

Learning from the developmental history of sustainable farming initiatives

Laure Triste^a, Joke Vandenabeele^b, Ludwig Lauwers^{a,c}, Fleur Marchand^a

^a *Social Sciences Unit, Flanders Research Institute for Agriculture, Fisheries and Food (ILVO), laure.triste@ilvo.vlaanderen.be*

^b *Laboratory for Education and Society, KU Leuven, Leuven, Belgium*

^c *Department of Agricultural Economics, University of Ghent*

Abstract: *A wide variety of public and private initiatives aim to support on-farm sustainable development. These sustainable farming initiatives (SFIs) show considerable variation in their success to do so. To understand the success of a Dutch SFI, we scrutinized its developmental history by using concepts from Engeström's Cultural-Historical Activity Theory (CHAT); i.e. activity system, contradictions, zone of proximal development (ZPD) and expansive learning (Engeström, 1987, 2009; Engeström & Sannino, 2010). In this research, we interpret our Dutch SFI as an activity system, and investigate how contradictions between the elements of the activity system were dealt with by its participating actors and contributed to expanded possibilities of the activity system. By defining on which account the SFI expanded in overcoming the internal contradictions, we were able to define nine factors and four dimensions for possible expansion. We called them dimensions of the zone of proximal development, i.e. a socio-spatial, temporal, meaning and institutional dimension. This research shows how SFI participants deal with internal contradictions that contribute to the SFI's possibilities for future development.*

Keywords: *Sustainable farming initiatives, Cultural-Historical Activity Theory, developmental history, contradictions, expansive learning*

1 Introduction

A wide variety of public and private initiatives aim to support farmers in the sustainable development of their farming practices. Sustainable farming initiatives (SFIs), are social constructs in which multiple (types of) actors collaborate to support on-farm sustainable development. Such a collaboration induces a social learning process, in which SFI participants and organizers are involved to interactively share their knowledge, to produce new knowledge and trust, and to form the basis for joint action (Pahl-Wostl, 2006; Beers et al., 2016). However, these SFIs can show considerable variation in their success to support on-farm sustainable development. Some SFIs develop themselves towards an enduring and established initiative, whilst others encounter difficulties to transcend the start-up phase.

Multiple scholars stress the dynamic character of collaborations and therefore argue that their outcomes can only be understood by taking into account the internal dynamics (in the case of innovations: Kilelu et al., 2013; in the case of LINSAs: Moschitz et al., 2015). For example, the processes of interaction between different types of actors can influence the outcomes of these processes (Beers et al., 2016; De Vente et al., 2016), or internal and external factors of an innovation initiative can induce both positive or negative interaction cycles between actors involved (Klerkx et al., 2010). So, based on Virkkunen and Kuutti's (1999) statement on organizations, we reason that, to understand the activities performed in SFIs, the problems they encounter in realizing these activities and the possible solutions to these problems, we need to examine the SFI's historical development. Also authors in other fields focused on the developmental history of initiatives to understand their state or impact on a given moment in time (e.g. Bui et al., 2016; Hermans et al., 2016)

In this paper, our aim is to contribute to this research on the development of initiatives and to find underlying causes for success in SFIs. In doing so, we use principles from the Cultural-Historical Activity Theory (CHAT; Engeström, 1987; Engeström, 2009; Engeström and Sannino, 2010) to understand the developmental history of SFIs, i.e. the way they created relationships, roles and responsibilities (Biesta, 2009), new working processes and tools during their existence. CHAT 's focus of analysis is collective activity systems in which activity is motivated by a collective, societal motive or object (Engeström, 2009; Vänninen, 2012), e.g. in our case the support of on-farm sustainable development. Interestingly, besides merely focussing on the interactions between the actors involved in the activity system, CHAT also explicitly gives a central role to tools and cultural artefacts in the activity system. Further, according to CHAT, contradictions or frictions within and between the elements of the activity systems are their main sources of internal change, and thus development. When practitioners of the activity succeed in creating and realising a potential path to overcome these contradictions (zone of proximal development), the activity system transforms towards a new developmental stage. This process is referred to as expansive learning (Engeström, 2001). These principles thus give an important role to the activity system's participants in the development and transformation of their activity (Restrepo et al., 2014).

We apply CHAT to understand the success of Veldleeuwerik, a Dutch SFI. By defining Veldleeuwerik as an activity system, and recognizing contradictions as forces for development, two specific research questions arise. First, which internal contradictions occurred in the development of Veldleeuwerik and how did the involved actors tackle them? Second, how did Veldleeuwerik's ability to overcome the contradictions contribute to its expansion and its growing ability to support on-farm sustainable development?

In following section 2, we describe the concepts of CHAT needed for the analysis, i.e. activity system, contradictions, zone of proximal development and expansive learning. The actual methodology to answer our research questions is described in section 3. In section 4, we answer the first research question, by presenting the contradictions that were crucial in our case's development and describe the ways its actors tried to tackle these contradictions. In section 5, we answer our second research question by discussing our case's success or failure to expand as an SFI. Finally, we conclude by identifying some characteristics that benefit expansion of an SFI, as indicated by our research.

2 Contradictions as sources for expansion

To investigate dynamics in the developmental history of SFIs, Engeström's Cultural-Historical Activity Theory (CHAT) and expansive learning theory, offers some interesting concepts: activity system, contradictions and zone of proximal development. CHAT has been widely used in practice and research, and proved its value particularly in the analysis of learning in not-traditional, hybrid and multi-organizational settings (Engeström and Sannino, 2010). Some of these studies have already been performed in an agricultural context. However, most of these studies used the theory in interventionist research (e.g. Seppänen, 2004; Mukute, 2009; Mukute and Lotz-Sisitka, 2012; Vänninen et al., 2015), rather than for analytical purposes (e.g. Pereira-Querol 2011) as we aim for in this research.

The first concept, activity system, is the theory's basic unit of analysis (Figure 1). An activity system is a social construct in which actions of individuals must be understood as being part of a collective activity motivated by a specific objective, e.g. support on-farm sustainable development. According to CHAT, an activity system can be defined by six elements: object, subject, tools/artifacts, rules, community, division of labour. The object is the driving force and thus the motivation for activity. The activity is mediated by cultural artifacts or tools that are created by people to control their activity, e.g., sustainability assessment tools, farmer discussion groups, expert presentations (Engeström, 2009; Vänninen, 2012). The subject is the actor who's perspective is used for the analysis (Pereira-Querol and Seppänen, 2009). The interaction between the subject and the other actors involved in the activity, i.e., the

community, are regulated by rules and the division of labour (Seppänen, 2002; Engeström, 2009; Vänninen, 2012). Activity systems can meet and interact with other activity systems to form a new collectively meaningful object (Engeström, 2009).

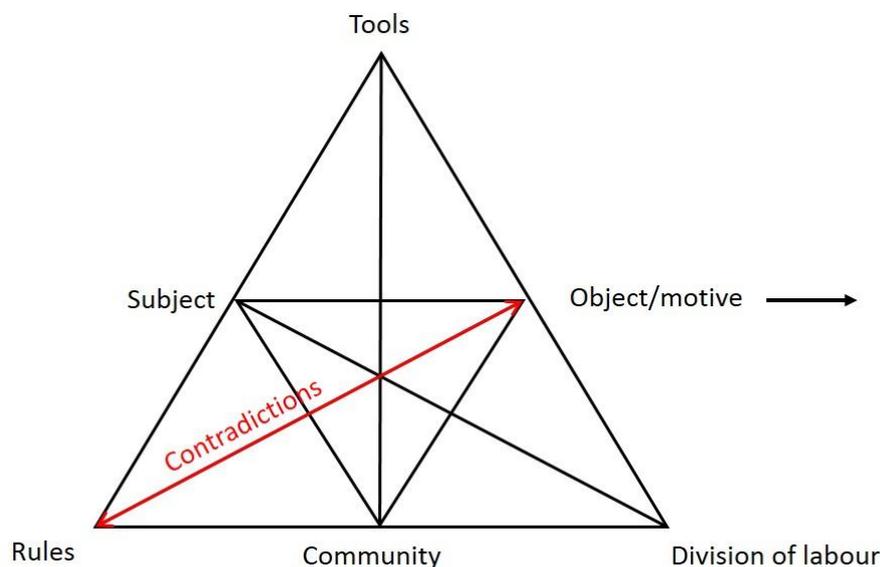


Figure 1. The structure of an activity system as developed by (Engeström, 1987)

The second concept, contradictions within and between the elements of the activity systems, are the activity system's driving forces for change, development and transformation (Miedema, 2008; Engeström, 2009). These contradictions must be seen as “historically accumulating structural tensions within and between activity systems (...) [which] can generate disturbances and conflicts or innovative attempts to change the activity” (Engeström, 2009). Engeström (1987) defines 4 types of contradictions. First, primary contradictions, also called ‘need state’, are the basic contradictions pervading all elements of the activity system (Miedema, 2008), e.g. conflicting rules within the system. Second, secondary contradictions, also called double binds, occur between elements of the activity system. They can result when new elements are adopted by the activity system and coincide with old elements; e.g., a new actor joins the activity system which causes conflicts in the existing divisions of labour. Third, tertiary contradictions, take place when the object of a more advanced form of the activity system is introduced into the old activity system, e.g., a new object of the activity system requires new mediating tools. Fourth, quaternary contradictions, occur when the central activity system is brought into relation with neighbouring activity systems. Activity systems develop and transform during longer periods of time. Therefore, to understand an SFI's current problems and future potentials, it is necessary to recognize its history of tackling previous contradictions, i.e. scrutinizing its developmental history.

The third concept, “zone of proximal development” (ZPD), can be used to understand the way an activity system tackles its contradictions. Engeström (1987) defines the ZPD as “the distance between the present everyday actions of the individuals and the historically new form of the societal activity that can be collectively generated as a solution to the double bind potentially embedded in the everyday actions”. In other words, potential solutions for dealing with problems or contradictions are thus inherent to the activity system itself and can be produced collectively by the actors involved in it (e.g. the creation of new tools, a new object and new social relations) (Engeström, 2009; Pereira-Querol, 2011). Eventually, the way an activity system decides to deal with the contradictions, reveals what needs to be learned to reach the future state of the activity system (Engeström, 1987). This means that “learners [have to] learn something that is not yet there (Engeström and Sannino, 2010)”. This

evolution of an activity system is described as a “journey through the zone of proximal development of an activity” (Engeström, 2009). When the actions taken to solve the contradictions result in a reconceptualization of the activity’s object and motive, and thus creates a wider horizon of possibilities, expansive transformation occurs (Engeström, 2009). So, contradictions become actual driving forces of expansive learning when they are dealt with in such a way that an emerging object is identified and turned into a motive (Engeström and Sannino, 2010)”. However, “an expansive learning process can involve smaller learning cycles within the actions, resulting in partial solutions (Vänninen, 2012)”. Expansive learning influences the whole activity system, because when the object of the activity system changes, the other elements of the activity system must be realigned accordingly (Vänninen, 2012).

In our research we used the concepts of contradictions, movement through the zone of proximal development and expansive learning to scrutinize the developmental history of the SFI Veldleeuwerik.

3 Methods

3.1 Case

Veldleeuwerik (VL) (which can be translated as ‘Skylark’) is a dynamic Dutch foundation that started in 2002. Table 1 describes the case according to the six activity system elements defined by Engeström (1987) as referred to in section 2. According to Engeström’s theory, we defined a new developmental stage of the SFI when a new object was defined and realigned in the case’s activity system. VL’s development then can be expressed in four developmental phases. However, the changes in the activity system’s phases should not be interpreted as immediate changes from one day to another, but rather as being smooth and gradual processes of change for the elements to adjust to the new object. The first phase started with a project (2002) in which a brewery, 10 arable farmers and an intermediary firm (cooperative that purchased barley from farmers for the brewery) closely collaborated to define sustainable barley. The second phase coincided with the expanded object of the project (2003-2004) in which a sustainable farming system for arable farmers was drafted (involving the whole on-farm crop rotation system instead of merely barley). The third phase started with the origin of the Foundation Skylark (2006), in which the developed sustainable farming system was tested and further fine-tuned with 45 farmers, 5 chain actors and the intermediary firm. This phase was accompanied with multiple discussions on how to organize the foundation and its sustainability system. The fourth phase (2011) coincided with a big growth in the number of participants (ca. 400 farmers, 25 chain partners and 15 advisory firms), which resulted in formalization measures taken by the foundation to organize its activities and maintain its quality. At the time of writing VL’s aim is to establish on-farm sustainable development and to facilitate sustainable arable food chains, by means of knowledge exchange between farmers and between farmers and chain partners. On-farm sustainable development is spurred using farm sustainability plans and regional farmer groups, in which sustainability plans are discussed in fixed groups of ca. 10 farmers on the farm of these farmers. At a VL Conference held in 2017, discussions about VL’s vision on the role it wants to play in society and the ways this should be accomplished (e.g. if and how to measure sustainable development) might announce a new development phase, however, it is too early to state this.

Table 1. Case description of Veldleeuwerik based on the six elements of an activity system (Engeström, 1987), in 4 subsequent developmental phases.

Activity system element	Phase 1: Sustainable Barley	Phase 2: Whole farm approach	Phase 3: Foundation Skylark	Phase 4: Professionalisation
Subject	- Project participants (10 farmers, brewery and intermediary firm)	- Project participants (10 farmers, brewery and intermediary firm)	- Foundation Skylark	- Foundation Skylark
Object	- Define sustainably produced barley and produce it accordingly	- Develop a system for on-farm sustainable development of arable farming practices	- Implement system to achieve continuous sustainable development on farms	- Expand system on arable farms throughout The Netherlands, build sustainable supply chains and restore context between farmers and consumers.
Tools	- Dialogue and knowledge exchange between farmers, the intermediary firm and brewery - Farmer discussion groups with expert involvement on soil and sustainable agriculture	- joint system development involving farmers, intermediary firm, brewery and research institutes - Farmer discussion groups	- Foundation: “Stichting Veldleeuwerik” (SV). - Farm development plan with 10 sustainability indicators - Sustainability assessment tools - Farmer discussion groups	- Farm development plan with 10 sustainability indicators - Sustainability assessment tools - Farmer discussion groups for farmers - Participation board - Advisor accreditation program - System certification - Online farmer sustainability profile - Connect to society - ”reward” farmers for participation - Upscaling knowledge exchange
Community	- 10 arable farmers - Intermediary firm - Brewery - Experts from research institutes - Project facilitator	- 10 arable farmers - Intermediary firm - Brewery - Experts from research institutes - Project facilitator	- 45 arable farmers - Intermediary firm - 5 agro-food chain partners (product buyers) - Farm advisors - Foundation board	- Ca. 400 arable farmers - 25 agro-food chain partners - 15 advisory firms - Foundation board - Advisory board - Quality board - 6 employees in the daily management group
Rules	- Farmers are willing and open in their communication towards the brewery - Farmers grow more than only barley	- Farmers are willing and open in their communication towards the brewery	- Farmers and chain partners contribute financially to the foundation - Farm advisors are not compensated for their advisory work - Intermediary firm merges with other firm (putting less emphasis	- Participation rules for farmer - Consumers are willing to pay for sustainable products

<p>Division of Labour</p>	<ul style="list-style-type: none"> - Brewery finances the project and project facilitator - Experts educate farmers on sustainable agriculture and soil knowledge - Intermediary firm facilitates contact between Brewery and farmers 	<ul style="list-style-type: none"> - Funding from EU, Province and brewery - Research institutes experienced in (agricultural) sustainability facilitated joint system development - Intermediary firm facilitates contact between Brewery and farmers 	<p>on SV)</p> <ul style="list-style-type: none"> - Advisor of the intermediary firm facilitates farmer discussion group - Arable farmers participate in discussion groups and take sustainability actions on their farms - Farmers, chain partners, advisors are represented in the foundation board 	<ul style="list-style-type: none"> - Accredited Farm advisors from advisory partners provide guidance in the farmer discussion group and make farm sustainability plans. - Arable farmers participate in discussion groups and take sustainable actions on their farms. - Chain partners organise workshops for farmers.
---------------------------	--	---	---	---

3.2 Data collection

Data were collected in different ways. First, 16 semi-structured interviews were performed between July 2013 and May 2015 with different types of actors involved in both cases: 2 persons involved at the very beginning of the initiative (a farmer and a facilitator from the intermediary firm), 5 organizing members, 6 farmers, 2 advisors and 1 chain partner. The interviews lasted between 1,5 to 2,5 hours. Our interview guide comprised questions on three developmental processes of the cases: the foundation of the SFI, development of the processes and tools supporting on-farm sustainable development, and implementation of these processes and tools. Questions on each process were guided by the activity system elements as described in section 2. All interviews were transcribed and coded in Nvivo 11 (QSR International). Second, field notes from 13 farmer meetings (May 2014-June 2015) and 1 conference organized by VL (conference called “fifteen years ahead”; June 2017) were used to gain a more thorough understanding of the SFI’s activities and dynamics. Third, available documents (newsletters, official publications, reports, website) were used to support our findings or to follow up new developments within the initiatives.

3.3 Data analysis

Our analytical process is schematized in Figure 2. All data were qualitatively analysed and for each developmental process (SFI foundation, practice and tool development, and practice and tool implementation) codes were assigned to following coding categories: the six activity system elements, contradictions, respondent reflections, and timeline. Based on the retrieved codes, we reconstructed the case’s developmental history. First, we defined the main contradictions within the subsequent phases of the activity systems (see 4.1), Second, we described how the case tackled these contradictions and how it contributed to the expansion of the SFI’s possibilities. From the analysis on the developmental history, we characterized accounts in which expansion took place. As these accounts reflect possible future developments of the SFI, we defined them ZPD factors. Those factors were further clustered in overarching ZPD dimensions, reflecting the specific domain in which expansion had manifested.

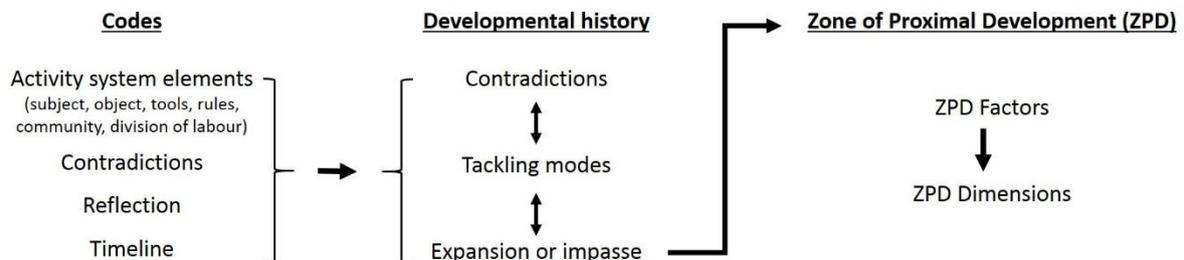


Figure 2. Analytical process: starting from codes, used to reconstruct the cases’ developmental history, which enabled us to categorize areas of expansion or impasse in ZPD factors and domains.

4 Contradictions and the way they were tackled.

Our analysis allowed us to define the crucial contradictions in Veldleeuwerik’s development. Table 2 summarizes between which activity system elements contradictions took place, the contradiction type (secondary or tertiary), a description, how the cases tried to tackle it, and how this contributed to the development of the SFI. The descriptions of the contradictions are numbered for easy referencing. We tried to give a chronological representation in the occurrence of these contradictions (e.g. as reflected in the different VL phases). However, these contradictions should not be interpreted as strictly sequential, but rather as processes that might have occurred simultaneously. Both secondary (between elements of the activity system, pictured by “II” in the tables) and tertiary contradictions were crucial in VL’s development. Secondary contradictions led to the formulation of new objects for the activity system and thus introduced a new phase in VL’s developmental history (Table 1). Tertiary

contradictions could be interpreted as naturally occurring, because the activity system's elements had realigned with the new object, but our analysis shows that they can have a major influence on future developments and expansion. We elaborate on this in following paragraphs.

Table 2. VL's main contradictions, the way VL tried to tackle them, and how it contributed to VL development.

Main contradiction	Type	Description	Tackling contradictions	Contribution to case development (E: expansion or I: impasse)
Object vs. Rules (phase 1)	II	VL1. The object of defining sustainable barley contradicted with the rule of farmers producing other crops besides barley on their farm.	- Farmers convinced VL actors to expand the subject of sustainable development from crop to farm level	- E: subject of sustainable development.
Community of practice vs Division of labour (phase 2)	II	VL2. The community of practice, lacking other suitable funding actors, contradicted with division of labour in funding VL, when its former temporal funding bodies (Provinces, EU and Brewery) stopped financing the activities.	- Set out Foundation Skylark and attract additional chain partners	- E: stakeholders involved - E: formalization of the organization - E: self-support
Object (phase 3) vs. community of practice (phase 2)	III	VL3. The object in phase 3, to test and implement the in phase 2 developed VL method for on-farm sustainable development, contradicted with the community of practice residing from phase 2, involving only farmers who contributed to the development of the VL method.	- The number of participating farmers was expanded to 45 across the province, due to the intermediary firm's connections. .	- E: participants - E: spatial spread
Community of practice vs. tools (phase 3)	II	VL4. The growing community of practices contradicted with the available tools that were not suitable to qualitatively support the growing number of farmers.	- Definition of formal participation rules and attribution of specific roles to advisors and farmers	- E: formalization of rules - E: formalization of the organization
Object vs. Division of labour (phase 3)	II	VL5. The object to implement the VL method on farms contradicted with the task package of some foundation board's members. VL6. The object to implement the VL method on farms contradicted with the task package of farm advisors facilitating the on-farm sustainable development, after their firm merged with another firm.	- Farmers threatened to leave VL. - The foundation board decided to put forward new objects focussing on growth, the development of sustainable agri-food chains, and to restore the context with society.	- E: subject of sustainable development
Object (phase 4) vs. Community of practice (phase 3)	III	VL7. The newly set object, to expand the initiative throughout The Netherlands, contradicted with the community of practice of phase 3, in which the necessary actors to achieve VL's objectives were not represented.	- Assignment of two payed people for 1 day each per week - Promised rewards for participating farmers	- E: participants - E: spatial spread - E: formalization of the organization - E: interpretation of the intended target group

		VL8. The newly set objective, to restore the social context between producers and consumers, contradicted with the community of practice, lacking societal actors.	- Successful attempts to gain support from some farmer unions, new chain actors and advisory firms. - Creation of an advisory board	- E: stakeholder involvement
Community of practice vs. Division of labour. (phase 4)	II	VL9. The community of practice, strongly growing in the number of participants, contradicted with the division of labour in the daily management group, as they were no longer able to deal with (administrative work load) related to the growing number of participants.	- The daily management group expanded to 4 full time equivalents - Regional coordinators were hired	- E: formalization of the organization
Community of practice vs Tools (phase 4)	II	VL10. The community of practice, strongly growing in the number of participants (farmers, chain actors, societal actors), contradicted with the available tools, which were not suited to guarantee a qualitative on-farm sustainable development	- Strict follow up of participation rules for farmers - Certification of the VL method - Development of new ways to guarantee knowledge exchange between the participating actors. - Automatic registration of the sustainability plan - Specifically designed training for accreditation of farm advisors	- E: formalization of rules - E: formalization of the organization - E: communication towards society
		VL11. The community of practice, strongly growing in the number of opinions regarding the VL method, conflicted with the tools of the VL method lacking measurement of actual on-farm progress.	- Decision to link 10 major ambitions for future development to the sustainability profiles of its participants.	- E: communication towards society

4.1 Phase 1: Contradictions giving shape to phase 2

In the first developmental phase, the object of defining sustainable barley contradicted with the general rule of farmers having a cultivation plan with multiple crops (VL1 in Table 2). As, at its outset, VL was financed by one of the major processors of barley, a brewery, it started with a focus on the sustainable production of this crop. However during tool development, this focus on a single crop contradicted with the rule that farmers also produce other crops besides barley on their farm. To tackle this problem, the farmers convinced the other VL actors to shift focus to the whole cultivation plan on farm level. This was possible because of the close interaction and mutual trust developed between the farmers, the intermediary firm and the brewery during collective tool development. In VL's overall development, this contributed to an expansion of the subject of sustainable development, namely from crop level to farm level. Thus, as a new object and motive was created, i.e., developing a method for on-farm sustainable development, this meant the start of developmental phase 2.

4.2 Phase 2: Contradictions giving shape to phase 3

In phase 2, a contradiction occurred between the community, lacking sufficient suitable funding partners, and the division of labour, when its former temporal funding bodies (Provinces, EU and Brewery) stopped financing the activities (VL2 in Table 2). To tackle this contradiction, four new (paying) chain partners, besides the brewery and the intermediary firm were attracted. The relationships between the involved actors were regulated by setting up the foundation "Stichting Veldleeuwerik", and additionally a new object and motive was formulated, i.e. to test and implement the jointly developed method for on-farm sustainable development during phase 2. In this foundation, new roles were attributed to new and old participants, e.g. by creating a foundation board. For participation in the VL foundation, all actor types (including farmers) had to contribute financially according to their firm size. This created equal decision-making positions between actors in the foundation board, and proved of value when the number of participants grew. Tackling this contradiction greatly influenced the overall development of VL, as it expanded the number of stakeholders (by attracting more chain partners), the degree of formalization of the organization (by setting up a foundation), and the degree of self-support (by becoming self-maintained).

Subsequently, this newly set object to test and implement the developed VL method for on-farm sustainable development, conflicted with then community residing from phase 2 (VL3 in Table 2). In this community no other farmers were involved than those that already had contributed to the development of the VL method, which made it impossible to further test it for on-farm sustainable development. To deal with this problem, the intermediary firm, having connections with a lot of farmers and chain partners, contributed an increased number of participating farmers of 45 across the province. This contributed to VL's first expansion in the number of participants and spatial spread.

4.3 Phase 3: Contradictions giving shape to phase 4

In phase 3, the growing community (of farmers and chain partners) caused a contradiction with the tools that were not suited to qualitatively support this growing number of participants (VL4 in Table 2). To deal with this issue, the participation rules changed from rather informal interactions between the involved actors towards more formal participation rules for farmers and by assigning advisors and farmers to specific farmer groups. This thus contributed to an increased level of formalization of the organization (clearly defined role division for farmers and advisors) and more strictly defined participation rules for farmers.

Later in phase 3, two issues could be interpreted as contradictions between the object and the division of labour. Both were simultaneously tackled in the same way. First, the object of phase 3 to implement the VL method on farms contradicted with the task package of some foundation board's members, who put a lot of time in negotiating about the goals and organization of the foundation. This time could not be invested in the actual implementation

of the VL method (VL5 in Table 2). Second, the object also started to contradict with the task package of the farm advisors, who facilitated the on-farm sustainable development (VL6 in Table 2). This happened after their firm merged with another firm, that lowered priority for time investment in VL. This highly influenced the advisors' motivation to perform their tasks for VL. Both contradictions resulted in diminished available time to support the participating farmers in on-farm sustainable development and diminished the activity (with farmers) in the field. This reduced activity in the field frustrated the farmers, and they threatened to leave VL if this situation would not change. This wake-up call urged the foundation board to change its ambitions, by focussing on growth (they claimed: "VL will be the most important method for arable farming in 2015"), the development of sustainable agri-food chains, and restoring the context between farmers and society. This changed object meant the start of developmental phase 4 (Table 1) and it coincided with an expanded meaning of the subject of sustainability, i.e., although the focus on sustainable development on farm level was still key, the newly set objects expanded this focus towards also setting up sustainable product chains.

Subsequently to the formulation of this new object, two issues occurred that we interpreted as contradictions between the newly set object of phase 4 and the community of phase 3. First, VL's newly set goal to grow contradicted with the community residing from phase 3, in which the necessary actors to achieve VL's goals were not present yet (VL7 in Table 2). To tackle this, the foundation board assigned two paid people for 1 day each per week to obtain these newly set goals. This contributed to VL's expansion of the organizational formalization. Further, several actions were taken to attract farmers. For example, a financial surplus for sugar beets produced by VL farmers was provided by an associated chain partner, VL farmers were allowed benefits to meet the CAP regulations, and the development of a product label for VL farmers was proposed. This reflects an expansion in focus on farmers intrinsically motivated to participate, towards farmers being externally motivated by these benefits. Both the efforts performed by the daily management and the actions taken to attract farmers, resulted in VL's quick growth since 2011. They reached a number of ca. 400 participating farmers in 2017, spread over the Netherlands. However, our interviews show that this growing number of people also induced some contradicting visions on the future of Skylark within the community (primary contradiction). Some of the participating farmers we interviewed wanted the initiative to stay small to guard quality of the process and to be able to distinguish them from the "mainstream" farmers. Contrary, the chain actors wanted VL to grow, because it is commercially beneficial for them. According to my information, this contradiction did not (yet) openly surface within VL.

Second, the newly set object, including restoration of the social context between farmers and society, contradicted with the community of phase 3, that lacked the involvement of consumers, environmental organizations, etc. (VL8 in Table 2). As a response, VL managed to gain support from some farmer unions, other chain partners (up to 60 in 2017), and advisory firms delivering farm advisors (25 in 2017). Further, an advisory board was installed to create societal support and to provide VL with advise on societal issues, such as on certification or a potential collaboration between arable farming and dairy farming. In the advisory board, several societal partners were involved that represent vested interests in the consequences of the performance of the SFI, such as farmers unions, environmental organizations, education and science, and regional water authorities. This higher embedding in society and the agri-food system, resulted in an expansion of the stakeholder involvement in VL.

4.4 Phase 4: Contradictions dealt with in phase 4

In phase 4, a contradiction arose between the strongly growing community and the divisions of labour within the daily management group (VL9 in Table 2). As a response, the daily management group expanded to four full time equivalents and regional coordinators responsible for organizing farmer meetings were hired from other firms. This further expanded VL's degree of formalization.

Further, two issues occurred that we interpreted as contradictions between the strongly growing community and the tools. A first contradiction occurred between the highly expanded community and the available tools, which could no longer guarantee a qualitative on-farm sustainable development (VL10 in Table 2). To tackle this, multiple actions were undertaken. First, to ensure qualitative sustainable on-farm development, the participation rules for farmers became more strict and a quality board was installed that acted in case of disputes about the adherence to these rules by farmers. Second, to further guarantee transparency regarding the sustainable on-farm development towards chain partners and societal actors, the VL method for on-farm sustainable development was certified. This further increased the degree of formalization. Keeping formalization as low as possible was guaranteed by farmers represented in the foundation board, and every introduction of increased formality was preceded by intense communication from the daily management group towards the participants (often in the regional discussion groups) to help them understand the necessity. Third, as the increased number of participants complicated knowledge exchange, new ways were developed to guarantee knowledge exchange between regional farmer groups across the country (e.g. regional exchange visits, newsletters, cross regional projects), between farmers and chain partners (knowledge workshops), and between participants, the foundation board and the daily management group (representation of multiple actors in several boards). Fourth, automatic registration of the sustainability plan by farmers was developed, thus creating so-called sustainability profiles, giving an overview of sustainability actions taken by farmers. Fifth, to ensure qualitative guidance of the farmers, a specifically designed training was set up to accredit involved farm advisors. All these actions contributed to a further formalization of VL. By introducing the sustainability profile of farmers, the opportunity to communicate towards society was also expanded, as it enabled to give an overview on sustainability actions taken by farmers.

A second contradiction arose between the expanded community, holding multiple actors' various visions, and the available tools, which were not able to respond to the chain partners' and consumers' demands to prove on-farm sustainable development (VL11 in Table 2). The growing number of opinions nourished the discussion on measuring on-farm progress. The initially involved farmers had a clear stance on measuring on-farm sustainable development, as they believed on-farm sustainable development is a matter of mentality change and awareness creation. Therefore, they were only interested in measuring progress if it would support farmers personally in their on-farm sustainable development. However, some newly joined actors and stakeholders favoured measuring on-farm progress to enable communication about progress made by VL farmers and VL's overall contribution to sustainable development in Dutch agriculture. Based on this discussion, the VL board decided to renew the certified VL method, and to link 10 major ambitions for future development to the sustainability profiles of its participants. This takes into account both the stance of some actors to hold minimal thresholds for farmers and the value farmers give to awareness creation and own farmer responsibility in sustainable development. At the time of writing, these ambitions are defined using a bottom-up approach, in which working groups of farmers and chain partners set out an approach, that will be fed back to the broader community during a working conference. Tackling this contradiction thus contributed to a changed meaning in how to communicate on their work towards society.

5 Factors and dimensions of expansion

Using the CHAT concepts, activity system and contradictions, helped us to understand the driving forces in VL's development. When VL's community tackled the occurring contradictions this resulted in an expansion of its possibilities. Our results show that expansion can take place on different accounts, thus reflecting multiple possible future developments in its ZPD. Based on our analysis, we found nine factors that influenced expansion (e.g. the number of participants or the meaning of the intended target group) in four overarching dimensions: socio-spatial, temporal, meaning and institutional. Figure 3 gives an overview of these ZPD dimensions and factors and on how VL expanded on this

regard. The arrows show how expansion took place, and the dotted box represents a neutral status without problems being perceived on this regard. The dimensions we defined, resemble those Pereira-Querol & Seppänen (2009) found in their research on the developmental history of an on-farm biogas production case in Brazil and the dimensions and scales Hermans et al. (2016) defined for the upscaling and outscaling of grassroots innovations based on literature research.

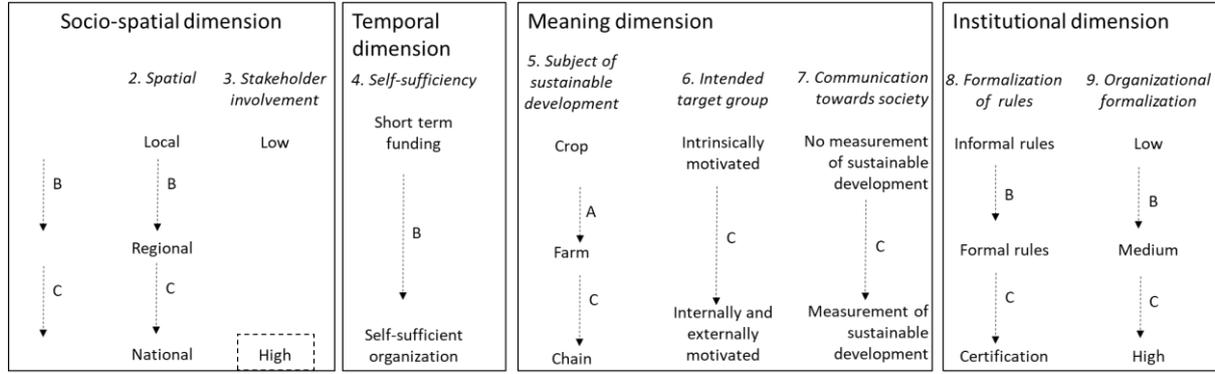


Figure 3. Developmental path in the ZPD dimensions' features of Veldleeuwerik. The letters beside the arrows refer to the developmental movements between the developmental history phases as described in Table 1. (Inspired by Hermans, Roep, & Klerkx, 2016).

5.1 Socio-spatial dimension

For VL, expansion in the socio-spatial dimension is influenced by the number of participants, the geographical distribution of the SFI, and the involvement of stakeholders. VL started with a rather small number of 10 (farmer) participants located in one province. Later, VL was characterized by two major periods of growth, after contradictions between newly set objectives and the community of the former developmental phase occurred.

Regarding the spatial expansion, VL started very local in the province of Flevoland, expanded across the province during the first period of growth, and further expanded on national scale during the second period of growth, when farmers and chain partners from all provinces in The Netherlands started to participate (2C in Figure 3).

Regarding stakeholder involvement, VL started from the close interaction between a brewery, an intermediary firm and farmers, resulting in the involvement of important stakeholders from its outset (Figure 3). This interaction was maintained throughout VL's development (e.g. in the foundation board in which mutual discussion was fostered). The involvement and mutual interactions between farmers and market actors was perceived as beneficial, because it motivated farmers to participate as *"it creates trust and hopefully coincides with a better position of the farmers towards the buyers"* (VL Farmer, 2014). Specifically, the intermediary firm's connections played an important role in both the communication between farmers and chain partners and the attraction of new farmers and chain partners at VL's earlier phases. Later, the ambition to set up sustainable product chains and to restore the social context between farmers and society, boosted the stakeholder involvement even more. The important role of intermediaries, defined as *"organizations working between social interests"* (Hansen and Coenen, 2015), to mobilize heterogeneous groups of actors, is also recognized by other scholars, for example in research on sustainability transitions (Hodson and Marvin, 2010; Hansen and Coenen, 2015)

5.2 Temporal dimension

The temporal dimension refers to factors influencing the longevity of the SFI, which mainly relates to the way the SFI is funded. VL shows that project funding is an easy way to start an initiative, but can also inhibit to find a self-supporting way to operate. Eventually, VL succeeded in developing a self-supporting organization, by asking contributions from all

participating actors (i.e., farmers, chain partners and advisory firms) according to their firm size.

5.3 Meaning dimension

This dimension is related to the changed meaning of concepts (the subject of sustainable development) and goals (the intended target group and communication towards society) occurring during SFI development. In their research on the scale dynamics of grassroots innovations, Hermans et al. (2016) argued that new opinions in a growing initiative can take its development in a different or opposing direction from what has been the initial ambition of pioneering actors.

The expansion of VL's subject of sustainable development, coincided with the decision to broaden the scope from barley to the whole farm. This opened perspectives to involve other food processors besides the brewery, which manifested in phase 3 (Table 1). In Phase 4, the subject expanded even more, when VL's objectives broadened towards the construction of sustainable product chains.

Further, our analysis shows a shift regarding the proposed motivation of the target participants. In the beginning, VL tended to focus on farmers that were intrinsically motivated to sustainably develop their farms, without other benefits or rewards being attributed to their participation. However, in their pursuit to attract more farmers, VL included rewards in participation, thus also appealing to externally motivated farmers, e.g.. a financial surplus for sugar beets produced by VL farmers and advantages for VL farmers to meet the CAP regulations in phase 4 (6C in Figure 3).

Further, meanings shifted in how to communicate towards society when the variety in actors and stakeholders increased. The initially involved farmers had a clear stance on measuring on-farm sustainable development (**Σφάλμα! Το αρχείο προέλευσης της αναφοράς δεν βρέθηκε.**Figure 3). As they believed on-farm sustainable development is a matter of mentality change and awareness creation, they did not value measuring and communicating progress on this account. However, when the link with the market and society was explicitly made in VL's fourth developmental phase, they felt urged by stakeholders to provide results about their activities and searched for ways to "measure" achieved progress.

5.4 Institutional dimension

VL's institutional dimension is influenced by the formalization of participation rules and the organization. We define formalization as the increased structure in role and task assignments, and roles and procedures that one has to be adhere to. We found that formalization is related to a growing number of participants. Provan and Kenis (2007) recognized that as the number of participants increases and the level of mutual trust and goal consensus declines, networks benefit from having a separate administrative entity to govern the network and its activities, such as VL's daily management group. Further, Matopoulos et al. (2007) recognized that the lack of suitable tools negatively influences information exchange and collaboration between collaborating supply chain actors when the number of companies increases.

VL shows that farmers tend to dislike the administrative load accompanied with formalization. Therefore, formalization grew gradually by adjusting the tools to deal with the growing number of participants. Formalization took a first step with the creation of Foundation Skylark. Later, in Phase 4, several governing bodies were created, e.g. a daily management group of paid employees, to manage VL's activities in the growing community. Further, the issue of the lacking suitability of the tools for the growing community, was tackled by the constant mutual involvement of all actor types (through the various governance boards, such as the advisory board, a participant board representing both farmers and chain partners) and ad hoc working groups), often facilitated by the daily management, in the creation of suitable

tools to guarantee the quality of the on-farm sustainable development process, the intra-organizational knowledge exchange and communication towards society.

6 Conclusion

This paper shows how the state of a sustainable farming initiative (SFI) on a given moment in time can be understood by scrutinizing its developmental history, using Cultural-Historical Activity Theory. We investigated the Dutch SFI Veldleeuwerik, by defining it as an activity system, and investigating the internal contradictions that occurred during its history and the way participating actors dealt with these contradictions. Our results show how the SFI expanded during its development in four dimensions: the socio-spatial, temporal, meaning and institutional dimension. These expansions indicate that the development of an initiative can benefit from: (i) intermediary actors, with a wide network, to attract and facilitate the communication between farmers and chain partners; (ii) the development of a self-supporting organization to which all partners financially contribute, which adds to equal positions within governance boards; (iii) the gradual development of the initiative, guided by stakeholder and farmers representation and involvement in the initiative and its governing bodies, e.g., to overcome internal contradictions, for the meaning making of the initiative's goals, concepts, and communication strategies, and for the development of new tools and rules; and (iv) regular adjustment of tools and instruments to the changing number of participants.

7 References

- Beers, P. J., B. van Mierlo and A.C. Hoes (2016) Toward an Integrative Perspective on Social Learning in System Innovation Initiatives. *Ecology and Society* 21(1).
- Biesta, G. (2009) Good education: What it is and why we need it. Inaugural Lecture. *The Stirling Institute of Education* 12.
- Bui, S., A. Cardona, C. Lamine, and M. Cerf (2016) Sustainability transitions: Insights on processes of niche-regime interaction and regime reconfiguration in agri-food systems. *Journal of Rural Studies* 48: 92–103.
- De Vente, J., M. Reed, L. Stringer. S., Valente and J. Newig (2016) How does the context and design of participatory decision-making processes affect their outcomes? Evidence from sustainable land management in global drylands. *Ecology and Society* 21(2): 24.
- Engeström, Y. (1987) *Learning by expanding: An activity-theoretical approach to developmental research*. Helsinki: Orienta-Konsultit 269
- Engeström, Y. (2001) Expansive Learning at Work: Toward an activity theoretical reconceptualization. *Journal of Education and Work* 14(1): 133–156.
- Engeström, Y. (2009) Expansive learning Toward an activity-theoretical reconceptualization. In: K. Illeris (Ed.) *Contemporary theories of learning*. New York: Routledge, pp. 53–73.
- Engeström, Y., and A. Sannino (2010) Studies of expansive learning: Foundations, findings and future challenges. *Educational Research Review* 5(1): 1–24.
- Hansen, T. and L. Coenen, (2015) The Geography of Sustainability Transitions: Review, Synthesis and Reflections on an Emergent. *Environmental Innovation and Societal Transitions* 17: 92–109.
- Hermans, F., D. Roep, and L. Klerkx (2016) Scale dynamics of grassroots innovations through parallel pathways of transformative change. *Ecological Economics* 130: 285–295.
- Hodson, M. and S. Marvin. 2010. Can cities shape socio-technical transitions and how would we know if they were? *Research Policy* 39(4): 477–485.

- Kilelu, C. W., L. Klerkx and C. Leeuwis (2013) Unravelling the role of innovation platforms in supporting co-evolution of innovation: Contributions and tensions in a smallholder dairy development programme. *Agricultural Systems* 118: 65–77.
- Klerkx, L., N. Aarts and C. Leeuwis (2010) Adaptive management in agricultural innovation systems: The interactions between innovation networks and their environment. *Agricultural Systems* 103(6): 390–400.
- Matopoulos, A., M. Vlachopoulou, V. Manthou and B. Manos (2007) A conceptual framework for supply chain collaboration: empirical evidence from the agri-food industry. *Supply Chain Management: An International Journal* 12(3): 177–186.
- Miedema, W. G. (2008) *Leren van Innoveren Wat en hoe leren docenten van het innoveren*. University of Amsterdam.
- Moschitz, H., D. Roep, G. Brunori, and T. Tisenkopfs (2015) Learning and Innovation Networks for Sustainable Agriculture: Processes of Co-evolution, Joint Reflection and Facilitation. *The Journal of Agricultural Education and Extension* 21(1): 1–11.
- Mukute, M. (2009) Cultural historical activity theory, expansive learning and agency in permaculture workplaces. *Southern African Journal of Environmental Education* 26: 150–166.
- Mukute, M. and H. Lotz-Sisitka (2012) Working With Cultural-Historical Activity Theory and Critical Realism to Investigate and Expand Farmer Learning in Southern Africa. *Mind, Culture, and Activity* 19(4): 342–367.
- Pahl-Wostl, C. (2006) The importance of social learning in restoring the multifunctionality of rivers and floodplains. *Ecology and Society* 11(1).
- Pereira-Querol, M. A. (2011) *Learning Challenges in Biogas Production for Sustainability*. *Educational Sciences*. University of Helsinki.
- Pereira-Querol, M. A. and L. Seppänen (2009) Learning as changes in activity systems: The emergence of on-farm biogas production for carbon credits. *Outlook on Agriculture* 38(2): 147–155.
- Provan, K. G., and P. Kenis (2007) Modes of Network Governance: Structure, Management, and Effectiveness. *Journal of Public Administration Research and Theory* 18(2): 229–252.
- Restrepo, M. J., M. Lelea, A. Christinck, C. Hülsebusch and B. Kaufmann (2014) Collaborative learning for fostering change in complex social-ecological systems: a transdisciplinary perspective on food and farming systems. *Knowledge Management for Development* 10(3): 38–59.
- Seppänen, L. (2002) Creating tools for farmers' learning: An application of developmental work research. *Agricultural Systems* 73: 129–145.
- Seppänen, L. (2004) *Learning Challenges in Organic Vegetable Farming. An Activity Theoretical Study of On-Farm Practices*. Thesis: University of Helsinki, 74
- Vänninen, I. (2012) *Change laboratory for supporting collaborative innovation and transformative agency in primary production*. Thesis: Lappeenranta University of Technology, 152
- Vänninen, I., M.A. Pereira-Querol and Y. Engeström (2015) Generating transformative agency among horticultural producers: An activity-theoretical approach to transforming Integrated Pest Management. *Agricultural Systems* 139: 38–49.
- Virkkunen, J., and K. Kuutti (1999) Understanding organizational learning by focusing on “activity systems.” *Accounting, Management and Information Technologies* 10: 291–319.