(2) Making planting schedule - The local trader will make a planting schedule - Farmers will follow the schedule	(2) The group has not implemented a planting schedule due to limited volume ordered from supermarkets	
<i>Group 3</i>		
(1) Supplying packaged produce to supermarkets	(1) The group prepared and sent samples of produce to a supermarket, but it was not accepted	(1) Finding other opportunities to expand their market
(2) Making a planting schedule	(2) The group has not implemented a planting schedule	(2) Identifying the kind of produce needed by markets before making plans for planting crops

Table 6. Implementation of agreed solutions and action plans, and follow-up plans with respect to logistics.

Agreed solutions and action plans	Implementation	Follow-up plans
<i>Group 2</i>		
(1) Working together to maintain roads	(1) Farmers continue to work together to fix roads	(1) Farmers and the local traders will contribute to the cost of paving roads, in addition to working together
<i>Group 3</i>		
(1) Working together to maintain roads	(1) Farmers continue to work together to fix roads	(1) Two plans - Farmers will contribute to the cost of paving roads, in addition to working together - Applying proposal to the local government

finance) when needed; and (4) encouraging participants to devise and implement their plans through periodic visits that correspond to the role of facilitators in SDL (Bosch, Mentz, and Goede 2019).

The effects of the COCREATE approach in supporting SDL activities in these cases are promising. It can be seen from the changes in roles and relationship between farmers and their local traders (in each group), especially in Group 1 and 2. Local traders in these two groups have become more aware of the farmers' situations and farmers have become more aware of the challenges with which local

Table 7. Implementation of agreed solutions and action plans, and follow-up plans with respect to finance.

Agreed solutions and action plans	Implementation	Follow-up plans
<i>Group 2</i>		
(1) The local trader will continue to provide farmers credit	(1) The local trader continues to provide farmers credit	(1) Keeping up the activity
(2) Separating money for farming and living	(2) Farmers have tried to separate money for farming and living	(2) Keeping up the activity
<i>Group 3</i>		
(1) Finding access to credit • Trying to acquire credit from family, neighbours/friends and the government	(1) Farmers have not been successful in acquiring credit access	(1) Applying to a government credit programme that requires a formal farmer group ^a

^aInformed by the agricultural extension officer.

Table 8. Implementation of agreed solutions and action plans, and follow-up plans with respect to institutions.

Agreed solutions and action plans	Implementation	Follow-up plans
<i>Groups 1 and 2</i>		
(1) Establishing a formal farmer group • Further group meetings • One farmer is appointed to collect data and documents required in the process of formalisation • Farmers and the local trader will contribute to administrative cost	(1) The group has processed the legalisation of farmer group, but the process at the level of the local government has not been finished yet • The group had internal meetings and a meeting with an agricultural extension officer • The group has collected and sent required documents to the local government • A formal organisational structure has been defined and implemented	(1) Keeping in touch with the local government to acquire up-to-date information regarding the process of legalisation • The local trader and farmers in the management of farmer group will be responsible for this
<i>Group 3</i>		
(1) Establishing a formal farmer group • One farmer is appointed to organise further group meetings, and to collect data and documents required in the process of formalisation • Farmers will contribute to administrative cost	• The group tried to establish a formal farmer group, but most farmers have been registered to an established farmer group (a coffee farmer group)	(1) Reorganising the group by: • Joining the coffee farmer group • Forming a vegetable division and appointing one farmer as a coordinator

traders are faced. Shifting the responsibility for post-harvest activities from the local traders to the farmers (that had never been done before in this area) for produce supplied to supermarkets required a major leap in faith from both parties, but it worked. Availability and transparency of market information from the supermarkets (price, volume order, post-harvest cost) increased awareness for both farmers and local traders, and provided the basis for discussions on daily practice: the choice of crops, planting date, desired quality, production techniques and possible governmental support. Shifting these tasks and responsibilities to the farmers was a direct consequence of the COCREATE approach, confirming the importance of awareness of value chain management for sustainable chains (Kusnandar, Brazier, and van Kooten 2019; Unnevehr 2015).

Meanwhile, the group that proceeded without the local trader (Group 3) struggled to implement solutions agreed in the design activities. However, in the follow-up design, they managed to reorganise their group (to be independent of the local trader) and to join an established group.

The need for additional technical knowledge (Benson and Jafry 2013) was also confirmed. All groups in this study discovered the need to form formal farmer groups to access technical knowledge from agricultural extension programmes and to access financial (governmental) programmes (e.g. production inputs subsidies, credit with low interest rate). The self-directed learning approach embraced within COCREATE, made it possible for facilitators to provide information when asked for.

Based on these results, implementing COCREATE demonstrates the need for new types of SDL in extension programmes. Initially intense, if the approach is implemented over time with farmers and local traders (and other chain actors), participants could be expected to become used to working with this approach requiring less-intense support from facilitators. Agricultural extension programmes (long established in Indonesia and other developing countries) can be extended to enable implementation of long-term COCREATE programmes. As the resources of agricultural extension programmes in Indonesia and other developing countries are limited, cooperation with local universities can be a promising strategy. Training for extension officers and others (people from local universities) is required to ensure COCREATE procedure is implemented appropriately. The other challenge of this approach is scalability. For this, ICT may well be able to provide a solution in the future. Further research is needed to explore these options.

Practical notes

- (1) COCREATE can be used by agricultural extension programmes to support farmers and other actors in the chain in a self-directed learning activities.
- (2) Implementation of COCREATE would require agricultural extension programmes to take a role as facilitator in self-directed learning activities in addition to providing specific courses on specific topics.

Notes

1. Crops planted by farmers in all groups are diverse, e.g. watercress, tomatoes, beans, cabbage, chillies, leafy green vegetables.
2. The continuation of the initial design activities reported in Kusnandar, van Kooten, and Brazier (2019).
3. Students from Unpad (a local university) supported by research assistants and lecturers from Unpad and TU-Delft.
4. Research assistants from Unpad.
5. The two local traders share information of price, volume order, post-harvest and transportation cost of produce supplied to supermarkets with the farmers.
6. Based on the rules, farmers who are registered in a formal farmer group cannot become a member of a new farmer group.
7. The head of coffee farmer group came to the follow-up design meeting invited by Group 3 and accepted the plans.

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