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Co-creation approach in designing sustainable coffee supply chain (a case in Bandung Regency, West Java, Indonesia

Tisna Umaran

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Research Article

Co-creation Approach in Designing a Sustainable Coffee Supply Chain (a Case in Bandung Regency, West Java, Indonesia)

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Abstract: Agricultural development in Indonesia had been conducted in a top-down manner since its independence, which had limited its effectiveness due to the gap between the reality faced by the development actors and the actors who are involved in the agricultural supply chain. This paper provides evidence of a more participative model design by involving most of the actors in its process. The study was done in action research through a co-creation approach, involving actors who contributed their thoughts in designing the most suitable model that can support them in reaching a more sustainable supply chain for coffee agribusiness in Bandung Regency, West Java, Indonesia. The results show that co-creation approach has managed to improve the performance of the coffee supply chain through the forming of the cooperative, which enhanced the coordination among the stakeholders. Furthermore, the involvement of farmers gave a significant contribution in the designing of the model.

Keywords: action research, co creation, supply chain, coffee agribusiness

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1. Introduction

Indonesia has always been placed in the top 3 of the world's coffee producing countries for around 3 decades [1]. Previous study of growth trend analysis for coffee consumption in Indonesia showed an average increase rate of 8.66 % during the 2016-2020 period [2]. This showed that the national consumption for coffee in Indonesia is growing in line with the growth of population.

The increase for coffee demand in both global and national market is responded by the increase of coffee production through land expansion, which is also shown in the data for coffee plantation, which has increased with the average annual growth rate of 3 % within the last 5 years [3]. The improvement was made possible by various government's programs. However, as other agricultural development programs, these improvements were being carried out in a top-down manner, putting less attention on its impact to the farmers' welfare [4]. The government aggressively encouraged the farmers to increase their production by giving them aids in form of physical means of production (seeds, fertilizers, farming tools), putting less attention to the potential value added of the commodity, that can be gained by the farmers.

Ensuring agricultural development's success is crucial in developing rural areas in Indonesia, which in the end will contribute to the country's overall economic stability. Since the day of its independence, Indonesian agricultural sector has been directed to fulfil the nation's ever-growing demand for food. Thus, the efforts of agricultural development have been focused on increasing the production level, through land expansion and farm

intensification [5], [6]. However, the top-down manner of agricultural development started from Soeharto regime in early 1970s and the remains lasted up until the present day. It had been successful in securing the nation's food security and developing its agriculture [6]–[8]. Unfortunately, it also brought negative side effects, which often put the farmers in a more difficult situation [9]–[13].

In the case of coffee, the farmers have more room for manoeuvre. That is to say that the commodity has high value potential, which allows the farmers to gain more profit by performing simple and inexpensive processing activities. Nevertheless, the current supply chain, which is long and complex, limits their opportunities to do that. Previous studies showed that this traditional supply chain has amplified rivalry to the disadvantage of smallholder farmers [14], [15]. Long chain supply chain made it difficult for farmers to gain more value, since most of the values are distributed to other actors. This has reduced the sustainability of Indonesian coffee's supply chain by posing risks which may affect the economic, environmental, and social aspect [16].

To transform the long supply chain which is considered to limit the farmers ability to grow, requires the involvement of the government who can facilitates the transformation through policies. This study aims to generate a system which enables the coffee supply chain in Bandung Regency to be more sustainable. The model will be generated by using co-creation approach through action research process. This was done to ensure the participatory process in its formulation, so that it can accommodate not only a fairer value distribution, but also the arrangement of rights and obligations among the involved actors.

Theoretical Framework

Sustainable Food Supply Chain

Various studies have shown the coherence of sustainability and supply chain. The supply chain involves several actors conducting product creation and/or delivery activities from the producer to consumer. Carter and Rogers [17] suggested the wide implementation of supply chain and coordination of sustainability due to the supply chain actors' focal position that linked them to producers and customers via products and services. These actors' practices are influenced by customers, governments, and other internal and external stakeholders such as non-governmental organization [18].

Sustainability in a supply chain includes economic, social, and environmental elements [19]. However, the experts in the French National Network on Local Food added health/nutrition and governance aspects to the system [20]. Chiffoleau then summarized the categorization as follows: the economic element includes farmers' income, jobs creation, farmers' workload, and contribution to the local economy; the social element includes social relations, collective actions and social innovations, accessibility to low-budget consumers, and value of women's work; the environmental element includes Green House Gas emissions, agrobiodiversity, and environmentally friendly practices; the health/nutrition element includes nutritious and healthy food; and the governance element covers the balance of power relations in the food chain, and the participation of the citizen in the food chain.

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Short Food Supply Chain for Sustainable Development

Food supply chain's sustainability is a topic producers, consumers, suppliers, researchers and policy makers are increasingly interested in. Nowadays, the advancement of various food chains has attracted much attention, with new governance starting to fill gaps left by conservative regulations and with the increasing public concern over the source and handling of foods. This concern is also confirmed by the substantial progress of short food supply chain (SFSC) initiatives as an alternative to the globalised food chains [21]. Logistics is one of the focal weak points which dynamically contributes to altering Short Food Supply Chain (SFSC) into a concrete and sustainable alternative to the globalised food system [22], [23].

SFSC is mostly characterised by its geographical nearness, which is the closeness between producers and consumers [24], [25]. This closeness can be conceptualised in relation to distance [26], [27], in time [28] or in terms of political boundaries such as regions [28], [29]. However, the distance between producers and consumers is not explicitly defined, but it is a function of the morphological and demographical structures of a region as well as of the actors involved and their purposes [21]. Marsden et al. [25] emphasised upon the type of connections between the producers and the consumers in these supply chains, and the role of this connection in creating value and meaning, rather than the type of the product itself.

SFSC is grounded on the shortest exchange between farmers and consumers and their subsequent relationships based on trust [21]. SFSC is categorized by insignificant number/absence of intermediaries [31], [32]. The chain and any possible intermediates must deliver a means of communication between farmers and customers: farmers can supply consumers with info and obtain their feedbacks in return [33].

SFSC provides opportunities for changing the production of food products from its 'industrial mode' and to construct supply chains that can potentially cut the long, complex and reasonably prearranged industrial chains within which a diminishing part of total added value in food production is gained by primary producers [30].

Co-Creation in Public Policy

Co-creation is defined as the participation of citizens in the commencement and/or the design of public services to bring positive outcomes [34]. In co-creation initiatives, citizens are considered as important and equal partners, who have specific resources and capabilities which are valuable for (re)designing public service delivery [35], (see the works of Alford [31], and Parrado et al. [32] for examples). At present, there is a cumulative trend to include citizens in policy making processes by the government officials and politicians as a mean to reduce the unintended outcomes that can potentially carry risks to the community, whenever new policies are being applied. Citizens are provided with the chance to be involved in the cooperative framing of what related services and service outcomes are and how they should be planned [35].

In the literatures, there are three types of co-creation based on the degree of citizen's involvement in the process. The first one involves citizen as co-implementer, where the citizen only participate in the implementation of an initiative (see [34]); the second involves citizens as co-designer, where the citizens were actively involved in designing process of the service delivery (see [35]); and the third, encompasses the citizens as an initiator and the public officials as following actor (see [36]).

This study employs second type of co-creation where the government took the initiative, while the citizens which in this case comprise of farmers, traders and processing companies were actively participating in the designing of the initiatives and its deliveries.

2. Materials and Methods

Bandung regency is one of the coffee producing areas in Indonesia, where quality beans are grown. It is located approximately 1000 m above sea level, in the feet of mountain areas that surround Bandung city. These geographical characteristics have made Bandung regency to be very suitable for growing high quality coffee beans, which is dominated by arabica variety. This has affected the farmers by providing them the opportunity to maximize their profit through value added activity. Because arabica coffee is known for its unique organoleptic characteristics, which is determined by its growing location's agroecosystem.

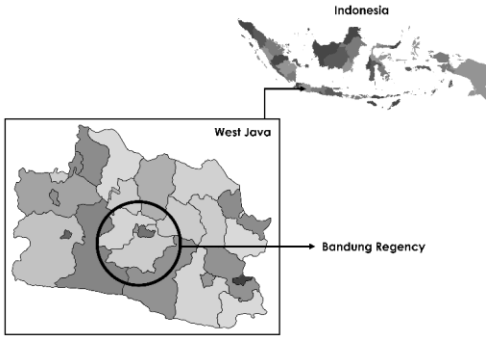

Figure 1. Location of Bandung Regency, West Java, Indonesia.

There are 26 districts in Bandung regency which are potentially feasible for coffee growing activities: Pangalengan, Paseh, Ibun, Kertasari, Rancabali, Pacet, Pasirjambu, Ciwidey, Cikancung, Cileunyi, and Cilengkrang. These districts are located within 6 mountains that surround Bandung City: Mount Tilu, Mount Malabar, Mount Patuha, Mount Manglayang, Mount Wayang.

Within this region, there are 40 farmers' groups consisting of 2,830 members. However, as we visited the groups, not all groups and all of the members in the list are still active. Thus, we only selected 20 groups. Within each group, we stratified the farmers based on their owned land size and categorized them into 3 categories: small farmers (less than 1 ha), medium farmers (1-3 ha), and large farmers (more than 3 ha). Then, we randomly selected 12 farmers from each group (4 per category) to select a total of 240 respondents for the survey phase of this study. Aside of that, we also included 25 middlemen (traders), 10 processors/roasteries and 5 retailers who are willing to participate in this study. Middlemen are those who buy cherries from the farmers, some do primary processing activities to process the cherries into green beans. Processors/roasteries are those who do the roasting process to turn green beans into roasted beans. Retailers are those who sell the roasted beans directly to consumers.

Prior to the workshop, in-depth interviews and focus group discussion (FGD) were conducted with key informants representing actors involved in coffee supply chain (heads of farmers' group, traders, roasteries, retailers) and policy makers. This was done to identify their motives, to build trust, and to create common grounds among them. In the FGD we also identify what do actors think about the current supply chain performance and its impacts on their business.

After the FGD, structured interviews were conducted to the select respondents. Questionnaires were given to the respondents to ask them about their perspectives toward the current supply chain performance. We asked closed questions such as 'what do you think of the overall supply chain performance?' and provided options for the answer such as: 1) Satisfied, 2) neutral, 3) not satisfied.

The results were then carried out to be discussed in the workshops involving representations of the actors, who also participated in the FGD. During the workshop we dig for further information on a more specific reasonings behind the results of the survey, (e.g., why do most farmers are unsatisfied? On what aspects? Etc.). The information were also triangulated by in-depth interviews with the key informants, which was conducted in between workshops.

The second workshop was carried out to gather the ideas from the key informants that can contribute to the model construction. Then, the last phase was to clarify the constructed model to key informants.

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The Action Research Process

Reason & Bradbury [37] defines action research as an "orientation to inquiry". The main elements of that positioning are that participants are involved and treated equally, and that the knowledge produced is practical. Thus, action research is collaborative [43]. However, the complexity of human systems also demands flexibility [44]. This flexibility can be provided from the basis which the action research uses. Dick et al. [44] states that there are currently two elements of this process that support it to function as a flexible meta methodology: the iterative cycles and the nested cycles.

The capacity of the iterative cycles to be nested is not much studied yet, although it is probably common in practice [44]. Nested cycles have been defined as a features of software development plans (e.g., [40]).

This stage is done often in the action research projects. Lewin (1946) defines this practice as 'a spiral of steps, each of which is composed of a circle of planning, action, and fact-finding about the result of the action'. There are at least five-element cycle: diagnosing, action planning, action taking, evaluating, and specifying learning [47]. Mctaggart [48] redeveloped the elements to plan, act, observe, and reflect, although in the later work they have displaced this cycle from its central position.

This process is also found in other fields, such as continuous improvement (e.g. Deming, 2018), and evaluation (e.g. Patton, 2010), and experiential learning (e.g. Kolb, 2014). These are amplifications of a basic cycle, which substitutes between action and the review of that action. This cycle is important as it allows trial and error to be informed by experience.

Based on those theoretical frameworks, we conducted action research together with the actors through focus group discussions, workshops, survey, and in-depth interviews.

Table 1. Action Research Process for Sustainable Coffee Supply Chain in Bandung Regency

Component	Brief Description	Rationale
Focus Group 1	Identifying the current problems on the coffee supply chain from the actors' perspective	Brief introduction to the theme of the study Creating common grounds with the actors Enhancing communications and collaborations among the actors Problem identifications by actors including farmers, suppliers, intermediaries, cooperatives, academicians, government agents to grasp their understanding of the current situation
Workshop 1	Scenario planning to define possible futures Half-day workshop	Multiple scenarios so that problems identified are likely to be relevant
Workshop 2	To generate solutions based on actors' perspective Half-day workshop	Study purpose was to define solutions by actors in coffee supply chain
Interviews	15 in-depth interviews	To triangulate findings from workshops
Framework	Research team collected material from workshops and interviews	To convert data into an actionable policy framework

Focus Group 2	One focus group with key informants Participants defined a vision for their sustainable coffee supply chain, identified present problems and the solutions	To extend results beyond the single coffee supply chain of the pilot study For participants to identify desirable future coffee supply chain while remaining anchored to some extent to the reality of their present situation
Survey	Survey of a stratified random sample of farmers	To triangulate the focus group results
Scenario-based workshops	In small groups (two for each group) participants considered a likely near-future scenario as realistic and challenging, to identify required solutions.	To collect more information To triangulate with data from pilot study and the components of the main study To collect data on differences between their supply chain, and other cases To augment the first survey
Framework check	As part of each scenario-based workshop (above), participants were asked to comment on the adequacy, usefulness, and completeness of the framework developed in the pilot study.	To further refine the framework. To test it against the perceptions of managers from the industry partners after they had been reflecting on required capabilities

3. Results

This section starts by providing the information gained from the informants for the existing supply chain. Continued with their perspectives towards the performance of the chain and their perceived problematic situations. And closed with the generated ideas and policies as results of the action research process.

3.1. Existing Coffee Supply Chain

In today's coffee supply chain, most of the farmers sell cherry (coffee fruit), limiting their possibility to gain more value from their product. They sell cherry to the middlemen, who will then sell them to the processing units in the village level. The cherry will be processed to produce green bean (raw coffee bean ready for roasting), to be sold to other processing units who have the expertise in coffee roasting (roastery). From the roastery, the roasted beans will be sold to the *horeca* (hotels, restaurants, cafés), coffee retailers, or directly to the consumers. Based on our findings, through this kind of supply chain, the farmers only gain 22% of the total value added, while the rest of the value goes to other actors. This is worsened by the fact that the farmers only gain this value in certain period of time, since they really depend on the seasonality of the plant. While other actors gain their value in a more frequent periods, most of them have a daily cycle. Along with the continuously increasing production costs in the farmers level, this situation poses a threat to the existence of the coffee farmers in the future.

Most of coffee farmers in Bandung Regency are focused only in the production of cherries (coffee fruits), leaving them with only a small portion of the value from the coffee business. To produce 1 kg of cherry, they have to spend approximately 4.500 IDR (0.3 USD), which includes all the production costs (plant maintenance & harvesting). The cherry is then sold with various selling price ranging from 3.000 IDR to 10.000 IDR (0.15 – 0.70 USD) per Kg, depending on the market situation. This condition illustrates the fragile position of coffee farmers, as they have to deal with price volatility. Sure, they can gain high profit when the selling price is at its highest, but according to the in-depth interviews result, this

situation occurs very rarely, not even once in a year. On the other hand, the production costs are almost fixed, and continue to increase periodically. This means that the farmers' have to deal with more pressure when they face the lowest selling price point. As most of the farmers rely solely on their coffee plantation for their livelihood, they sometimes see that there is no future for them to stay in the coffee production, which means that it poses a threat to the sustainability of the coffee agroindustry as a whole.

Based on the survey, here are the perspective of actors toward the current coffee supply chain in Bandung Regency:

Table 2. Actors' perspective towards the current coffee supply chain performance in Bandung Regency

Actors	n	Satisfied	Neutral	Not Satisfied
Small-holder Farmers	80	n=8 (10%)	n=16 (20%)	n=56 (70%)
Medium Farmers	80	n=12 (15%)	n=12 (15%)	n=56 (70%)
Large Farmers	80	n=16 (20%)	n=24 (30%)	n=40 (50%)
Middlemen	25	n=15 60%	n=7 28%	n=3 12%
Processor	10	n=4 40%	n=2 20%	n=4 40%
Retailer	5	n=3 60%	n=1 20%	n=1 20%

Source: Fieldwork (processed)

From the Table 2., we can see that most of the farmers are not satisfied with the current supply chain performance (50-75%). Based on the following workshop, discussion, and in-depth interviews with the farmers, we learned that the most common reason was due to their low bargaining position, which limits their capability in gaining more value from their product. One of the farmer group leaders shared his point of view:

'We are stuck in this situation, we know that the beans sell more than the cherries, but we do not know the standard quality of the beans asked by the market, we do not have the access to the technology, also most of us have no opportunity to do that because we have a deal with the middlemen even before the fruits are ready to be harvested'. Y (43)

This applies for all farmers, especially small and medium scale farmers who own less than 3 ha of coffee area. This situation also shows the exclusion of the farmers from the supply chain. By only selling coffee fruit (cherries), the farmers' interaction with the market is limited, so that their access to information and knowledge regarding the market situation is also partial.

The middlemen/traders are mostly satisfied (60%) and have no objection (28%) with the current supply chain performance, as they do less work and gain more value in general. Based on the following workshop and in-depth interviews with them, we learned that while they seem to gain less value per Kg compared to the farmers, but they do their business daily, leading to a faster cashflow and capital accumulation. They also have less risks as they do not have to face the risks that are being faced by the farmers (for example, uncertainty of the nature that determines product quality and productivity). It might seem that they have to face the risks occurred in the market level (such as price volatility), but in practice, they bring back these risks to the farmers. When the market price dropped, they will use this information to justify their position so that they can buy the cherries

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with a lower price from the farmers. The unsatisfied middlemen are mostly small-scale traders who are new to the business, hindering them to penetrate the existing structure of the chain. These middlemen found it hard to build trust and commitment from the farmers as their source of supply, as most farmers have already made some arrangements with other traders who can give more advantage to the farmers (e.g., by giving loans, agro-input, etc.).

Some processors/roasteries are satisfied (40%) and neutral (20%) with the current chain, but this only applies to those who have an arrangement with the traders/middlemen, ensuring the raw materials that they need to do their business. However, there are 40% of the processors who are not satisfied. Based on the workshop and in-depth interviews with the processor, we found that this was due to unstandardised green beans quality and the uncertainty of supply brought by random middlemen without any contract/arrangement.

'Up to this day, it is hard for us to maintain the quality of our product, and our ability to meet the market demand. It is hard for us to make contract with our suppliers because we received green beans from different traders all the time. This affects our business and made it hard for us to expand'. JN (35)

As for the retailers, most of them are satisfied (60%) and neutral (20%). Based on the workshop and in-depth interviews with the processor, we learned that this was due to their high bargaining position in the chain. They have many options to select on which product that they consider to be worth selling. If there are suppliers who cannot meet their standards, they can just simply pick another supplier. However, this only apply for those who are already in the business for quite a while. As for newcomers, they feel unsatisfied (20%) with the current supply chain due to their limited networks and information.

These first 3 phases of the study were not only able to encourage the actors to identify their own problems, but also to see their position in the bigger picture by acknowledging that other actors have problems too. The results of the in-depth interviews and the first workshop is summarized in the Table 3. below.

Table 3. Identified problems in the current coffee supply chain

Sustainability Problems	Farmers	Processing Units	Traders (incl. middlemen)
Economic (incl. production and marketing)	Limited market share Limited value gained No local exporters Low cherry price High production costs Low capital Dependency on the middlemen Low technology Limited knowledge and skills	Unstandardized product quality Unpredicted product availability Low equipment and machine capacity Volatile product price Low capital	Volatile product price Low capital Unstandardized product quality Unpredicted product availability
Social	Dependency on the middlemen	Unorganized middlemen	Low commitment from the farmers Unhealthy competition

Environmental	Polluted farm Soil degradation Unpredictable season Changing agroecosystem	Low quality product due to environmental degradation	Low quality product due to environmental degradation Long traveling time and range to reach each plantation

Source: Fieldwork (processed)

From the results of the survey and the first workshop, the participants agreed and concluded that the most urgent root of the problem in their current supply chain is the relationship between the farmers and the middlemen. Most farmers complained about their dependency to the middlemen. Increasing production costs combined with the volatile (often low) selling price of the cherry limits the farmers' capital capacity to enter the next farming cycle. This situation is usually addressed by having a deal with middlemen. The middlemen give certain credits for the farmers with some arrangements, which often put the farmers in a difficult situation. For example, the middlemen agreed to give loan to the farmers, as long as the farmers are willing to sell their product to them with a lower price. Not to mention the interests which further burdened the farmers.

This situation affected both the production and supply level of the system, which then lead to the problems faced by the processors and retailers. Currently the processors and retailers complained about the continuity of the product (both for quality and quantity), which is determined by how well the farmers organize their farm. While the performance of the farmers itself is limited due to their unhealthy relationship with the middlemen. Thus, the participants agreed that we should focus on fixing this problem first before moving to other areas. Consequently, the next action research activities were focus in creating the most plausible solutions to the problems especially based on the relationship between the farmers and the traders.

Some of those problems are actually being addressed in the current policy, especially regarding production. However, the fact that the farmers still brought those up during the discussions showed that those problems still exist. Most of the current policies only focus on improving the farmers' capacity through trainings and providing aids (usually in the form of agro-input e.g., seeds, fertilizers, pesticides). Nevertheless, those efforts only managed to bring temporary changes that last only for a short period of time.

The second workshop then pursued the solutions for the identified problems, where both parties (farmers and traders) discussed the solutions that suits them best. In this workshop, the government officials and academicians acted as referees to give advice and suggestions for the farmers and the traders. Aside of that, the referees also have to make sure that the generated solutions do not give more advantage for one party while negatively affect the other.

According to the conclusion of the first workshop, the participants agreed that the second workshop should be more focused on the involvement of the farmers and the traders. We experienced that the discussions were a little bit heated as they try to negotiate a solution for the seemingly unfair trade network, which requires the traders to be willing to give some of their profit opportunity to the farmers. However, the workshop managed to generate solutions with feasible implementation.

Table 4. Agreed solutions for the farmers-traders problem in coffee supply chain

Problems	Solutions		Implementation
	Farmers	Traders (incl. middlemen)	
Economic	Collective farming to improve efficiency	Involvement in quality control to disseminate	Most of these activities involves collective actions which

	Collective post-harvest management to improve product quality Collective marketing to improve bargaining position	market information for the required standard quality Collective trading to improve capital and marketing	need to be organized in a cooperative
Social	Joint training with experienced farmers Access to market information (price and quality)	Involvement in quality control to disseminate market information for the required standard quality	
Environmental	Collective farming to control the application of GAP		

Source: Fieldwork (processed)

3.2. The Role of the State

The government with the help from the academicians who are involved in this research plays an important role in leading and facilitating the co-creation process. The authorities that they have over the actors involved in the supply chain made it possible for them to gain control. However, at this stage we also found that the government institutions have their own problems in regulating the coffee supply chain. Their main problem was due to the complexity of rules and regulations, in which they can operate.

Bandung Regency's Agricultural Services is more focused on the production elements, while the trading elements are under the Trading Services. Both institutions work under different ministries i.e., the Ministry of Agriculture and the Ministry of Trade. They are both tied to different goals and

State and governance traditions can be defined as sets of institutional and cultural practices that constitute a set of expectations about behaviours [52]. The co-creation successful rate is determined by the authorities, since they are the one who have to power to manage the relationships among the actors. Whether co-creation will be allowed to be a game changer is dependent on the state and governance traditions already in place [35].

Table 5. Arrangements Between Farmers and Traders in the Proposed Cooperative Model

Sustainability Element	Farmers		Traders (incl. middlemen)	
	Rights	Duties	Rights	Duties
Economic (production, marketing)	Access to credit from the cooperative Access to affordable quality agro-inputs Market price information	Focuses on coffee cultivation Improve product quality and quantity Pay debts Ensure supply continuity	Access to Credit from the cooperative	Provide market information (desired quality and price) Transparency in buying price

Social	Trainings and guidance for Good Agricultural Practices Trainings on certified nursery	Join trainings and disseminate gained knowledge Farm collectively	Information of planting schedule Trainings and guidance	Disseminate knowledge
Environmental	Trainings and guidance for environmentally friendly agricultural practices	Apply Good Agricultural Practices Improve agroecosystem through multicropping	Access to product distribution centre as their pick-up point	Create a distribution centre with the most effective and accessible location for all traders and farmers to cut range

4. Discussion

Sustainability in a supply chain includes economic, social, and environmental elements [19]. Those three elements should be equally important and be taken into account in the supporting policies of coffee development. However, in this case, the root of the problems seems to be focused in the social aspect of the supply chain. The existing long and complex chain limits the farmers' ability to gain more profit, further impacting to the restriction of their potential to grow. This situation threatens the other actors as the farmers are the main actor who produce raw materials which allow other businesses along the chain to run.

In the case of coffee in Bandung Regency, we can see that the farmers are the ones who suffered the most. This study suggested that they have to be more involved in the chain so that they can gain more bargaining position in making the arrangement with other actors. To do this, they have to organize themselves in doing their activities collectively, and they also have to divide roles among themselves.

Although many other studies suggested that the term of SFSC refers to the exclusion of some actors from the chain [15], [21], [23], [31], [53]–[56], our findings showed a different perspective. We have to understand that each actor involved in the supply chain has their own motives and needs. In addition, they also play roles that made it possible for the chain to work. Thus, the relativity of their roles and motives in the chain should be the subject for developing a more sustainable supply chain. The action research resulted in the forming of cooperative which can represent the farmers without excluding the traders. The actors understood that no matter how negative the middlemen presence is perceived by most people, they do play an important role, and moreover, they also have families to feed. Thus, we decided to include them into the cooperative and let them do their usual roles in a more organized and transparent manners.

Co-creation in social innovation involves the creation of long-lasting outcomes [57], [58] which aim, through a process of participation and collaboration, to address societal needs by fundamentally changing the relationships [59], positions and rules between the involved stakeholders [34]. Social innovation is relatively autonomous, but interdependent, actors try to shape the content and results of policy programs [60]. Therefore, the actors become 'co-creators' and are expected to deliver valuable input to the development of a public service [61].

5. Conclusions

Short-circuiting the long, complex and often unfair agricultural supply chain will always be an ongoing process. The heterogeneity of actors involved in the supply chain,

each with their own motives and background, making it difficult to look at it in a simplistic point of view. Thus, the term of 'short-circuiting' has to be further discussed. Transforming the long supply chain into a shorter one does not necessarily mean that we have to cut one or two parts of the chain, as it would also mean to cut somebody's livelihood, which will lead to more problematic situation.

Based on our action research, the participants came up with the idea that embrace more collaboration than competition, inclusion over exclusion. Hopefully, by accommodating everyone's needs and expectations, and encouraging mutual understandings among the actors, will lead to a more sustainable supply chain in the future. However, the sustainability of the initiative itself needs to be ensured by involving supporting actors who have the authorities and knowledge, who can act as a referee to help the actors in dealing with unwanted conflicts or situations, which are always possible to happen in the future.

The co-creation approach allowed the participation of the actors in the policy making process, which in this case, is manifested through the initiation of the cooperative. This process shows the potential for the actors to grow from within, which will be the seed for endogenous development in the future. As in its current state, the initiatives have just started, and we see that as a step toward a more sustainable coffee supply chain. Prior to the initiatives, the supply chain was still in the traditional long and complex state. After the initiatives, most of the actors agreed on working together under the cooperative. However, it is too early to judge if the new implemented SFSC works better than the previous one. Further research should be carried out to measure the success of the initiatives in the future. There are still some room for improvements. Based on our experience, unfortunately in our case, the co-creation approach is not able to improve the coordination among the policy makers. The complexity of the government institutions lies in an unreachable area for us, which requires a higher-level intervention.

Supplementary Materials:

Unavailable online

Author Contributions:

I am Tisna Umaran, a doctorate program student. This study is the part of my thesis, so I am responsible for most of the process including conceptualization, research (data collection and analysis), writing, and original draft preparation.

Tomy Perdana is my promotor, who is an expert in supply chain studies. He contributes to supervise me during my research and the writing of this paper. His contributions mainly focus in conceptualization and methodology. He also helps in editing and supervision of this paper.

Denny Kurniadie is my co-promotor, specializes in agronomy, thus he contributes in editing and supervising the methodological, results, and discussions section of this paper. He also contributed during my research, especially in dealing with farmers.

Parikesit is my co-promotor, an expert in sustainability sciences, he contributes in results and discussions writing, reviews, and article editing (both contextual and grammars).

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