# The Evolution of Participatory Approaches for Agricultural Development: FPR and FFS

Master Thesis

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# The Evolution of Participatory Approaches for Agricultural Development: FPR and FFS

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Image on front page: Farmer Field School Malawi – Farmers Review Africa
https://farmersreviewafrica.com/world-neighbors-expands-its-work-to-malawi/malawi-farmer-field-school/

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Enjoy reading!

## Abstract

Agricultural development is generally acknowledged as the primary solution to poverty reduction. Since the 1980s, more participatory approaches have been developed to also reach the poor smallholder farmers in sub-Saharan Africa. But even after years of experience in agricultural technology transfer, uncertainty on how to provide technical aid to positively impact agricultural development in Africa still prevails among NGOs today. In order to simplify decision-making about the use of agricultural participatory approaches, the objective of this thesis is to analyze how the two last developed participatory approaches, namely: farmer participatory research (FPR) and the Farmer Field School (FFS), operate as modes to transfer technology. In this comparative analysis, the focus lies on the type of technology transfer, the level of participation, and andragogical principles. It was found that FPR and FFS both moved away from the material transfer of technology. FPR emphasizes the transfer of designs for new technologies through collaborative research between farmers and researchers. FFS takes it a step further and focuses on the transfer of capacity through participatory, experiential learning. Here, the level of farmer participation in the needs and opportunity assessment and research and development stage is also higher than in FPR, namely, collegial instead of collaborative. For the learning process, FFS builds on andragogical principles, taking into account farmers' self-concept, experiences, readiness to learn, orientation to learning, and motivation. When analyzing 100WEEKS' LI-program, it was discovered that some aspects of the FFS approach are still being used in recently developed development programs. Just like FFS, the LI-program stimulates participatory, experiential learning, but the topics covered during the training are chosen without consulting the farmers. The LI-program is thus only based on some of the andragogical principles.



Keywords: Participatory Agricultural Approaches, Sub-Saharan Africa, Transfer of Technology, Andragogy, 100WEEKS

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# List of acronyms

***AESA*** Agro-ecosystem Analysis

***FAO*** United Nations Food and Agriculture Organization

***FFS*** Farmer Field School

***FPR*** Farmer Participatory Research

***FSR*** Farming Systems Research

***HIV*** Human Immunodeficiency Virus

***HYV*** High-yielding Variety

***ICM*** Integrated Crop Management

***IPM*** Integrated Pest Management

***IPPM*** Integrated Production and Pest Management

***ITK*** Indigenous Technical Knowledge

***IWSM*** Integrated Water and Soil Management

***LI*** Living Income

***NGO*** Non-Governmental Organization

***SDG*** Sustainable Development Goal

***SSA*** Sub-Saharan Africa

***ToT*** Transfer of Technology

***T&V*** Training and Visit (System of Agricultural Extension)

***VSLA*** Village Savings and Loan Association

# 1. Introduction

## 1.1 Background

In September 2015, all member states of the United Nations adopted the 2030 Agenda for Sustainable Development with its seventeen Sustainable Development Goals (SDGs). The first of these SDGs is the goal to end poverty in all its forms everywhere (United Nations, 2015). Unfortunately, despite the efforts of the international community, the number of people who live in extreme poverty, which means they are surviving on less than US$1.90 a day (United Nations, n.d.), has increased rather than decreased in the last few years. The first rise in extreme poverty since 1998. One of the main drivers of this increase, according to the Sustainable Development Goals Report (2022), is the recent COVID-19 pandemic. COVID-19 has erased more than four years of steady progress against poverty. Rising inflation and the impacts of the war in Ukraine may hinder progress even further. The combined crises could result in 676.5 million people living in extreme poverty in 2022. This would mean an additional 95 million people compared to pre-pandemic forecasts.

Approximately 80 percent of these extreme poor live in rural areas and most of them rely directly or indirectly on agriculture, forestry, fisheries, and related activities for their livelihoods (Anríquez & Stamoulis, 2007; The World Bank, 2021; Waddington, et al., 2014). Since these people benefit significantly more from agricultural growth than from growth in other sectors of the economy, agriculture development is generally acknowledged to be the primary solution to poverty reduction (Anríquez & Stamoulis, 2007; Sikander, et al., 2021; Waddington, et al., 2014). Over the years, different approaches to agricultural development have been used. A well-known example is the adoption of modern technologies, such as high-yielding variety seeds and mechanized farm tools, during the Green Revolution in the 1960s and 1970s (John & Babu, 2021; Otsuka & Muraoka, 2017). However, it turned out that those technologies were based on Western intensive cultivation methods and were not appropriate for every situation. Particularly poor farmers in marginal and rain-fed areas of sub-Saharan Africa practicing complex, diverse, and risk-prone agriculture were left behind. That is why, since the 1980s, the approach has drawn increasingly on more participatory approaches in order to reach rural smallholder farmers (Waddington, et al., 2014).

Since then, many agricultural participatory approaches have been developed. Some have been drawn from a wide range of nonagricultural contexts and were adapted to new needs. Others are innovations arising out of situations where practitioners have applied the approaches in a new setting (Pretty, 1995). Among these approaches are participatory rural appraisal (Chambers, 1994b), farming systems research (Norman, 1978), farmer participatory research (Farrington & Martin, 1988), and the Farmer Field School (Röling & van de Fliert, 1994). These are all closely related approaches that aim to disseminate agricultural technologies through farmer participation. But even after years of experience in agricultural technology transfer, uncertainty on how to provide technical aid to positively impact agricultural and rural development in Africa still prevails among NGOs today (Mgendi, Shiping, & Xiang, 2019), and new training methods are still being developed. An example of such an NGO is 100WEEKS, which developed a program for smallholder farmers in SSA to help them establish sustainable livelihoods (100WEEKS, n.d.). The aim of this research is to help NGOs, like 100WEEKS, in the process

of choosing an effective agricultural participatory approach to provide technical aid to smallholder farmers in SSA.

## 1.2 Research objective and questions

As mentioned in the previous paragraph, this research aims to simplify NGOs' decision-making about the use of already existing agricultural participatory approaches to provide technical aid to smallholders in SSA and to prevent them from adopting a less-preferable approach or having to come up with one all by themselves. Based on the assumption that the lack of a clear overview of the different agricultural participatory approaches leads to NGOs' uncertainty on how to provide technical aid, the research objective is to contribute to a better overview of the different agricultural participatory approaches. A second assumption is that an analysis of the two last developed agricultural participatory approaches will also cover some of the previously developed agricultural participatory approaches that were or were not mentioned in the introduction, since the approaches evolved over time as they were applied in new settings. By checking the dates of the first articles published about the various approaches on Google Scholar, the farmer participatory research approach and the Farmer Field School approach were found to have emerged last. And thus, the following research question was created:
*How do farmer participatory research and the Farmer Field School approach operate as modes to transfer technology to improve agricultural practices in SSA?*

In order to answer this question, the following sub-questions (SQ) were formulated:
*SQ 1: When were both approaches developed and with what objective?*
*SQ 2: What are the characteristics of the two approaches?*
*SQ 3: How are the approaches applied in newly developed development programs?*

When analyzing how both approaches operate, emphasis was placed on the type of technology transfer and the level of farmer participation aimed for, and thirdly, on the andragogical principles followed. The next chapter will elaborate on these concepts before the answers to the questions are presented. Chapter 3 describes the origins and emergence of both approaches. This answers the first sub-question. In Chapter 4, an answer is given to the second sub-question by zooming in on the key elements of the Farmer Field School[1]. The fifth chapter is a comparative analysis of the Living Income program from 100WEEKS and the FFS approach[2] to see how (elements and/or principles of) the FPR and FFS are applied in newly developed development programs. This provides an answer to the third sub-question. Based on these chapters, a conclusion is drawn and presented in Chapter 7 and the discussion is in Chapter 6.

## 1.3 Methodology

This research aims to simplify NGOs' decision-making about the use of already existing agricultural participatory approaches to provide technical aid to smallholders in SSA and to prevent them from

[1] During the research, it was discovered that farmer participatory research is not as concrete as FFS. Therefore, this sub-question could not be answered for FPR.
[2] Again, the choice was made to no longer focus on the FPR but only on the FFS, since this approach focuses on training farmers. This will be explained in more detail later in this thesis.

adopting a less-preferable approach or having to come up with one all by themselves. In order to support NGOs in their decision-making process, this thesis is designed as a descriptive and comparative study to assess how farmer participatory research and the Farmer Field School approach operate as modes to transfer technology to improve agricultural practices in sub-Saharan Africa. A number of methods are used in this study, which will now be discussed.

*Semi-systematic literature review*

The aim of Chapters 3 and 4 of this thesis was to create a clear overview of the origins, main objectives, and characteristics of FPR and FFS. According to Snyder (2019), a literature review is the best data collection method for this goal. In her article, Snyder distinguishes three broad types of commonly used review methods: systematic, semi-systematic, and integrative review approaches. The method applied in this research is similar to what she calls the semi-systematic review. As the word semi indicates, this type of review method partially follows the systematic approach to identify, select, and analyze relevant literature but does not fulfill all criteria. A semi-systematic review may have some flexibility in terms of the search strategies used, inclusion and exclusion criteria, and data extraction methods. It can be used, for example, to provide a historical overview of a specific topic, identify research gaps, or simply discuss a particular matter. For this semi-systematic literature review, peer-reviewed articles and book chapters were collected from Google Scholar and the online WUR Library. In some cases, when using the Google Scholar database, an institutional login was required to get access to the full version of the article. Usually, the WUR login credentials were sufficient, but some journals could not be accessed. Whenever this was the case, I tried to find the articles in the online library of the UvA (Universiteit van Amsterdam), for which I had received, very generously, the login information from a friend who studied there. The only exclusion criterion was the language of the article; as I only speak English and Dutch, publications in other languages were excluded since translating them would have been too time-consuming. No time constraints were applied for the collection of relevant articles to ensure a comprehensive literature search. However, I did focus on the older articles first, since it was possible that the approaches had changed over time as they were adapted to new needs or applied in a new setting. Thus, the older articles were considered to be more relevant, as the description of the approach would be closer to how it was originally intended.

A number of queries were used to search for relevant articles. The queries included the following keywords, singularly and in various combinations, first of all: ‘Farmer Participatory Research’ AND/OR ‘Farming Field School’ OR ‘FFS’. Since the focus was on technical aid for smallholder farmers in SSA, ‘Sub-Saharan Africa’ OR ‘SSA’ was occasionally added to the search string, but this was not necessary when looking for general information about the approaches, such as the emergence. Other queries used were ‘transfer of technology’ OR ‘technology transfer’, ‘agricultural extension, and ‘andragogical principles’ OR ‘andragogy’. In addition to literature found using these search queries, both backward and forward snowballing were employed to find relevant articles. Backward snowballing refers to using the citations in and reference list of the paper examined to identify additional relevant papers to include. Forward snowballing refers to identifying new papers based on where the paper being examined is actually cited (Wohlin, 2014). The titles, abstracts, introductions, and/or conclusions of the found articles were screened to assess their relevance. Relevant articles were saved and used as a basis for Chapters 3 and 4.

*Case study*

The aim of Chapter 5 is to see how (elements and/or principles of) the agricultural participatory approaches are applied in newly developed development programs and, with that, provide an answer to the third sub-question. Therefore, the Living Income program from NGO 100WEEKS was analyzed and compared to the FFS approach. This program was chosen because it focuses on supporting smallholder farmers in sub-Saharan Africa. Furthermore, it was also known that the organization had been struggling with how to design the training program; therefore, using them as a case could also turn out to be beneficial to them as well. A case study approach was chosen for this analysis, as this enables the researcher to generate an in-depth understanding of the research subject in its real-life context (Crowe, et al., 2011; Tomaszewski, Zarestky, & Gonzalez, 2020). The data required for this case study was primary data that was gathered through several data collection tools or methods. First of all, the website from 100WEEKS was used to find the general information used in the introduction of the chapter. Like the goal of the organization and how they try to achieve it. Secondly, their training manual, which is gray literature, was used for specific information about the LI-program. Some topics were not explained in these sources, for example, the level of participation of the local farmers in the design of the program. Therefore, a personal interview with the regional head of programs from 100WEEKS, who designed the LI-program, was conducted in order to fill in the gaps. The interview was semi-structured since this type of research method can be useful to explore "puzzles" that emerge (or remain) after analyzing findings (Adams, 2015). The interview guide can be found in the Appendix on page 36. As visible here, the topics discussed were the modules and topics, participation, coaches, and other. The interview was divided into thirteen predetermined questions, in some cases accompanied by follow-up questions. Because the interview was conducted in Dutch, the guide was originally written in Dutch but, for this purpose, translated into English. The interview was conducted via Microsoft Teams, which enables easy recording. Thanks to the recording, the interview could be transcribed.

# 2. Conceptual Framework

The two agricultural participatory approaches will be described and analyzed using different concepts, which are elaborated on below.

## 2.1 Transfer of technology

Farmer participatory research and the Farmer Field School are two different approaches with the same goal, namely, the transfer of technology (ToT). ToT is the process of disseminating technology from the places where it was generated to users in other places (Koutsouris, 2017). This process began long before the development of FPR and FFS. A well-known example is the transfer of crops, animals, equipment, and husbandry techniques between the Old and New Worlds during the Columbian Exchange (Nunn & Qian, 2010). Back then, dissemination was mainly a byproduct of travel, exploration, and communication undertaken primarily for other reasons (Ruttan, 1975). From the early 20$^{th}$ century, the process no longer only involved the diffusion of supplies and practices but also the transfer of knowledge and skills, as well as the development of the capacity to use and adapt the technology (Ayanlade, et al., 2022; Ruttan, 1975). Ruttan (1975) and Ruttan and Hayami (1973) distinguish three types of agricultural technology transfer: (a) material transfer, (b) design transfer, and (c) capacity transfer.

*Material transfer* is the direct transfer or import of new materials, e.g., seeds, plants, animals, machinery, and the practices or techniques associated with these materials. The recipients are merely passive consumers of the results of knowledge produced by others that they cannot reproduce. Local adaptation is not conducted in an organized manner; instead, farmers' trial and error is mostly responsible for the "naturalization" of the transferred materials.

*Design transfer* is the transfer of information in the form of blueprints, formulas, books, etc. As part of this kind of transfer, plant materials or prototype machines are imported for testing purposes, to obtain genetic materials, or to slightly modify their designs to adapt them to local ecological conditions or to different tasks rather than for their own use. Thus, the recipients are able to domestically produce the materials that were formerly imported.

*Capacity transfer* is primarily the transfer of scientific knowledge and skills rather than technologies themselves or designs for them. The objective is to create indigenous capacity for the development of technology. As local agricultural science and engineering capacity is strengthened, technologies are invented that are precisely adapted in order to meet the local ecological conditions. An important feature in the process of international capacity transfer is the migration of (agricultural) scientists.

## 2.2 Extension and andragogical principles

As mentioned in the previous paragraph, the transfer of technology has undergone a paradigm shift. Whereas the primary aim of material transfer was the straightforward adoption of standardized, prescribed technologies, capacity transfer centers on people and the dissemination of technical knowledge and skills rather than technologies (Van de Fliert, 2003). A commonly used concept in this context is "extension". Although many people consider extension and transfer of technology as one and the same, Rao and Van den Ban (2012) argue that

> "Extension is concerned mainly with education of farmers on management of resources and decision-making skills, which may contribute to technology transfer. Hence, it is necessary to

> understand that the focus of extension is on education of the farmers rather than supply of technical inputs and services" (Rao & Van den Ban, 2012, p. 842).

In the 1970s, Malcolm Knowles distinguished adult education from child education. He emphasized the fact that adults do not learn in the same way as children. Unlike children, who are often dependent learners, ready to learn whatever society says they ought to learn, under conditions of compulsory attendance, adults are much more self-directed, experienced, and almost always voluntary learners. They are ready to learn something when they experience a need to learn it, and they simply disappear from learning experiences that do not satisfy them. In addition, adults attach more meaning to lessons they gain from experience as opposed to children, who frequently act as passive recipients of others' expertise. Accordingly, experiential techniques like experiments and discussions are fundamental in adult education to fully understand and utilize information (Anurugwo & Mbara, 2019; Knowles, 1980). The art and science of helping adults to learn was given the name andragogy. Etymologically, this term was derived from two Greek words: ἀνδρ- (andr-), meaning "man" and ἀγωγός (agogos), meaning "leading/guiding". Thus, andragogy literally means "leading man". In contrast to pedagogy, which can be traced back to the Greek word παιδί, meaning "child" (Anurugwo & Mbara, 2019; Knowles, 1980; Olofu & Patrick, 2021).

Since agricultural extension is aimed at helping farmers, who are adults, to develop their skills, it is only logical that it adheres to the basic andragogical principles. Knowles' assumptions about the characteristics of adult learners resulted in the following six principles of andragogy:

(1) The need to know

Adults need to understand why it is important to know or do something before learning it. They want to know why they should undertake a learning project and what advantages and disadvantages there are to acquiring and not acquiring this new knowledge (Anurugwo & Mbara, 2019; Ebun-Cole, 1992; Holton, Swanson, & Naquin, 2001).

(2) Self-concept

As people mature, their self-concept evolves from that of a dependent personality toward that of an autonomous and self-directed individual. Adults believe they are capable of making their own decisions and facing the consequences. They also have a strong psychological desire to be acknowledged by others as being self-directing. When they are told what to do and how to think as if they were dependent children, frustration and resistance often occur. Therefore, the teacher's responsibility is to engage in a process of mutual inquiry with adults rather than to use the transmittal techniques so prominent in youth education (the lecture, assigned readings, etc.) (Ebun-Cole, 1992; Holton, Swanson, & Naquin, 2001; Knowles, 1980; Yusuf, 2021).

(3) The role of experience

Because of their older age, adults have a significant volume of experience under their belts. Accordingly, a group of adults will have a more diverse background than a group of children. Therefore, emphasis should be placed on personalized teaching and learning strategies. These experiences also make adults themselves the richest resources for many types of learning. This again demonstrates why the emphasis in andragogy has shifted from the transmittal techniques toward the more participatory

experiential techniques that draw on the learners' experiences (group discussions, simulation exercises, problem-solving activities, etc.) (Anurugwo & Mbara, 2019; Ebun-Cole, 1992; Holton, Swanson, & Naquin, 2001; Knowles, 1980; Yusuf, 2021). Lastly, adults also derive their identity from their experiences. Because adults define themselves largely by their experience, they have a deep investment in its value. When their experiences are ignored or devalued, it is not only a rejection of their experiences, but they also feel rejected as persons (Ebun-Cole, 1992; Knowles, 1980).

(4) Readiness to learn

In order for adults to learn, the time should be right. The developmental tasks of adults' social roles (e. g., becoming a worker, a spouse, a parent, etc.) determine their readiness to learn. In other words, adults are typically ready to learn when they experience the need to cope with a real-life situation. Therefore, it is important to synchronize learning activities related to a particular developmental task with the relevant developmental stage (Anurugwo & Mbara, 2019; Ebun-Cole, 1992; Holton, Swanson, & Naquin, 2001; Knowles, 1980). The teacher can also stimulate learners' readiness to learn by inviting them to think ahead and envisage how the course contents and materials will apply to their lives (Yusuf, 2021).

(5) Orientation to learning

To a child, education is essentially the accumulation of a reservoir of knowledge and skills that might be useful later in life. They tend to have a subject-centered orientation to learning. Adults, on the other hand, generally tend to approach most of their learning with the expectation of immediate application. Adults' orientation to learning is life-centered or problem-centered. They see education as a process of improving their ability to cope with the life problems they face now and to achieve their full potential (Ebun-Cole, 1992; Holton, Swanson, & Naquin, 2001; Knowles, 1980).

(6) Motivation

The more motivated someone is to participate in learning, the more likely he or she is to learn and retain information. Although adults are responsive to some external motivators (better jobs, promotions, higher salaries, etc.), adult learners' motivation is internal rather than external. Curiosity, the desire to grow, the need to tackle a specific problem, and the satisfaction of accomplishment are all examples of internal motivators (Holton, Swanson, & Naquin, 2001; Yusuf, 2021). Adults' motivation to continue growing and developing is easily blocked by barriers such as a negative self-concept or a lack of opportunities or resources. Therefore, the attitude of the teacher should be positive and encouraging (Anurugwo & Mbara, 2019; Ebun-Cole, 1992).

## 2.3 Participation

Simply put, "participation" refers to the action of taking part or becoming involved in something (Cambridge Dictionary, n.d.). From a democratic perspective, participation is a citizen's right. Citizens should be able to at least act with the intention of influencing decisions that will affect them, their families, and their communities (Fiorino, 1990; Middendorf & Busch, 1997; Verba, 1967). In the case of agricultural participatory approaches, this means that farmers could be involved in the generation, evaluation, and/or dissemination of agricultural technologies. "Could", because participation can take on multiple forms and serve many different interests. As mentioned in the introduction, participation

has become a very popular concept in development programs since the 1980s (Aref, 2011; Waddington, et al., 2014). It was such a fashion that almost everyone in development adopted it as part of their work, but with different and sometimes contradictory motivations and objectives (Pretty, 1995). As a result, participation is a "buzzword", a term that embraces a wide range of possible meanings and diverse understandings about how it should be used and practiced (Leventon, et al., 2022; White, 1996).

To clarify the concept of participation, a number of scholars (Arnstein, 2019; Pretty, 1995; Probst, et al., 2003; White, 1996) have formulated typologies and "ladders" that outline different levels of participation. The types of participation range from more manipulative nominal forms to transformative forms. In the first case, decisions have already been made and people are told what is to happen only because the organization is seeking legitimization of its decisions. Chambers (1994a) compares this type of participation with a cosmetic label; it is used to make whatever is proposed appear good. A transformative form of participation, on the other hand, describes a process that is empowering and enhances local people's capacity for self-directing innovation development. In this case, people decide and act for themselves, largely independent of external institutions.

When looking at the participation of farmers in the two chosen approaches, I will be using the somewhat newer typology constructed by Johnson, Lilja, and Ashby (2003), as this classification talks especially about the relationship between scientists (which include outside agencies, extension systems, or formal research agencies) and farmers. The typology is used as a guideline to indicate change, not to categorize. The five types of participation created by Johnson, Lilja, and Ashby are:

(1) Conventional: scientists are all-powerful. They make the decisions alone, without organized communication with farmers.
(2) Consultative: scientists make the decisions alone, but with organized communication with farmers. Scientists know about farmers' opinions, preferences, and priorities through organized one-way communication with them. Scientists may or may not let this information affect their decisions. Decisions are neither made with farmers nor delegated to them.
(3) Collaborative: decision-making authority is shared between farmers and scientists and involves organized communication among them. Scientists and farmers know about one another's opinions, preferences, and priorities through organized two-way communication. The decisions are made jointly; neither scientists nor farmers make them on their own. No party has the right to revoke the shared decision.
(4) Collegial: farmers make the decisions individually or collectively in a group process while they are involved in organized communication with scientists. Farmers know about scientists' opinions, preferences, proposals, and priorities through organized one-way communication. Farmers may or may not let this information affect their decision.
(5) Farmer experimentation: farmers make the decisions individually or in a group without organized communication with scientists.

Figure 1 provides an overview of all five types of participatory research. Although conventional research is part of the typology, it is not an example of participatory research since farmers are not involved in the process; they only act as research subjects.

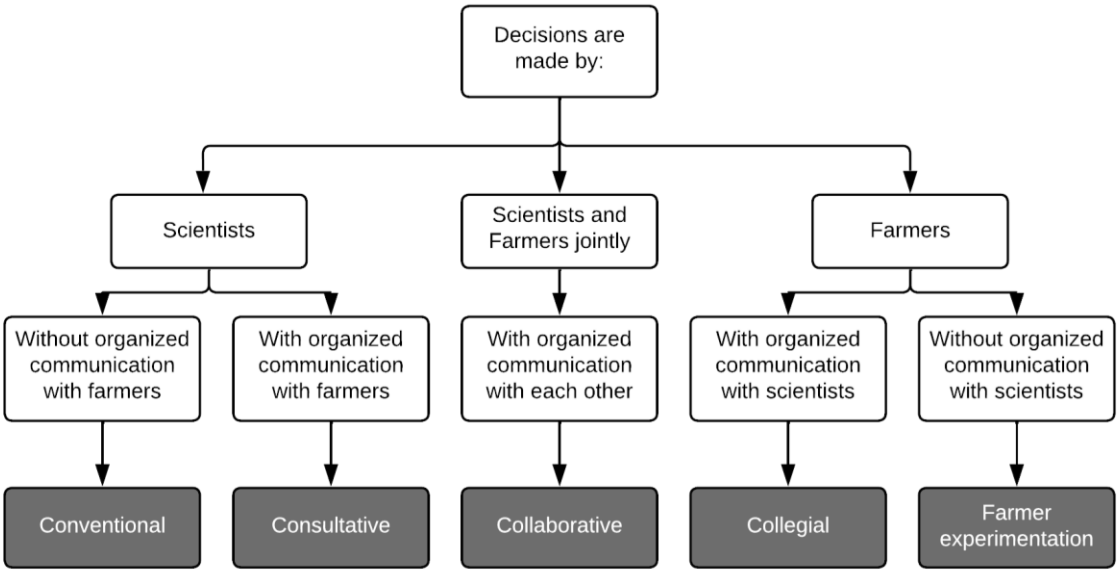


***Figure 1:*** *Types of Participatory Research Based on Locus of Decision-making (adapted from Lilja & Ashby (1999))*

# 3. Origins and emergence of the approaches

In this chapter, the origins and emergence of both approaches are discussed. The first part of the chapter shows how farmer participatory research arose as a response to the shortcomings of previous approaches to technology transfer. It is written in chronological order and starts with the predominance of the traditional transfer-of-technology model. The second part of this chapter describes that the Farmer Field Schools were introduced as a response to problems associated with the Green Revolution. Although the FFS underwent fewer evolutions before the final approach was developed, its emergence and spread are also recounted chronologically.

## 3.1 Origins and emergence of farmer participatory research

*The traditional transfer-of-technology model*

Farmer participatory research emerged in the 1990s as a response to the failures of previous approaches to transfer technology. From the 1950s until the 1980s, the traditional transfer-of-technology model was predominant in sub-Saharan Africa (Hulme, 1992; Ponzio, Gangatharan, & Neri, 2013; Selener, 1997). In this top-down model, agricultural technologies are developed by researchers at research stations and passed on to extension services for dissemination among farmers. Researchers believed these packages of practices to be perfect and that they would help farmers achieve the same level of productivity achieved on the research stations. However, smallholder farmers' uptake of these technologies was low (Glover, 2009; Ponzio, Gangatharan, & Neri, 2013; Selener, 1997). There are a number of explanations for the low adoption rates. First of all, it is possible that the farmers did not trust foreign initiatives because of their colonial past (Bulte, Richards, & Voors, 2018; Shiferaw, Hellin, & Muricho, 2011). In the 1980s, the sub-Saharan countries – with exception of Ethiopia and Liberia which were never colonized – had only just recently gained their independence (Sylvester, 2005). With their exploitation still fresh in minds, it is not surprising that the smallholder farmers were suspicious of the promoted practices and therefore did not apply them. Another explanation for the low adoption rates is that the technologies that are "perfected" at these stations generally facilitate increased productivity and profitability for the larger, better-endowed farmers but turned out to be inappropriate for the small, resource-poor farmers. Reason for this is that the conditions under which resource-rich farmers farm are comparable to those of the research station, while the farming and living conditions of resource-poor farmers are much more complex (Chambers & Jiggins, 1987; Selener, 1997). They, for example, have less control over physical conditions (flat land, irrigation), less access to inputs (improved seeds, fertilizers, pesticides, draught power), and different priorities (family first, crops for sale second, risk reduction) (Chambers & Jiggins, 1987). Because researchers failed to recognize the farmers' diverse contexts, they came to conclude that the smallholder farmers were backward or ignorant and that the key to success lay in improving the extension service. Thus, the traditional transfer-of-technology model was modified into the Training and Visit System of Agricultural Extension (Ponzio, Gangatharan, & Neri, 2013; Selener, 1997).

*The Training and Visit System of Agricultural Extension*

The Training and Visit System of Agricultural Extension, which was shortened to the T&V system, was originally introduced by the World Bank in Turkey in the late sixties (Feder & Slade, 1986; Feder, Slade, & Sundaram, 1986), exported to Asia in the seventies, and spread to African countries in the early

eighties (Hulme, 1992). In 1986, it was being implemented, on either a national or project scale, in over forty developing countries (Feder, Lau, & Slade, 1987; Feder & Slade, 1986). The aim of the T&V system remained the material transfer of technology to bridge the gap between the modern technology recommended by researchers and that practiced by the majority of traditional farmers. New about this system, compared to the traditional transfer-of-technology model, is that it focused on building a triangular relationship between the three main stakeholders, i.e., farmers, extension agents, and researchers, in order to create a better extension service (Abbas, et al., 2009; Abdullah, et al., 2014; Godtland, et al., 2004). As a result, extension agents under the T&V system had to be constantly trained so that they could provide up-to-date and relevant information to the contact farmers, whom they were expected to visit frequently and regularly on their plots (Hulme, 1992; Feder, Lau, & Slade, 1987; Feder, Slade, & Sundaram, 1986). Although the provided information was up-to-date, the T&V system concentrated on transferring simple standardized messages and technologies that had been planned and developed by researchers and were still not adapted to local conditions (Glover, 2009; Musa, Aboki, & Auda, 2013; Olayemi, Ope-Oluwa, & Angba, 2021). Theoretically, feedback from farmers was feasible, but the incentives for extension staff to gather such feedback and report it were not much changed compared to earlier times (Anderson, Feder, & Ganguly, 2006). The T&V system remained a rather supply-driven or top-down approach, only including farmer participation in a limited fashion (Olayemi, Ope-Oluwa, & Angba, 2021; Selener, 1997; Van den Ban & Mkwawa, 1997).

*Farming Systems Research*

As mentioned above, the T&V system did improve the extension service, but non-adoption of the recommended technologies remained a problem. This was attributed to problems and constraints occurring at the farm level. As a response, Farming Systems Research (FSR) arose in the 1980s (Martin & Sherington, 1997; Ponzio, Gangatharan, & Neri, 2013; Selener, 1997). In order to diminish small-holder farmers' constraints on the adoption of new technologies, FSR argued that the development of these technologies must be grounded in full knowledge of the whole farming system, including the farm household (Sands, 1986). Therefore, FSR maximized on-farm research instead of on-station research, involved the farmers in the research process, and provided feedback from farmers (Biggs, 1995; Byerlee, Harrington, & Winkelmann, 1982; Chambers & Jiggins, 1987; Martin & Sherington, 1997; Norman, 1978). FSR recognized the value that farmers' knowledge, based on their experience and traditional experimentation, can play in improving the farming system (Norman, 1978). This changed the model of technology development from a linear "top-down" transfer of technology model to a dynamic and iterative approach based on learning and modification (Martin & Sherington, 1997; Norman, 1978). When looking at the different types of ToT explained in the Conceptual Framework on page 6, this implies a move from the material transfer of technology to the transfer of designs that can be modified to local conditions. However, while farmers were involved in the research process, the key decisions about what problems research should investigate tended to remain in the hands of the researchers (Chambers & Jiggins, 1987).

*Farmer participatory research*

In the 1990s, farmer participatory research emerged (Ponzio, Gangatharan, & Neri, 2013; Selener, 1997). According to farmer participatory researchers, one of the main weaknesses in the older agricultural research and development approaches described above is the lack of interaction between

researchers and farmers. In order to bridge the divide between research and practice, advocates of FPR believe that farmers should be involved as partners in the research and development process. They no longer consider farmers as passive components of the investigated system; instead, farmers are recognized as experts in their fields. Particular emphasis is placed on the participation of farmers in the early stages, e.g., the needs and opportunity assessment to identify their real problems and constraints (Farrington, 1989; Selener, 1997; Snapp, DeDecker, & Davis, 2019; Van de Fliert & Braun, 2002). By allowing farmers to bring both their indigenous technical knowledge (ITK) and their goals and constraints, FPR strengthens the demand-pull on the research agenda (Farrington & Martin, 1988). Consequently, researchers no longer recommend standard technologies or packages to farmers, expecting them to adopt them. Instead, they offer adaptable technological options that meet user needs and preferences (Farrington, 1989; Selener, 1997; Snapp, DeDecker, & Davis, 2019; Van de Fliert & Braun, 2002). This has significantly improved the applicability of technologies to local circumstances as well as increased their acceptance by farmers (Hauser, et al., 2016). Some researchers have gone beyond merely recognizing the value of farmers' ITK to make research more relevant. Instead, they primarily see the possibility for farmers to acquire the capacity to search for new technologies themselves and ultimately drive local innovation (Farrington, 1989; Farrington & Martin, 1988). This supports what Cornwall and Jewkes (1995) argue, namely that the researcher's attitude is a key element of participatory research.

## 3.2 Origins and emergence of the Farmer Field Schools

*Lessons from the Green Revolution*

The Farmer Field Schools were first introduced in the rice fields of Indonesia in the late 1980s (Braun, Thiele, & Fernandez, 2000; Godtland, et al., 2004; Guo, et al., 2015; Isubikalu, 2007; Najjar, Spaling, & Sinclair, 2013; Nederlof & Odonkor, 2006; Waddington, et al., 2014). With the technical assistance of the Food and Agriculture Organization of the United Nations (FAO), 200 Farmer Field Schools were established in four districts of Yogyakarta (Abdullah, et al., 2014; Braun & Duveskog, 2008). They were originally developed as a response to problems associated with the Green Revolution in the 1960s and 1970s (Nederlof & Odonkor, 2006; Waddington, et al., 2014). During that period, the developing world witnessed an extraordinary growth in food production and food security. The adoption of technologies such as high-yielding variety (HYV) seeds, (inorganic) fertilizer and pesticides, improved irrigation facilities, and mechanized farm tools raised agricultural yields substantially. In many areas, the production of cereal crops tripled with only a 30 percent increase in the land area cultivated (John & Babu, 2021; Pingali, 2012). However, a number of challenges emerged. First of all, the technologies promoted were not appropriate to the challenges smallholder farmers, particularly in sub-Saharan Africa, were facing. As a result, these farmers were left behind. Second, in parts of the world where modernization was successful, it was also associated with adverse environmental and health consequences (Waddington, et al., 2014). At the end of the 1980s, Indonesian farmers were intensively using chemical pesticides, promoted by the government and private industry (Braun & Duveskog, 2008). This misuse not only caused water pollution and damage to the soil but also led to severe pest outbreaks. Reason for the latter is that pesticide overuse made some pest species, like the brown plant hopper, resistant (pest resistance) and eliminated their natural enemies (loss of biodiversity) (Braun & Duveskog, 2008; Braun, Thiele, & Fernandez, 2000; John & Babu, 2021).

Thus, the Farmer Field Schools were initially developed in Indonesia to improve rice farmers' analytical and decision-making skills, of which a key objective was to end dependency on pesticides as the main pest-control measure. To accomplish this, the farmers were introduced to Integrated Pest Management (IPM). IPM aimed to reduce pesticide use and associated risks by promoting more appropriate and ecologically sustainable pest management techniques (Abdullah, et al., 2014; Braun & Duveskog, 2008; Braun, Thiele, & Fernandez, 2000; Feder, Murgai, & Quizon, 2004a; 2004b; Isubikalu, 2007; Najjar, Spaling, & Sinclair, 2013; Nederlof & Odonkor, 2006; Waddington, et al., 2014). The FFS approach is based on the idea that the best learning takes place by experiencing rather than listening. Therefore, the dissemination of these technologies does not take place through the instruction and supervision of extension agents; instead, farmers learn to draw reasoned conclusions through observation and social learning-by-doing (Isubikalu, 2007; Najjar, Spaling, & Sinclair, 2013; Nederlof & Odonkor, 2006). Extension agents are facilitators of the learning process as they ask the farmers questions and encourage them to seek answers rather than lecturing or providing answers (Guo, et al., 2015; Nederlof & Odonkor, 2006). The FFSs are organized around a season-long series of weekly meetings that end at harvest (Feder, Murgai, & Quizon, 2004a; Wandji, et al., 2007), but participants are expected to continue the learning process on their own after the facilitator leaves (Braun, Thiele, & Fernandez, 2000). Through the learning process, farmers' capacity to analyze their farming systems, identify problems, and find solutions relevant to the local conditions, is strengthened. Because of the acquired knowledge and skills, the farmers gain self-confidence and become key decision-makers (Braun et al., 2006; Isubikalu, 2007; Lund & Rahman, 2011; Waddington, et al., 2014). Several researchers documented substantial impacts of FFSs in terms of increased farm productivity, reduced use of pesticides, and improved farming knowledge about pest management and crop cultivation (Feder, Murgai, & Quizon, 2004a; Friis-Hansen & Duveskog, 2012; Godtland, et al., 2004; Van den Berg & Jiggins, 2007). Based on the reviewed evidence, Van den Berg, et al., (2021) concluded that the FFS has enabled smallholder farmers to actively adapt their livelihood strategies to changing external variables and therefore has the potential to contribute to achieving the SDGs.

*Spread of FFS around the world*

In 1990, shortly after the introduction of the FFS in Yogyakarta, 1800 FFSs for rice IPM were launched in Java, Sumatra, and South Sulawesi - three of the main islands of Indonesia (Braun & Duveskog, 2008; Braun, et al., 2006). From 1991 to 1994, the FFS program gradually moved from its single crop (rice) focus to the management of other crops, like vegetables and cotton, and spread to different countries in Asia (Abdullah, et al., 2014; Braun & Duveskog, 2008; Braun, et al., 2006; Van den Berg & Jiggins, 2007). From the mid-1990s onwards, the experience gained in Asia was used to help establish FFSs in parts of Africa, Latin America and the Caribbean, the Middle East, and Central and Eastern Europe (Braun, et al., 2006; Van den Berg & Jiggins, 2007). Since the problem of pesticide use was less evident in Africa than it was in Asia, FFSs in Africa were extended beyond IPM technologies to include all aspects of husbandry practices in a number of enterprises (Anandajayasekeram, Davis, & Workneh, 2007). Examples of variants are integrated production and pest management (IPPM), integrated crop management (ICM), and integrated water and soil management (IWSM) (Waddington, et al., 2014). In Africa also, more health and nutrition "special topics" were included here because of farmers' low level of awareness about the dynamics of diseases such as HIV/AIDS and malaria, which cripple many rural communities (Braun & Duveskog, 2008). By 2012, FFSs were present in at least 90 countries worldwide

(Guo, et al., 2015; Waddington, et al., 2014), producing 10-20 million FFS graduates (Abdullah, et al., 2014; Van den Berg, et al., 2021). Around 60 percent of beneficiaries have been in Asia; however, over half of all FFS projects have been based in Africa, reason for this is that some Asian FFS programs have been implemented on a national scale (Waddington, et al., 2014). There are no estimates available for the period after 2012 (Van den Berg, et al., 2021). As the FFS-brand name gained popularity among farmers, governments, and donors alike, it occurred that the brand name was sometimes applied to approaches that mirrored the traditional transfer-of-technology model rather than group-based learning processes (Nederlof & Odonkor, 2006; Sherwood, Schut, & Leeuwis, 2012; Van den Berg, et al., 2021).

## 3.3 Conclusion

In short, it was found that farmer participatory research and the Farmer Field Schools emerged around the same time (the 1990s) with the aim and potential that technologies are being developed that are adapted to local circumstances, through farmer participation. However, in order to reach this, the FPR and FFS focus on different things. FPR can be seen as the third generation of modified approaches to transfer technology that attempt to fix the problems of the traditional ToT model. In contrast to its predecessors, FPR is a bottom-up approach that recognizes the value of farmers' ITK to make research more relevant and improve the applicability of technologies to local circumstances. FPR, therefore, focuses on the collaborative participation of farmers in the needs and opportunity assessment as well as the research and development stage. Consequently, what is transferred to farmers are no longer standard "one-size-fits-all" technologies. Instead, FPR emphasizes the transfer of design as a means to transfer technology.

The FFS approach also aims for the development of locally relevant solutions and recognizes the importance of farmers' ITK in this process. However, instead of focusing on engaging farmers as partners in the research process, in FFSs, the emphasis is placed on educating farmers. Through participatory forms of education, farmers will strengthen their capacity to analyze their farming systems, identify problems, and find solutions themselves, with the help of "experts". In this process, the farmers become the key decision-makers, which indicates at least a collegial level of participation. In the case of FFS, technology transfer thus means the transfer of capacity to develop technologies. This was first applied in the context of IPM to address the problem of intensive pesticide use in rice but was extended to include other practices and enterprises as it spread to other countries. An overview of the information from this chapter is given in Table 1 on the next page.

Both FFS and FPR have contributed to increased farm productivity through the development and dissemination of applicable technologies and practices. Despite this, successful cases are not the norm. The more transformative hopes of the approaches have not always been realized, instead, they often remain theory since implementing the approaches is not straightforward, but also encounters challenges that cannot always be overcome. One of the challenges remains the lack of trust. In light of their history of exploitation during colonial times, farmers are still skeptical regarding foreign initiatives promoted. Another challenge is the high impact of the attitude of the researcher or facilitator. If they are more concerned with pleasing their donors or themselves than with the farmers they are attempting to help, the concept of participation may just serve as a cosmetic label and cover up what in reality is the traditional top-down method of technology transfer.

**Table 1.** *Overview of the different agricultural participatory approaches distinguished in Chapter 3*

| | **Traditional ToT** | **T&V system** | **FSR** | **FPR** | **FFS** |
|---|---|---|---|---|---|
| **Emerged/ Dominant:** | 1950s | Late 1960s | 1980s | 1990s | 1990s |
| **(New) Ideas:** | Agricultural technologies are developed by researchers at research stations and passed on to extension services for dissemination among farmers. | Aim to create a better extension system. Extension agents are expected to visit farmers frequently and regularly, to make sure the information is relevant. | On farm research maximized and value of farmers' ITK recognized. | Emphasis on involvement of farmers in early stages.<br><br>Value of ITK recognized.<br><br>Some see possibility to acquire capacity to develop technology themselves. | Selection of the subject should depend entirely on local people's needs and interests.<br>Value of ITK recognized.<br>Aim to strengthen farmers' capacity to make better decisions through experiential learning. |
| **Level of participation:** | | | | | |
| *Needs & Opportunity* | Conventional | Conventional/ Consultative | Conventional/ Consultative | Collaborative | Collaborative/Collegial |
| *Research & Development* | Conventional | Conventional | Consultative | Collaborative | Collegial/Farmer Experimentation |
| **Kind of technology transfer:** | Material transfer | Material transfer | Design transfer | Design transfer<br>In some cases: capacity transfer | Capacity transfer |

# 4. Key elements of the Farmer Field School

The previous chapter explained that farmer participatory research and the Farmer Field Schools emerged around the same time with the objective of involving farmers more in the decision-making process of the needs and opportunity assessment and the research and development process. The purpose of this chapter is to show how the FFS is trying to achieve its goals by zooming in on the key elements of the approach. The first section pays attention to the preparatory actions. The second part of this chapter focuses on the group, field, and facilitator, and the third part on the curriculum. While the initial plan was to focus on FPR and FFS this chapter focuses on the FFS only, because it was found that the FPR approach is not as concrete.

## 4.1 Preparatory actions

There is a list of activities that the facilitating organization should undertake before implementing an FFS. This phase is referred to as the preparatory phase and can take between one and three months. The preparatory actions generally include:

- Consult and coordinate with other programs operating in the region, such as farmers' organizations, government ministries, NGOs, and others. During consultations, present the FFS approach, seek collaboration and participation, and explore intervention areas that could form a basis for FFS implementation (Braun, Thiele, & Fernandez, 2000; FAO; FAO, 2016; Okoth, Nalyongo, & Bonte, 2010).
- Identify and train FFS facilitators through a formal FFS training of facilitator (ToF) course. This course should be developed and run by experienced FFS master trainers. The facilitators could be government extension staff, NGO staff, or farmers who are graduates of an FFS (FAO, 2016; OBANR & JICA, 2017).
- Identify and contact communities that meet the requirements for establishing FFS. In most cases, community leaders should be contacted first to seek their advice and authorization (FAO, 2016). They will organize the introductory meeting between the facilitating organization and the community members. Initial contact with the partner community is needed to understand the area and identify the farmers' needs and desires. This also helps in defining the community's consent and willingness to participate in the FFS (Braun, Thiele, & Fernandez, 2000; FAO; OBANR & JICA, 2017; Okoth, Nalyongo, & Bonte, 2010)
- Organize the group. First and foremost, this entails meeting with the members of the community to explain the FFS principles and dispel any myths. Second, the interested members' expectations should be leveled. This can be done by giving them a mini-FFS experience. Lastly, the participants should be identified and registered. Their commitment to the FFS is formalized by signing a basic agreement or learning contract (FAO; Okoth, Nalyongo, & Bonte, 2010).
- Select a learning subject: crop, livestock, or enterprise. The selection of the FFS subject should depend entirely on local people's needs and interests. Facilitators are allowed to advise on issues not well-known to the farmers. Their suggestions can be considered in farmers' decision-making (FAO; OBANR & JICA, 2017). Based on the focal subject and gaps identified, the facilitator, together with the program team, can develop the FFS curriculum (FAO, 2016).
- Design and conduct a baseline survey. This is needed to form a basis for the eventual evaluation of the impacts of an FFS based on comparisons between existing knowledge and practices before

the start of the FFS and after its implementation. Furthermore, it could provide information about the social context, its challenges and opportunities, and potential social vulnerabilities within the community (FAO; FAO, 2016).

- Select and prepare the field and meeting site (seating, roof, etc.). Hold discussions with local communities and authorities to identify the specific geographical focus of the implementation of an FFS. All members should have easy access to the meeting site, which is typically under a tree near the field (Braun, Thiele, & Fernandez, 2000; FAO; OBANR; JICA, 2017; Van den Berg & Jiggins, 2007).

## 4.2 Key ingredients: group, field, facilitator

The key ingredients of an FFS are a group of about 20 to 30 farmers (typically from one community) with a common interest, a field, and a facilitator (Braun, Thiele, & Fernandez, 2000; Nederlof & Odonkor, 2006). Depending on their culture and the topic chosen, the group may be mixed with men and women together or separated. The group could be a newly formed or established one, such as self-help groups, women's groups, or youth groups. The FFS tends to strengthen these existing groups. Although the FFS is not developed with the intention of creating a long-term organization, it often becomes one, as a lot of FFS groups develop into support groups so that participants can continue to support one another even after the FFS activities end (Braun & Duveskog, 2008; Gallagher, 2003; Nederlof & Odonkor, 2006).

The group of farmers meets regularly - often on a weekly basis - in a designated field within close distance of the community throughout the major part of the growing cycle (Guo, et al., 2015; Nederlof & Odonkor, 2006). FFSs are conducted on a shared field, rather than on several individual farmers' fields, to enable collective decision-making and discovery (Nederlof & Odonkor, 2006). Typically, the field is divided into two test plots: a "farmer practice" plot, on which farmers apply conventional cultivation methods, and a demonstration plot, where farmers apply new practices based on the FFS technology (e.g., IPM). In this way, differences between farmers' traditional practices and the newly introduced practices are easily observed and analyzed (Lund & Rahman, 2011; Nederlof & Odonkor, 2006; Waddington, et al., 2014). The field serves as the teacher, and it provides majority of the study materials, such as plants, animals, pests, soil particles, and real problems (Braun & Duveskog, 2008; Friis-Hansen & Duveskog, 2012; Gallagher, 2003). Farmers usually feel much more comfortable in field situations than in classrooms. In most cases, communities can provide a study site with a shaded area for follow-up discussions (Braun & Duveskog, 2008; Gallagher, 2003).

The FFS group sessions take place under the guidance of an FFS-facilitator who leads the participant farmers through the exercises (Braun & Duveskog, 2008; Friis-Hansen & Duveskog, 2012; Gallagher, 2003; Najjar, Spaling, & Sinclair, 2013). FFS-facilitators typically are extension agents (Guo, et al., 2015; Waddington, et al., 2014), but more and more often they are farmers who have graduated from previous FFSs (Nederlof & Odonkor, 2006; Waddington, et al., 2014). These farmers may be chosen to be farmer-facilitators by the group at the end of the FFS cycle. In the next season, they can then lead their own FFS (Anandajayasekeram, Davis, & Workneh, 2007). Reason for this is that farmer-facilitators are often more effective than outside extension staff because they have proven to be motivated, know the community and its members, speak their local language, are recognized by members as peers, and

know the area well (Braun & Duveskog, 2008; Braun, Thiele, & Fernandez, 2000). From a financial perspective, farmer facilitators require less transport and other financial support than formal extensionists. They can also operate more independently (and therefore cheaper) outside formal hierarchical structures (Braun & Duveskog, 2008; Gallagher, 2003). Candidates for the role of farmer-facilitator are identified during the FFS process, where it is easy to observe participants' capacities and potential as facilitators. Farmer Field School graduates are then given one to two weeks of training to improve their technical, facilitation, and organizational skills (Braun & Duveskog, 2008; Braun, Thiele, & Fernandez, 2000; Gallagher, 2003). The facilitator's role and attitude are key factors in determining the success of an FFS. He or she should promote active participation by encouraging farmers to ask questions and seek answers rather than lecturing or providing answers (Braun, Thiele, & Fernandez, 2000; Friis-Hansen & Duveskog, 2012; Guo, et al., 2015). For example, if a farmer asks, 'Is this insect a pest?' a good facilitator would answer with another question: 'What can we do to find out?' (Braun, Thiele, & Fernandez, 2000).

## 4.3 The curriculum

The FFS curriculum follows the natural cycle of its subject, be it crop, animal, or handicraft. In the case of crops, this means that the FFS begins with its first session one to three weeks after transplanting or germination of seeds and ends at harvest (Braun & Duveskog, 2008; Braun, Thiele, & Fernandez, 2000; Gallagher, 2003; Wandji, et al., 2007). The number of sessions thus depends on the maturity period of the subject. For instance, a crop like sweet potatoes needs about forty sessions, while groundnuts or cowpeas only need about twenty sessions (Isubikalu, 2007). Because of this approach, the sessions cover all critical phases of crop growth in parallel with what is happening in the FFS member's field, and the lessons learned can be applied directly (Braun & Duveskog, 2008; Gallagher, 2003). An FFS session does not include any lectures. All activities in the FFS curriculum are based on adult learning principles such as experiential learning (learning-by-doing), participatory, hands-on work. Each activity has a procedure for action, observation, analysis, and decision-making. The emphasis is not only on "how" but also on "why" (Anandajayasekeram, Davis, & Workneh, 2007; Braun & Duveskog, 2008; Gallagher, 2003). The farmers usually work in smaller subgroups of four to five farmers and devote considerable time to agro-ecosystem analysis (AESA). AESA involves three steps: observing the crop, analyzing the field situation, and making proper decisions about the management of the crop. Each group of farmers observes ten random plants in the demonstration plot as well as the farmer practice plot, recording their observations about the plant (growth, number of tillers, crop stage, etc.), pests, defenders, diseases, water, and weather and soil conditions. When the present actors are identified, they can start analyzing the field situation and draw their analysis on large sheets of paper. The advantage of using a drawing is that it forces the participants to observe closely and intensively. It is also a focal point for the discussions that follow, and the drawing can be kept as a record. During the discussions, the farmers propose which management practices should be carried out in the demonstration plot the following week. Each group presents its analysis and proposed actions in a plenary session, followed by questions and discussion (Braun, Thiele, & Fernandez, 2000; Lund & Rahman, 2011). Besides AESA, the standard components of an FFS session are special topics based on locally specific problems (like nutrition, HIV/AIDS, water sanitation, and marketing) and energizers/ teambuilding exercises to improve group dynamics (Nederlof & Odonkor, 2006; Waddington, et al., 2014). The schedule of a classical rice IPM field school session is given in Box 1.

**Box 1 Standard schedule of an FFS session for IPM**

**Opening:** with greetings and prayers, a repetition of material covered during the previous session, an introduction of the day's program, and sometimes stretching exercises.

**Agro-ecosystem Analysis (AESA):** Farmers form small groups (about five persons), make observations of the whole field, and examine ten plants per plot, recording the number of tillers per plant, collecting insects, and any other relevant information. Each group prepares drawings of their observations. AESA drawings include: pests; natural enemies; weather, plant, field, and water conditions; and action decisions.

**Presentation and discussion:** Each group presents their drawings and conclusions during an open discussion. The whole group reaches a consensus about the crop management practices that need to be done in the coming week.

**Break:** Refreshments (water/tea/etc.)

**Group dynamics exercise:** Various activities are undertaken with the aim to stimulate attention and participation, as well as strengthen group communication and increase solidarity.

**Special topic:** The facilitator guides the group in experiments, exercises, and discussions on special topics that are not covered during the field activities but are of special interest to the group. This could include health and nutrition, seed selection, postharvest handling and storage methods, and economic analysis.

**Evaluation:** Evaluation of the day and planning for the next session.

## 4.1 Conclusion

The overall goal of FFS is to empower smallholders by assisting them in learning and developing the skills required for informed decision-making. For the learning process, the FFS builds heavily on andragogical principles, such as participation and experimentation. Theoretically, it makes sense that this also forms the foundation for the key elements of the FFS. Once the FFS participants have been identified and registered, it is up to them to choose the focal learning subject to be studied (e.g., crop, livestock, enterprise). The facilitator should not make the decisions; instead, he or she is only allowed to provide advice on the subject. As a result, there is a collaborative or even collegial, form of participation in this case. The same goes for the selection of the special topic. Also, after the subject has been chosen and the FFS sessions have started, the facilitator must refrain from teaching. During the AESA, the farmers themselves must observe, analyze, and make decisions about the management practices that will be carried out the following week. When they ask the facilitator a question, the facilitator could respond by asking another question. Thus, also during the FFS sessions, decisions are made by the farmers, suggesting collegial participation or even farmer experimentation.

As mentioned before, whether participation genuinely implies a consultative, collaborative, or collegial relationship often greatly depends on the attitude of the researcher and/or facilitator. In case of the FFSs, the facilitators recruited were mainly former extension agents, who were educated within the traditional transfer-of-technology model. When these "traditional" extension agents become FFS facilitators, a large amount of re-training from their previous top-down methods, is required to allow

for a mentality change towards a supply-driven orientation and appreciation for indigenous knowledge (Anandajayasekeram, Davis, & Workneh, 2007; Braun & Duveskog, 2008; Nederlof & Odonkor, 2006). However, technical training of facilitators is frequently prioritized. As a result, facilitators end up organizing lectures and answering questions raised by farmers, using the FFS as a regular “school” to recommend farmers the “best” practices in the name of participation. This reverses the FFS objective from farmer learning back to material transfer (Braun & Duveskog, 2008; Isubikalu, 2007).

# 5. 100WEEKS

This chapter answers the question how the approaches are applied in newly developed development programs by analyzing the Living Income program (LI-program) from 100WEEKS. As mentioned in the methodology section, in contrast to the other sub-questions, the data needed to answer this question is primary data. And thus, this data could not be gathered by conducting a literature review, instead their website, training manual, and an interview with the regional head of programs of 100WEEKS were used. 100WEEKS is a Dutch NGO that gives cash and training to people living in extreme poverty in Rwanda, Ghana, Uganda, Ivory Coast, and Jordan (100WEEKS, n.d.). The goal is that the participants will be able to establish sustainable livelihoods on their own terms. The organization believes that almost all people living in poverty have the capacity to improve their situation. They simply lack the means. That is why 100WEEKS offers its participants direct, unconditional cash transfers via mobile-money platforms. Each participant receives eight euros a week for one hundred weeks. Hence, the name 100WEEKS. The cash transfers are a gift, not a loan; 100WEEKS says it does not ask for anything in return (100WEEKS, n.d.). The participant can decide how to spend the money. For example, one might start a small business, trade, or project to help improve their own situation and take care of their family. Although cash transfers are said to be unconditional, in the training manual (personal communication, April 6, 2022), it is stated that the participants do have a duty to attend the weekly group meetings. If they miss three meetings without a valid reason, the mobile money cash transfers can be stopped.

## 5.1 The Living Income program

*The curriculum*

The Living Income program is one of the two primary programs carried out by 100WEEKS. This program focuses on smallholder farmers who produce crops that sustain the value chains of large companies, e.g., coffee or cocoa. The LI-program consists of a combination of direct cash transfers, weekly training, and savings group meetings (100WEEKS, n.d.). Weekly meetings take, in general, one hour and are led by a facilitator whom they refer to as “coach” (100WEEKS Training Manual, personal communication, January 12, 2023). The curriculum for the training is developed by the regional head of programs of 100WEEKS and consists of several modules (P. Meijer, personal communication, January 10, 2023). The different modules covered during the training are: introduction, self-empowerment, setting up a VSLA (village savings and loan association), financial literacy, entrepreneurship, best agricultural practices, and life skills such as hygiene, nutrition, and family planning. The module about agricultural practices takes ten weeks and is placed in weeks 56-65 of the program. As visible in Figure 2 on the next page, the module includes eight training sessions that each cover a different topic. Each fifth session is a summary session where the last four sessions are reviewed to make sure that the participants have remembered the most important takeaways and actions.

In the sessions, the participants are challenged to think about their own agricultural practices: why they undertake these practices, how they can improve the practices in which they are involved so far, and/or what practices could be added to the current ones and the challenges involved. By understanding their land and activities, they can maximize its potential (100WEEKS Training Manual, personal communication, April 6, 2022). The topics of the sessions are prescribed, but the coaches can

| Module | Training sessions | | | | Review |
|---|---|---|---|---|---|
| Agricultural practices | 56 Intro Best agricultural practices | 57 Crop cycle & climate change | 58 The importance of soil & seeds | 59 Soil fertility ! ⚥ | 60 |
| Agricultural practices | 61 Pre-planting | 62 Pest and water control | 63 Post-harvest | 64 Choosing a group crop | 65 |

***Figure 2**: Curriculum layout of the agricultural practices module (100WEEKS curriculum, personal communication, April 6, 2022)*

decide to spend more time on one topic if they see the need for it. During the training, it is an option for the participants to set up an enterprise as a group. They could, for example, decide to rent out the chairs or tent used for the training sessions. Another example, as visible in Figure 2 under week 64, is to cultivate a crop on a collective piece of land. The goal of the group enterprise is to learn to work together and to generate an income as a group. However, it has not yet been proven whether the group enterprise actually achieves these goals (P. Meijer, personal communication, January 10, 2023).

*Training principles*

The 100WEEKS curriculum is based on the knowledge that adults learn most of what they know through their own experience, resulting in the following training principles (100WEEKS Training Manual, personal communication, January 12, 2023):

(1) Learning-by-doing: Learning is mainly based on practical exercises and activities. Lectures and theory are kept to a minimum. Most of the time, the participants are given homework to help them implement what they have learned in their daily lives. This enables participants to analyze and learn from their own experiences.

(2) Participatory: Learning occurs when participants get excited and motivated through practical exercises to which they contribute. In most of 100WEEKS' training sessions, the group of 20-25 women is divided into smaller groups. Group sizes of five to eight stimulate full participation, allowing everyone to speak up and share their experience. In this way, they are actively involved in the process of acquiring new information.

(3) Peer-to-peer: 100WEEKS wants to ensure that people learn a lot from each other during their training sessions. Therefore, the training of 100WEEKS is built around the peer-to-peer learning method, with the facilitator playing a supporting role. The participants work together through a series of activities and discussions solely guided by simple step-by-step instructions on the activity sheets. New knowledge, skills, and competences are developed through the interactions between participants and the sharing of existing local knowledge and experience.

(4) Repetition/Reflection: Reflection is key for learning because humans easily forget and go back to their habits. In their curriculum, 100WEEKS has built in a lot of room for reviewing and reflection. At the start of each session, participants review what they learned the week before. At the end of each session, they reflect on what they learned during the session. Every five weeks, a reviewing session is held to look back at the sessions conducted, the learnings applied, and the actions taken.

*The (role of the) coaches*

The coaches are local people who have a background in education. For example, a teacher at an elementary school. 100WEEKS made the conscious decision to use local coaches because they are closer to the participants and it is more cost-efficient. This does mean that the coaches are not experts on the subjects covered in the training. However, this is not a problem because the organization does not desire from their coaches that they have all the answers. Instead, the coaches are expected to help the participants develop their own knowledge and skills through social learning-by-doing. Before the start of the program, the selected coaches receive a five-day training. During this training, they are taught how to facilitate this kind of learning (P. Meijer, personal communication, January 10, 2023). As participatory and experiential training involves both "talking" and "doing", the training site should allow for enough space to enable participants to move around and for easy repositioning of chairs, tables, and/or floor mats. The traditional classroom setup (rows of chairs and/or tables) is not suitable for this type of training. Instead, a U-shape arrangement or seating participants in smaller circles around tables enables everybody to see each other (100WEEKS Training Manual, personal communication, April 6, 2022). Besides that, the coaches are also encouraged to look at the participants' needs. Based on their findings, the coaches can decide to dedicate more than one session to a certain topic. The coaches can make this decision alone or together with the participants. Once the program has begun, the coaches in the same area meet each other monthly to discuss different topics and prepare the sessions together (in case the programs started around the same time and align) (P. Meijer, personal communication, January 10, 2023).

## 5.2 Comparative analysis LI-training

Even though the Living Income program from 100WEEKS consists of a combination of direct cash transfers, weekly training, and savings group meetings, only the weekly training will be analyzed since this thesis focuses on the transfer of technology that happens during the training. However, the cash transfers do play a role in this; this will be explained later. It has become clear that the LI-training focuses on extension and the learning of participants rather than research and is thus more comparable to the FFS approach than it is to the FPR approach. Therefore, the following sections explain the similarities and differences between the LI-training and FFS approach.

*Similarities*

Both the curricula from the FFS and LI-training are based on certain andragogical principles, such as taking into account the participants' self-concepts and experiences. Practically, this involves weekly training for about 25 participants, who are then divided into smaller subgroups. The training is led by a facilitator or coach, whose job is not to teach through lecturing but by asking questions and guiding the participants through assignments and discussions. This implies that the participants are acknowledged as being self-directed and that their experiences are recognized as resources for learning. Thus, like the FFS approach, the LI-program of 100WEEKS uses a collegial form of participation or even farmer experimentation during their training sessions. Another similarity could appear when participants in the LI-training choose to cultivate a crop together. It is completely up to the participants what to do with this field; they could decide, like the FFS, to divide the field in two test plots to compare conventional and new technologies and practices. However, this is not the goal of this practice, and therefore it is not very likely to be the case.

*Differences*

A notable difference is that the LI-program, unlike the FFS approach, does not synchronize the learning activities with relevant real-life situations. The FFS training sessions follow the crop cycle, while the LI-training sessions about agriculture take just ten weeks to discuss different topics. This can have an impact on the participants' motivation and readiness to learn. As explained in the Conceptual Framework, adults are typically motivated and ready to learn when they feel the need to tackle a real-life problem they face at that very moment. In the case of the LI-program, this might mean the participants lack motivation. 100WEEKS comes with a different approach to keep its participants motivated. They provide cash transfers with the condition that recipients attend the weekly group meetings. This is an external motivator for the participant. However, it is questionable whether this will be sufficient since adults' intrinsic motivation outweighs the extrinsic, as also mentioned in the Conceptual Framework. A second difference is the content of the training sessions. Since the LI-training is not crop-specific, the training sessions do not include an AESA and last only 1-1.5 hours rather than the entire morning. Basically, the LI-training focuses solely on the "special topic" in the FFS training. A third difference is that the curriculum for the training of 100WEEKS is developed by the organization's regional head of programs. Thus, the modules are predetermined without consulting the participants, which indicates a conventional form, or absence, of participation. During the training, the coaches are free to decide to spend more time on a specific topic if they believe this is needed. The coaches can make this decision alone or together with the participants. Depending on their choice, this would be more consultative or collaborative participation. This differs from the FFS approach, where the level of participation is collaborative or even collegial since participants get to choose the learning subject and the special topics themselves.

## 5.3 Conclusion

The purpose of this chapter was to show whether and how the FPR and FFS approaches are currently being used as modes of technology transfer by analyzing the LI-program from 100WEEKS. This program can be compared with the special topic part of the FFS training. The level of participation during the training is similar to that of the farmers participating in an FFS, namely, collegial. Reason for this is that 100WEEKS, like the FFS approach, builds on the andragogical principles of self-concept and the role of experiences. The idea is that new knowledge and skills are developed through the interactions between participants and the sharing of existing local knowledge and experience. The facilitators are not expected to share any subject-specific knowledge. Thus, another similarity with the FFS approach is that the LI-program also uses capacity transfer to transfer technology. Striking is that with the development of the LI-program 100WEEKS seems to have slipped back into self-determining farmers' needs rather than asking them about them, returning to the days of the traditional ToT, where there was no farmer participation, which predominated more than half a century ago. This demonstrates what has been discussed before and will be elaborated more on in the next chapter, namely that when organizations or programs claim to be participatory, it can take various forms and differ per stage of the development process.

# 6. Discussion

The general objective of this research was to create an overview of different agricultural participatory approaches in order to help NGOs in the process of choosing an effective agricultural participatory approach to provide technical aid to smallholder farmers in SSA. Because participatory approaches evolved over time, it was assumed that an overview of the evolution of the two last developed approaches would also include a significant amount of the others. In the analysis of farmer participatory research and the Farmer Field School, emphasis was placed on their level of farmer participation, the type of technology transfer aimed for, and thirdly, on the andragogical principles followed. In this chapter, some remarkable findings and limitations of the research will be discussed.

## 6.1 Theory vs. Practice

*Participation*

It was found that both FPR and FFS advocates acknowledge the importance of involving farmers in the needs and opportunity assessment in order to identify their real problems and constraints and also recognize the value of farmers' ITK, resulting in at least a collaborative level of participation in the needs and opportunity assessment and the research and development stage. Unfortunately, it should be noted that this is still theory and that these levels of participation are not always reached in practice. Several case studies have revealed that the approaches, presented as participatory, often turn out to be an extensive form of the traditional ToT model (material transfer) they mean to replace. As mentioned in the conceptual framework, participation has become a buzzword that people adopt for different reasons, ranging from manipulative to transformative. Whether participation genuinely implies consultative, collaborative, or collegial relationships often greatly depends on the attitude of the researcher and/or extension agent/facilitator. In some cases, researchers were more concerned with pleasing their donors (and themselves) than with the farmers they were attempting to help. These researchers only pretend to use participation, while in reality, they continue to employ the traditional top-down method of technology transfer (Isubikalu, 2007). In other cases, the FFS facilitators were not targeted and trained in an appropriate way (Waddington, et al., 2014). The facilitators recruited were mainly extension agents, who were hired and educated within the "traditional" transfer of technology model, where extension was considered a top-down process of technology transfer from the expert to the farmer. When these "traditional" extension agents become FFS facilitators, a large amount of re-training from their previous top-down methods, with which they are familiar, is required to allow for a mentality change towards a supply-driven orientation and appreciation for indigenous knowledge, which requires time to enable staff to make the shift in thinking feasible (Anandajayasekeram, Davis, & Workneh, 2007; Braun & Duveskog, 2008; Nederlof & Odonkor, 2006). Instead, technical training of facilitators is frequently prioritized over training in participation and providing opportunities for personal development and mentality change among facilitators. As a result, facilitators end up organizing lectures and answering questions raised by farmers, revealing much "off-shelving" of already manufactured technologies from research stations, just like they were used to. They are using the FFS as a regular "school" to recommend farmers the "best" practices in the name of participation. This reverses the FFS objective from farmer learning back to material transfer (Braun & Duveskog, 2008; Isubikalu, 2007).

*FPR-FFS and FFS-FPR*

Another example where theory differs from practice is in the divide between farmer participatory research and the Farmer Field School approach. In theory, the focus of FPR lies on research in order to develop locally adapted technologies, while FFS focuses on the education of farmers to reach the same goal. In practice, however, it turns out that the two approaches are not mutually exclusive and can, in fact, be used in combination. There are examples of FFSs in Uganda, Ethiopia, and the Andes that implemented FPR components, causing a shift in the emphasis of the approach (Ortiz, et al., 2004). In these FFSs, participatory research has almost the same weight as training (Thiele, et al., 2001). Because of the emphasis on participatory research, the approach was called FPR-FFS (farmer participatory research through Farmer Field Schools) (Ortiz, et al., 2020; Van de Fliert, et al., 2003). In this spirit, the communities conducting FPR-FFSs are considered a network of farmer experimenters who learn the biophysical principles of new technologies and how to evaluate them (Orrego, et al., 2001).

## 6.2 Limitations

This thesis has several limitations, mainly related to the case study. First of all, the Living-Income program from 100WEEKS was used as a case study to assess whether agricultural participatory approaches still operate as modes to transfer technology in the present day and, if so, how. Because the LI-program is just an example of one of the latest development programs, it only answers the question in a limited way. If another program had been chosen, the outcomes could have been different. Secondly, the results of the comparison between the LI-program and the FFS approach were even more limited because the program did not focus on farmers. Contrary to what is stated on the website of 100WEEKS, the LI-program is not focused on smallholder farmers who produce coffee or cocoa for large companies. Instead, it's mainly focused on the farmers' wives. This makes the program not much different from the out-of-poverty program offered by 100WEEKS: the same training is provided, with the only difference being that under the LI-program the participants' living income is measured, since this is important for multinational companies such as Unilever, which has committed to paying all their employees a living wage/income and encourages their suppliers to do the same. Since this thesis is about agricultural participatory approach to provide technical aid to smallholder farmers in SSA, it might have been better to use another program from another NGO as a case study. Instead, I decided to continue based on the assumption that their training principles would have been the same if the program had been focused on farmers themselves, as was stated on their website. This decision was mainly made due to time constraints.

# 7. Conclusions and recommendations

The aim of this research was to create an overview of agricultural participatory approaches. In order to achieve the aim of this research, the following research question was developed: *How do farmer participatory research and the Farmer Field School approach operate as modes to transfer technology to improve agricultural practices in SSA?* Through a mixed-methods approach that included a literature review and case study of the LI-program from 100WEEKS, it was found that both FFS and FPR can effectively empower farmers to experiment with and adopt new technologies and practices that are suited to their specific contexts. In order to achieve this, FPR, as well as the FFS approach, moved away from the material transfer of technologies to the transfer of designs and capacity. In this process, farmers' participation in the needs and opportunity assessment as well as the research and development stage of the new technologies and practices is key. However, there are also challenges to their implementation. First of all, farmers need to trust the initiatives, and secondly, researchers and extension staff need to have the right attitude and training. If the latter are not in place, the participatory approaches are at risk of being pulled back into the traditional technology transfer paradigm they are supposed to challenge.

In more detail: It was found that FPR and FFS emerged around the same time (the 1990s), and both aim for the development of agricultural technologies that are adapted to the local conditions and the farmers' needs to improve the farming situation of smallholder farmers. In order to achieve this, FPR, as well as the FFS approach, moved away from the transfer of standard, "one-size-fits-all" technologies that were developed by researchers at research stations and passed on to extension services for dissemination among farmers. Instead, FPR emphasizes the transfer of designs of new technologies. These designs are then tested and modified by researchers and farmers through collaborative research and development. FFS takes a step further by emphasizing capacity transfer because FFS advocates believe that through adult education, farmers will become capable of analyzing their farming systems, identifying problems, and finding solutions themselves.

The type of participation cannot simply be determined for an entire approach such as FPR or FFS because the type can differ per stage of the development process. For FPR, the level of participation in the needs and opportunity assessment as well as the research and development stage is collaborative. Farmers are no longer considered passive components of the investigated system but partners who can bring their goals, constraints, and knowledge. In FFSs, farmers get to be the key decision-makers in the needs and opportunity assessment as well as the research and development stage. They are the ones who choose the focal learning subject and the special topics. The facilitator is only allowed to provide advice, implying a collegial level of participation. Also, during the FFS sessions, decisions are made by the farmers, suggesting at least a collegial level of participation.

Since FFS focuses on adult education, this approach is very much engaged with andragogical principles. Through the use of participatory experiential learning techniques instead of transmittal techniques, the FFS takes into account the farmers' self-concept and experiences. By letting the participants select the learning subject and topics, the sessions align with the farmers' real-life situations and thus ensure that they are internally motivated and ready to learn. Since FPR focuses on participatory research instead of education, it is not engaged with andragogical principles like FFS is.

When looking at the LI-program from 100WEEKS, it was found that some aspects of the FFS approach are still used in development programs that are recently developed, even though this approach is already thirty years old. Just like the FFS, the LI-program focuses on the transfer of capacity by letting participants find their own (adapted) solutions through participatory experiential learning. In doing so, the program builds on the andragogical principles of self-concept and the role of experiences. What is striking is that the organization seems to have slipped back into self-determining farmers' needs rather than asking them about them. This raises the question: will the participants from the 100WEEKS LI-training be motivated enough to learn?

## 7.1 Recommendations

*Recommendations for NGOs*

As mentioned above, when looking at the LI-program from 100WEEKS, it was found that the curriculum was developed without any farmer participation, returning to the days of the traditional ToT, which predominated more than half a century ago. Since the program is a more recent addition to 100WEEKS, less long-term data are available concerning its effects. However, based on the evolution of agricultural participatory approaches, where farmer participation in the needs and opportunity assessment went from conventional to consultative to eventually collegial even at Farmer Field Schools, it would be surprising if non-adoption does not turn out to be a problem. Lessons from the past have taught us that adoption levels in general remain low if learning activities are not related to the challenges the participants face at that moment. When designing and implementing a new program, I would advise NGOs like 100WEEKS to be cautious not to forget the lessons from the past.

*Recommendations for follow-up research*

This thesis provides several leads for further research. First and foremost, I am aware that the overview of agricultural participatory approaches that this research aimed to provide is not complete. There are still several other approaches, like participatory rural appraisal mentioned in the introduction, that this research does not cover. Follow-up research might add to the overview created in this thesis. The second suggestion is related to the matter discussed in the previous paragraph. 100WEEKS made the interesting decision not to involve farmers in the design of the LI-program. If, after measuring the effects of the LI-program, the level of adoption of new agricultural technologies, against expectations, turns out to be significant, this would be an interesting topic for further research because it would contradict previous lessons.

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# Appendix

## Interview guide: Regional Head of Programs 100WEEKS

*General information about the training for farmers:*

1. Is the Living-Income Program thé program for smallholder farmers (as stated on your website)?

2. Have you already started with this program? If so:
    a. When?
    b. Where?

*(Selection of) modules and topics:*

1. Which modules are covered during the training?

2. How is decided which modules and topics will be covered?
    a. Who makes the decision?
    b. Does consultation with the farmers take place?

3. In the curriculum under the best agricultural practices module, I saw that there was a moment that the participants choose a group crop (week 64). Is that a standard component of the training?

4. What is the purpose of this group crop? (i.e. to learn new practices, like FFS)
    a. If so, how does this take place? (i.e. AESA)

*Participation:*

1. In your training manual participation is mentioned as an important principle. Why do you think this is important?

2. How does participation take shape in the program?

*Coaches:*

1. Who gives the weekly training?

2. What are the selection criteria for the coaches?

3. Do the coaches receive a training before the program starts?

4. What is the role of the coaches during the farmers' training?

*Other:*

1. Are the participants asked for feedback?