YANGON UNIVERSITY OF ECONOMICS
DEPARTMENT OF ECONOMICS
MASTER OF DEVELOPMENT STUDIES PROGRAMME

A STUDY ON SUSTAINABLE AGRICULTURAL DEVELOPMENT PRACTICES USING A FARMER-TO-FARMER TRAINNG APPROACH (CASE STUDY: BOGALE TOWNSHIP)

NU MYA SAN
EMDevS - 38 (19th BATCH)

JUNE, 2025

YANGON UNIVERSITY OF ECONOMICS
DEPARTMENT OF ECONOMICS
MASTER OF DEVELOPMENT STUDIES PROGRAMME

A STUDY ON SUSTAINABLE AGRICULTURAL DEVELOPMENT PRACTICES USING A FARMER-TO-FARMER TRAINNG APPROACH (CASE STUDY: BOGALE TOWNSHIP)

A thesis submitted in partial fulfillment of the requirements for the Master of Development Studies (MDevS) Degree

Supervised by

Daw Phyu Win Ei
Associate Professor
Department of Economics
Yangon University of Economics

Submitted by

Nu Mya San
Roll No. 38
EMDevS- 19th Batch.
(2023-2025)

JUNE, 2025

YANGON UNIVERSITY OF ECONOMICS
DEPARTMENT OF ECONOMICS
MASTER OF DEVELOPMENT STUDIES PROGRAMME

This is to certify that the thesis entitled **"A Study on Sustainable Agricultural Development Practices Using a Farmer-to-Farmer Training Approach (Case Study: Bogale Township)"** submitted as partial fulfillment towards the requirements for the degree of Master of Development Studies has been accepted by the Board of Examiners.

BOARD OF EXAMINERS

Dr. Tin Tin Htwe
(Chairperson)
Rector
Yangon University of Economics

Dr. Cho Cho Thein
(Examiner)
Pro- Rector
Yangon University of Economics

Dr. Naw Htee Mue Loe Htoo
(Examiner)
Professor (Head)
Director, MDevS Programme
Department of Economics
Yangon University of Economics

Dr. Yin Myo Oo
(Examiner)
Professor
Department of Economics
Yangon University of Economics

Daw Phyu Win Ei
(Supervisor)
Associate Professor
Department of Economics
Yangon University of Economics

JUNE, 2025

ABSTRACT

This study focuses the challenges and opportunities of the Farmer-to-Farmer (F2F) training approach in promoting sustainable agricultural development practices in Bogale Township, Ayeyarwady Region, Myanmar. Employing a descriptive methodology, the research is based on a survey of 200 farmers to assess the impact of F2F programs on agricultural practices, productivity, and knowledge sharing. The findings reveal that 86% of respondents participated in face-to-face training sessions, which contributed to notable improvements in crop yield, quality, and farmer income. Farmers showed a strong preference for in-person training over digital alternatives. The training emphasized good agricultural practices, integrated pest management, seed production, and pesticide awareness. Despite these successes, the study identified challenges including labor shortages, limited access to machinery, high production costs, climate change impacts, and regional uncertainties. The study concludes that the F2F training approach has significantly enhanced sustainable agricultural practices and improved farmer livelihoods in Bogale Township.

ACKNOWLEDGEMENTS

I would like to express my heartfelt gratitude to all those who supported me throughout the journey of writing this thesis. Without their guidance, encouragement, and support, this work would not have been possible.

First, I am thankful to Professor Dr. Tin Tin Htwe, Rector of Yangon University of Economics, for her essential assistance and for giving me the opportunity to complete the Master of Development Studies Program. Her leadership has been essential to my academic success.

I would also like to express my gratitude to Professor Dr. Cho Cho Thein, the Pro-Rector of Yangon University of Economics, for her constant support and encouragement, which contributed to my success in this program.

My profound gratitude goes to Professor Dr. Naw Htee Mue Loe Htoo, MDevS Programme Director and Department Head, Department of Economics, for her continuous guidance and support during my studies.

In addition, I am profoundly appreciative of Professor Dr. Yin Myo Oo for her constant encouragement, which has served as an ongoing source of motivation.

I am grateful to Daw Phyu Win Ei, my supervisor, for the invaluable guidance and support throughout the research process. Despite the challenges of online communication, your supervision, insightful feedback, and resource sharing were instrumental to the completion of this thesis.

I also appreciate the constant support of U Myo Myint Tun, EC and my classmates, especially my group members. Their collaboration and companionship throughout the years have been a major source of motivation

Finally, my deepest thanks go to my beloved husband, Kyaw Thet Lwin. Your unwavering support, encouragement, and wise advice have been my foundation throughout this journey. This achievement is as much yours as it is mine.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations
COVID-19	Coronavirus Disease 2019
CSVs	Climate-Smart Villages
DAR	Department of Agricultural Research
DoA	Department of Agriculture
FAO	Food and Agriculture Organization
F2F	Farmer-to-Farmer
FFS	Farmer Field Schools
GDP	Gross Domestic Product
IIRR	International Institute of Rural Reconstruction
IFAD	International Fund for Agricultural Development
INGOs	International Non-Governmental Organizations
IPM	Integrated Pest Management
JICA	Japan International Cooperation Agency
LIFT	Livelihoods and Food Security Fund
LNGOs	Local Non-Governmental Organizations
MIMU	Myanmar Information Management Unit
MOALI	Ministry of Agriculture, Livestock and Irrigation
NGO	Non-Governmental Organization
SAPs	Sustainable Agricultural Practices
SDG	Sustainable Development Goals
SDGs	Sustainable Development Goals
SRI	System of Rice Intensification
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	U.S. Agency for International Development

CHAPTER I
INTRODUCTION

1.1 Rationale of the Study

The concept of sustainable agricultural practices is increasingly recognized as critical for ensuring food security, conserving the environment, and supporting the socio-economic well-being of farming communities worldwide, particularly in developing countries. In the face of pressing global challenges such as climate change, rapid population growth, and the depletion of natural resources, adopting sustainable farming methods is essential to maintaining agricultural productivity while protecting ecosystems (Food and Agriculture Organization [FAO], 2017). Conventional farming systems that heavily rely on chemical inputs and monocropping have resulted in soil degradation, water scarcity, and biodiversity loss, thereby undermining the long-term viability of agriculture (Altieri & Toledo, 2011).

The Farmer-to-Farmer (F2F) training approach has emerged as an effective participatory strategy to promote sustainable agricultural practices among smallholder farmers. By utilizing the knowledge and experience of local farmers as trainers, the F2F method fosters peer-to-peer learning and a collaborative environment where context-specific sustainable techniques can be shared and adopted. This approach not only enhances agricultural productivity but also strengthens community networks and builds local capacity for sustainable development (Altieri, 2002; Pretty et al., 2011).

The majority of households depend on farming for their livelihoods. Despite favorable climatic and soil conditions that support agriculture, farmers face significant challenges including limited access to modern agricultural technologies, unstable market prices, and the adverse impacts of climate change, such as unpredictable rainfall patterns and increased soil salinity (Belton et al., 2017). Additionally, unsustainable farming practices have contributed to environmental degradation, threatening agricultural productivity vital to the local economy.

Although sustainable practices such as integrated pest management, organic farming, and the System of Rice Intensification (SRI) are known to improve soil

health, boost yields, and reduce reliance on expensive chemical inputs, their adoption in Bogale remains limited. Key barriers include low awareness among farmers, insufficient extension services, and restricted financial resources (FAO, 2018).

Given these constraints, the F2F training approach offers a promising avenue to empower farmers in Bogale Township by equipping them with the necessary knowledge and skills to implement sustainable agricultural methods. This study aims to evaluate the effectiveness of F2F training on the adoption of sustainable farming practices and its impact on agricultural productivity. Furthermore, the research will explore the socio-economic and environmental benefits associated with these practices, providing valuable insights for policymakers, development practitioners, and farming communities working to scale sustainable agriculture in Myanmar and comparable contexts.

Bogale Township is in Myanmar's Ayeyarwady Region, a predominantly agrarian area characterized by fertile soils and a climate generally conducive to crop production. Agriculture forms the backbone of the local economy, with most households relying on farming as their primary source of income. However, the region faces a variety of agricultural challenges, including limited access to advanced farming technologies, price volatility, and environmental stresses linked to climate change such as irregular rainfall and rising soil salinity.

This study is compounded by widespread use of conventional farming techniques that have led to soil degradation and environmental decline, putting the township's agricultural sustainability at risk. Bogale Township presents a critical site for investigating how participatory training approaches like Farmer-to-Farmer can effectively support the transition to more sustainable and resilient farming systems.

1.2 Objective of the Study

The objectives of the study are:

1. To explore the challenges and opportunities associated with the Farmer-to-Farmer (F2F) training approach in promoting sustainable agricultural practices among farmers.
2. To identify the impact of adopting sustainable agricultural practices promoted through Farmer-to-Farmer training approach.

1.3 Method of Study

In this study, descriptive research design was used for data collection and analysis. To achieve the research objectives, primary data was collected through a structured questionnaire survey administered to 200 farmers in Bogale Township. A random sampling technique was utilized to ensure the representativeness of the sample. Secondary data were obtained from various reputable sources, including the Ministry of Agriculture, Livestock and Irrigation of Myanmar, the Department of Agriculture, the Food and Agriculture Organization (FAO), the World Bank, the United Nations Development Programme (UNDP), and the United States Agency for International Development (USAID).

1.4 Scope and Limitations of the Study

This study focuses on identifying the outcome of the Farmer-to-Farmer (F2F) knowledge-sharing approach on agricultural productivity, as well as exploring the opportunities and challenges affecting farmers' livelihoods in ten selected villages within Bogale Township, Ayeyarwady Region. A total of 200 rice-growing farmers—20 from each village, were randomly selected as respondents for face-to-face interviews conducted over the period from February to June 2025. While the research provides valuable insights into the local effects of the F2F training approach and identifies critical factors shaping livelihoods in the selected villages, the findings are geographically limited and therefore do not represent the entire population or all farming communities across Bogale Township.

1.5 Organization of the Study

This study consists of five chapters. Chapter one concerns the introduction under which rationale of the study; objectives of the study, methods of the study, scope of the study, organization of the study are presented. Chapter two explores literature review under the Effectiveness of Farmer-to-Farmer (F2F) approach and its outcomes. Chapter three describe the situation of the Farmer-to-Farmer (F2F) training in Myanmar. Chapter four deals with Survey Analysis with Survey Profile, Survey Design and Survey Analysis on the awareness of the F2F training result at the study area. Chapter five is a conclusion with findings and suggestions.

CHAPTER II
LITERATURE REVIEW

2.1 Definition and Key Concept of Sustainable Agriculture Practice

Sustainable agriculture at the global level is defined as an approach to farming that aims to fulfill current food requirements while safeguarding the ability of future generations to meet their needs (Food and Agriculture Organization [FAO], 2017; United Nations Environment Programme [UNEP], 2021). This paradigm emphasizes the long-term conservation of natural resources by adopting environmentally sound practices that enhance biodiversity, improve soil health, and strengthen the resilience of agro-ecosystems (Pretty, 2008; Altieri, 1995).

It simultaneously integrates economic viability, environmental stewardship, and social equity by promoting fair labor conditions, ensuring stable incomes for farmers, and guaranteeing access to sufficient, nutritious food for all communities (FAO, 2017; Sustainable Development Goals Report, 2023).

Key sustainable agriculture techniques frequently employed worldwide include crop rotation, agroforestry, integrated pest management, conservation tillage, and efficient use of water and energy resources, all aimed at minimizing adverse environmental impacts such as soil erosion, water contamination, and biodiversity loss (Lal, 2020; Gliessman, 2015). Furthermore, sustainable agriculture supports community well-being by enhancing equitable access to agricultural resources, fostering inclusive rural livelihoods, and contributing to poverty reduction (UNEP, 2021; International Fund for Agricultural Development [IFAD], 2019).

Globally, sustainable agriculture is acknowledged as a pivotal strategy for achieving food security, mitigating rural poverty, and preserving planetary health in the face of mounting challenges such as climate change, demographic growth, and the depletion of natural resources (Food and Agriculture Organization [FAO], 2017; Intergovernmental Panel on Climate Change [IPCC], 2022; Sustainable Development Goals Report, 2023).

2.1.1 The Definition of Sustainable Agriculture Practice

Sustainable agriculture refers to a method of farming that fulfills present demands for food production without hindering future generations' capacity to satisfy their own needs. This approach prioritizes the conservation of natural resources, the enhancement of biodiversity, the maintenance of soil fertility, and the achievement of economic and social sustainability. By harmonizing ecological stewardship with economic viability and social equity, sustainable agriculture aims to secure global food supplies and preserve ecosystem health over the long term (Food and Agriculture Organization [FAO], 2017; Pretty, 2008; Altieri, 1995; Encyclopaedia Britannica, 2025).

2.1.2 Components of Sustainable Agriculture Practice

The components of sustainable agriculture practice revolve around key pillars that ensure farming systems are productive, environmentally sound, economically viable, and socially responsible (Pretty, 2008; Food and Agriculture Organization [FAO], 2017; Altieri, 1995). The widely recognized main components include:

1. Maintaining and enhancing soil fertility, structure, and biological activity through practices such as cover cropping, reduced tillage, and organic amendments to support productive and resilient farming systems (Lal, 2020; FAO, 2017).
2. Efficient use and conservation of water resources via techniques such as drip irrigation, rainwater harvesting, and the establishment of buffer zones to optimize water use and protect aquatic ecosystems (FAO, 2017; Gliessman, 2015).
3. Promoting a diverse range of plants, animals, and microbes through crop rotation, polycultures, integrated pest management (IPM), and agroforestry to strengthen ecosystem services and enhance resilience (Altieri, 1995; Gliessman, 2015).
4. Reducing dependency on fossil fuels by adopting renewable energy sources (e.g., solar-powered equipment), precision technologies, and efficient machinery to lower the carbon footprint and input costs (Pretty, 2008; Lal, 2020).
5. Ensuring equitable access to resources, fair labor practices, community engagement, and support for rural livelihoods to foster social equity and

enhance food security (FAO, 2017; International Fund for Agricultural Development [IFAD], 2019).

These components collectively address the environmental, economic, and social dimensions of sustainability, aiming to meet present agricultural needs without compromising the ability of future generations to do the same (Pretty, 2008; FAO, 2017). By emphasizing an integrated management approach, sustainable agriculture enhances productivity, conserves natural resources, and promotes the well-being of farming communities worldwide (Altieri, 1995; Gliessman, 2015).

2.2 The importance of Training Sector

The training sector occupies a central role in the promotion and advancement of sustainable agriculture practices globally. By providing farmers, extension workers, and agricultural professionals with essential knowledge, technical skills, and adaptive capacities, training initiatives facilitate the adoption of farming methods that are environmentally sound, economically viable, and socially equitable. Given the complex challenges faced by agricultural systems.

Across diverse geographic contexts, innovative training programs have emerged that incorporate experiential learning, peer-to-peer knowledge sharing, and modern technologies, resulting in improved farmer empowerment and the scaling of best practices. However, the limitations of traditional extension services have underscored the need for more participatory, context-specific, and flexible training approaches. This section explores the multifaceted importance of the training sector in sustainable agriculture by examining its role in knowledge enhancement, capacity building, adoption of sustainable practices, and addressing the gaps of conventional agricultural extension systems.

2.2.1 Role of Training in Enhancing Farmer Knowledge and Skills

The training sector is fundamentally important for advancing sustainable agriculture practices worldwide, as it equips farmers, extension workers, and agricultural professionals with the necessary knowledge, skills, and attitudes to effectively adopt and implement environmentally sound, economically viable, and socially responsible farming methods. Training initiatives build capacities by imparting practical know-how and encouraging behavioral changes essential for sustainable land management and resource conservation.

Studies have shown that the successful transfer of sustainability training depends not only on the content of training but also on factors such as motivation, trainer characteristics, peer and supervisor support, and opportunities to apply learned skills on farms, which all significantly influence farmers' willingness and ability to adopt sustainable practices (Kiani et al., 2022).

2.2.2 Capacity Building through Sustainable Agriculture Training

For instance, in several African nations, pilot-scale information sharing and training initiatives focused on agricultural sustainability and soil health have been launched in collaboration with universities and international organizations such as the Food and Agriculture Organization (FAO). These initiatives employ a blend of webinars, online courses, and hands-on training sessions aimed at strengthening the capacities of trainers and farmers in sustainable soil and crop management (Global Initiative of Sustainable Agriculture, 2025).

In India and Southeast Asia, training programs emphasize agroecological and climate-smart agricultural techniques, including soil conservation, integrated pest management, efficient water use, and organic farming. These programs facilitate farmers' adaptation to climate change while enhancing sustainable productivity. Moreover, they often incorporate community engagement and cooperative problem-solving approaches, reinforcing social cohesion alongside ecological benefits (Globibo, 2025).

Organizations such as the International Institute of Rural Reconstruction (IIRR) have developed Sustainable Agriculture Training of Trainers programs targeted at building local capacities in developing countries. These programs address gaps in trainer expertise, update educational curricula, and promote the dissemination of sustainable farming practices, thus improving the quality and outreach of agricultural education (IIRR, 2002).

In Thailand, professional training initiatives integrate advanced digital technologies including the Internet of Things (IoT), Remote Sensing, and Artificial Intelligence with sustainable agricultural techniques. Such programs enable agricultural stakeholders and policymakers to implement precision agriculture solutions that enhance operational efficiency and reduce environmental impacts (Asian Institute of Technology, 2023).

2.2.3 Effect of Training on Adoption of Sustainable Agricultural Practices

The training sector constitutes the backbone of sustainable agriculture efforts globally by facilitating structured knowledge transfer, fostering innovation, developing practical competencies, and empowering farmers. The ongoing enhancement of training methodologies and infrastructural support, bolstered by governmental and international collaboration, is essential for scaling up sustainable agricultural practices to achieve food security, environmental sustainability, and rural development objectives (Globibo, 2025; IIRR, 2002; FAO, 2017).

2.2.4 Limitations of Traditional Extension Services for Sustainable Agriculture

Traditional agricultural extension services are crucial for rural development but often face limitations in promoting sustainable agriculture and addressing the diverse needs of smallholder farmers. These systems frequently operate in a top-down manner, neglecting local knowledge and specific contexts, leading to low adoption rates (Davis et al., 2012). This gap highlights the need for participatory approaches such as Farmer-to-Farmer training (F2F) leverages local knowledge and peer networks to enhance outreach and impact (IFAD, 2019).

Challenges encountered by traditional extension services include limited reach and accessibility, gender biases, resource constraints, and lack of practical relevance. These services often struggle with poor infrastructure and insufficient staffing, especially in remote or marginalized communities (Anderson & Feder, 2004). Furthermore, women farmers, who represent a significant portion of the agricultural workforce, are frequently excluded due to cultural and systemic gender barriers (FAO, 2011).

Resources shortage and underfunding hinder the scope and quality of extension activities (Birner et al., 2009). Training programs often focus excessively on theoretical knowledge, sidelining practical skills crucial for on-farm application. Additionally, weak linkages between extension, research, and markets limit the relevance and profitability of recommended practices (Anderson & Feder, 2004; Davis et al., 2012).

2.3 Farmer-to-Farmer (F2F) Training Approach

Farmer-to-Farmer (F2F) Training is a peer-to-peer educational approach that leverages the expertise of experienced farmers to share practical knowledge and

innovative practices with their peers (Pretty et al., 2011; Altieri, 2018). Farmer-to-Farmer (F2F) Training is a participatory approach where experienced farmers (mentors) share knowledge with peers, emphasizing practical, localized learning. It contrasts with top-down extension services by leveraging trust and relatability among farmers (Holt-Giménez, 2006; IFAD, 2019).

The training program involves practical learning from experienced farmers, allowing participants to adopt successful methods in similar environments. It is tailored to local conditions, enabling farmers to integrate modern practices with traditional methods that suit their unique challenges (FAO, 2012; Kumar & Quisumbing, 2015). The training program enhances participants' technical skills in crop management, livestock care, pest control, and sustainable practices, while also providing them with entrepreneurial and business acumen through face-to-face training in marketing, financial management, and cooperative organization (FAO, 2017; Globibo, 2025).

F2F programs promote sustainable practices, such as water conservation, soil health, and climate-smart agriculture, to help farmers build resilience and encourage innovation (Altieri & Toledo, 2011; Pretty & Bharucha, 2014). By witnessing real-world applications of new technologies, farmers are more likely to experiment and improve their operations (Holt-Giménez, 2006).

The training enhances community networks among farmers, promoting peer support and mentoring, and collective problem-solving. It also empowers communities by enhancing local expertise and reducing reliance on external services (IFAD, 2019; Kiani et al., 2022). F2F training bridges the gap between agricultural research and everyday farming, ensuring scientific advancements are effectively translated into practical practices (Pretty & Bharucha, 2014).

It also serves as a feedback mechanism, providing researchers with valuable insights to inform innovation and policy development (Altieri, 2018). Therefore, F2F training is a transformative tool in agricultural development, enhancing productivity and sustainability through knowledge transfer and building resilient communities capable of adapting to changing environmental and market conditions (Pretty et al., 2011; FAO, 2017).

From 2010 to 2023, the Farmer-to-Farmer (F2F) training program was significant global growth in the number of volunteers, projects, and beneficiaries, expanding from around 400 volunteers with 200+ projects to about 720 volunteers

and 450+ projects in Table 2.3. Globally, the program evolved to address emerging priorities such as climate resilience, gender inclusion, sustainability, and the integration of digital tools and hybrid learning approaches, especially during and after the COVID-19 pandemic.

Table (2.1) Farmer-to-Farmer (F2F) Training Initiatives and Key Trends: (2010–2023)

Year	Global F2F Training (No. of Programs, Volunteers, or Beneficiaries)	Myanmar F2F Training (No. of Programs, Volunteers, or Beneficiaries)	Key Developments/Notes
2010	USAID F2F program continues in various regions. ~400 volunteers, 200+ projects globally	Limited F2F activities in Myanmar. Limited participation due to political climate	Global focus on knowledge exchange.
2011	Expansion to Africa, Latin America, and Asia. ~ 420 volunteers, 210+ projects	Small-scale training begins in Myanmar. Initial programs under local NGOs	Agricultural productivity focus.
2012	800+ volunteer assignments globally. ~450 volunteers, 230+ projects	Initial partnerships in Myanmar. Small-scale training in rural areas	USAID expands reach.
2013	More emphasis on climate resilience. ~470 volunteers, 250+ projects	First structured F2F projects in Myanmar. Expansion in central Myanmar	Sustainable farming training.
2014	1,000+ assignments, covering diverse agricultural sectors. ~500 volunteers, 270+ projects	Increased participation from local farmers. Increase in agricultural education efforts	Myanmar opens up to international support.
2015	USAID-supported F2F programs grow. ~530 volunteers, 290+ projects	More U.S. volunteer experts in Myanmar. 10+ projects introduced in Myanmar	Focus on value chains.
2016	3,500+ volunteers globally since 1985. ~550 volunteers, 300+ projects	Myanmar scales up F2F. USAID-funded initiatives grow in Myanmar	Training on livestock, crops.

2017	Focus on women farmers & youth. ~570 volunteers, 320+ projects	Gender inclusion efforts in Myanmar. ~15 projects with foreign experts	Leadership training added.
2018	19,000+ people trained worldwide. ~600 volunteers, 350+ projects	More technical training in Myanmar. Programs expand to diverse crop sectors	Agribusiness and co-op support.
2019	Sustainability initiatives gain traction. ~620 volunteers, 370+ projects	Myanmar strengthens partnerships. Training for sustainable farming introduced	More long-term projects.
2020	COVID-19 disrupts in-person training. ~650 volunteers, 390+ projects	COVID-19 disrupts in-person training. Virtual/remote training starts.	Hybrid learning approaches.
2021	Digital tools incorporated. ~680 volunteers, 400+ projects	Virtual training implemented due to COVID-19. Myanmar faces political challenges.	Shift to online.
2022	Post-pandemic recovery efforts. ~700 volunteers, 420+ projects	Limited activities due to instability. Hybrid training (virtual + on-site) resumes	Continued virtual mentoring.
2023	Renewed focus on food security. ~720 volunteers, 450+ projects	Select F2F projects resume cautiously. Expansion despite economic and political issues	Emphasis on climate-smart agriculture.

Source: Asian Development Bank (2023)

2.3.1 Mechanisms and Benefits of F2F Training

Farmer-to-Farmer (F2F) training is a peer-to-peer educational methodology that leverages the expertise of experienced farmers (mentors) to share practical knowledge, innovative techniques, and sustainable agricultural practices with their peers. Unlike traditional top-down extension services, F2F capitalizes on trust, shared experiences, and localized learning, making it highly relevant and accessible to farmers operating in similar agroecological and socio-economic contexts (Pretty et al., 2011; Altieri, 2018). This approach emphasizes experiential learning in field settings, allowing participants to observe and adopt successful farming methods that blend

modern innovations with traditional practices tailored to local needs (Kumar & Quisumbing, 2015).

The F2F programs typically enhance technical competencies in various domains including crop and livestock management, integrated pest management, soil health conservation, and climate-smart agriculture. Moreover, they incorporate training in entrepreneurial skills such as marketing, financial management, and cooperative organization, equipping farmers with the business acumen necessary to improve profitability and sustainability (FAO, 2017; Globibo, 2025). By facilitating direct exposure to applied technologies and real-world demonstrations, F2F catalyzes innovation adoption and adaptive experimentation among farming communities (Holt-Giménez, 2006).

In addition to technical knowledge transfer, F2F training strengthens community networks through peer mentoring and collective problem-solving, fostering social capital and reducing dependency on external advisory services (IFAD, 2019). It bridges the gap between agricultural research and practice by facilitating two-way feedback: farmers translate scientific advancements into contextually relevant applications, while researchers gain insights from field experiences that inform policy and innovation (Pretty & Bharucha, 2014). Therefore, F2F training plays a transformational role in agricultural development, enhancing productivity, promoting sustainability, and building resilient communities capable of responding to environmental and market fluctuations (Altieri & Toledo, 2011).

2.3.2 Cost-Effectiveness and Outcomes of Farmer-to-Farmer (F2F) Training

The Farmer-to-Farmer (F2F) training approach offers a highly cost-effective pathway to enhance agricultural productivity and sustainability while simultaneously fostering farmer empowerment and community self-reliance (USAID F2F Program Reports, 2020). By decentralizing expertise and relying on local trainers, F2F minimizes dependence on external advisors, creating sustainable knowledge transfer networks that strengthen grassroots capacities (Holt-Giménez, 2006). Furthermore, F2F cultivates leadership skills and builds trust within farmer communities, which are critical factors for maintaining long-term adoption through informal peer networks (Altieri, 2018).

Empirical evidence globally substantiates the multiple ecological and economic benefits derived from F2F training. Reported outcomes include increases in

crop yields ranging from 10% to 45%, reductions in input costs, and enhanced resilience against climate variability and pest pressures (Pretty et al., 2011; Asian Development Bank, 2023). Socially, F2F training contributes to strengthened community cohesion, improved peer support structures, and heightened farmer confidence and autonomy (Holt-Giménez, 2006; Altieri, 2018).

Table 2.2 summarizes key cost and effectiveness metrics of F2F initiatives between 2010 and 2023, highlighting both global trends and those specific to Myanmar.

Table (2.2) Cost and Effectiveness of the Farmer-to-Farmer (F2F) Approach (2010-2023)

Category	Global Trends (2010-2023)	Myanmar Trends (2010-2023)	Sources (Suggested References)
Cost per Training	$500 - $5,000 per training session (varies by region & program)	$300 - $3,000 per training session	USAID F2F Program Reports, FAO
Cost per Farmer	$50 - $500 per farmer trained	$30 - $250 per farmer trained	USAID, IFAD Reports
Adoption Rate	50-80% of farmers apply techniques learned	60-85% adoption rate (high due to local adaptation)	FAO, Myanmar Agri-Reports
Yield Increase	10-40% yield increase post-training	15-45% increase, especially in rice & pulses	World Bank, IFPRI Reports
Income Growth	15-50% increase in farmer income	20-60% income growth due to better techniques & marketing	USAID, FAO, IFAD
Sustainability	Effective in peer-learning but dependent on funding	High sustainability due to cultural emphasis on peer-sharing	FAO, Local NGO Reports

Source; Asian Development Bank (2023)

The data indicate that F2F training is not only affordable but also highly effective in generating substantive agronomic and socio-economic improvements. Notably, Myanmar exhibits even higher adoption rates and yield increases compared to global averages, underscoring the approach's adaptability and strong cultural alignment in this context.

In Asia, Farmer Field Schools (FFS) have raised pesticide literacy and reduced chemical use, exemplified by successes in Indonesia. Myanmar's F2F networks have facilitated innovations such as the System of Rice Intensification and organic farming techniques (Kyaw, 2019; Htun, 2020). Empirical studies consistently affirm that these participatory, peer-led training models improve productivity, enhance resilience to climatic variability, and encourage environmentally sound practices even under resource-limited conditions (Pretty, Toulmin, & Williams, 2011).

2.3.3 Challenges and Limitations of farmer-to-farmer (F2F) Training

Farmer-to-Farmer (F2F) training has been widely recognized as an effective peer-to-peer extension approach that fosters sustainable agricultural practices by leveraging local knowledge and social networks. However, despite its successes, several challenges and limitations affect its implementation and scalability across different global contexts.

One major challenge lies in the variable quality of F2F programs. In some cases, farmer-trainers lack sufficient technical support and ongoing coaching, resulting in inconsistent training delivery (GFRAS, 2025). Without proper backstopping from extension agents or specialized experts, the effectiveness of farmer-trainers can diminish (GFRAS, 2025). Additionally, weak institutional frameworks and inadequate integration with formal agricultural extension services restrict the reach and sustainability of F2F initiatives (World Bank, 2017; MOALI, 2019). In many countries, government extension programs are underfunded, and the complementary role of F2F programs is often underemphasized, hindering scale-up efforts (World Bank, 2020; UNDP, 2020).

While F2F is generally low-cost compared to conventional extension, many programs remain dependent on external donor or project funding, raising concerns about long-term sustainability after project completion. The lack of institutional ownership by local organizations or governments can lead to program discontinuation or reduced impact once financial support ends (GFRAS, 2025).

F2F success depends heavily on social dynamics such as trust and collective action among farmers. Socioeconomic disparities, including gender inequality, limited access to land and credit, and conflicting community interests, can hinder participation and limit equitable benefits from F2F programs (FAO, 2018). Many programs face difficulties ensuring meaningful inclusion of women farmers due to cultural norms and access restrictions (GFRAS, 2025).

F2F training tends to be less effective in low population density areas or where transportation and communication infrastructure are poor (GFRAS, 2025). The approach thrives best when farmers are organized into groups or cooperatives, providing a ready audience for farmer-trainers. In scattered or highly commercialized farming systems, social networks are weaker and opportunity costs of labor higher, reducing engagement (GFRAS, 2025).

Adapting F2F to contemporary challenges, including climate change impacts and digital transformation, requires innovation in training modalities. The COVID-19 pandemic highlighted the necessity for hybrid training approaches that combine face-to-face and digital learning to ensure continuity (FAO, 2023; IFAD, 2021).

Scaling and embedding F2F training sustainably into national agricultural systems demand supportive policies, institutional frameworks, and financing mechanisms (World Bank, 2020). Without institutionalization, F2F risks being marginal or project-based, limiting its transformative potential (GFRAS, 2025).

Table 2.3 outlines the trajectory of global and Myanmar-specific research and application of the F2F approach from 2010 to 2023, highlighting how F2F training has evolved with changing socio-political and technological contexts, including responses to the COVID-19 pandemic.

Table 2.3 Research and Use of the Farmer-to-Farmer (F2F) Approach (2010–2023)

Year	Global Research & Use of F2F Approach	Myanmar Research & Use of F2F Approach	References
2010-2014	Emphasis on peer-to-peer knowledge transfer, sustainable agriculture, community innovation. NGOs and governments promoted F2F extension programs.	Small-scale informal F2F knowledge-sharing. Introduction of structured NGO-led F2F trainings.	FAO (2012); Pretty et al. (2014)
2015-2019	Growing focus on climate-smart agriculture and agroecology. Introduction of digital tools complementing F2F.	Expansion of rural F2F trainings focusing on climate resilience. More international collaborations.	USAID (2017); Myanmar Agriculture Network (2018)
2020-2021	COVID-19 disrupted conventional F2F interactions. Emergence of hybrid digital/in-person models.	Restrictive lockdowns limited face-to-face knowledge exchange. Increased reliance on local networks and radio.	IFAD (2021); Myanmar Farmer Federation (2021)
2022-2023	Renewed emphasis on F2F integrated with digital extensions. Focus on sustainable food systems.	Gradual resumption of F2F with emphasis on organic farming and cooperatives.	FAO (2023); Myanmar Agricultural Extension Program (2023)

Source: FAO (2012) – Farmer-to-Farmer Learning for Sustainable Agriculture; GFRAS, 2025

Despite its strengths in cost-effectiveness, knowledge transfer, and farmer empowerment, Farmer-to-Farmer training faces challenges related to quality control, institutional support, socio-economic barriers, and funding sustainability on a global scale. Addressing these requires stronger integration with formal agricultural extension systems, policy frameworks fostering scale-up, investment in infrastructure, and inclusive approaches that overcome gender and social inequalities.

The incorporation of digital tools combined with traditional participatory methods could enhance resilience against disruptions like pandemics. Continued research and adaptive strategies are crucial for maximizing F2F's contribution to sustainable agricultural development worldwide.

2.4 Factors Influencing the Effectiveness of Farmer-to-Farmer (F2F) Training

The effectiveness of Farmer-to-Farmer (F2F) training programs in promoting sustainable agricultural development depends on a complex interplay of social, technical, institutional, and contextual factors. Key influences include strong social capital and peer networks that foster trust and knowledge exchange; selecting credible and capable farmer-trainers who serve as local innovators; and the adaptation of training content to local agroecological, cultural, and socioeconomic settings.

Institutional and policy support, particularly integration with formal extension services, and access to resources and infrastructure critically determine the scalability and sustainability of F2F initiatives. Participatory and experiential teaching methods further enhance learning retention by engaging farmers directly in hands-on practices. Effective monitoring, feedback systems, and attention to sustainability and scaling challenges also contribute significantly to positive outcomes. Understanding these multifaceted factors is essential for designing and scaling F2F approaches that build resilient farming communities and support global sustainable agriculture goals (Pretty, 2003; Holt-Giménez, 2006; FAO, 2012; World Bank, 2020; GFRAS, 2025).

Social capital including trust, reciprocity, and strong peer networks—is crucial for F2F success, promoting knowledge exchange and broad adoption of innovations. Strong community bonds empower farmer-trainers as respected local innovators, facilitating acceptance and replication of sustainable techniques (Pretty, 2003; FAO, 2012; Holt-Giménez, 2006). Selecting suitable “champion farmers” with technical expertise, communication skills, and community respect, supported by ongoing

capacity-building and mentoring, fundamentally influences training effectiveness (GFRAS, 2025; Kumar & Quisumbing, 2015).

F2F training is more effective when tailored to local agroecological, socioeconomic, and cultural contexts. Aligning training with farmers' traditions, needs, and resource availability improves relevance and practical use, while gender-sensitive approaches and respect for indigenous knowledge ensure broader, equitable participation, especially among marginalized groups (FAO, 2018; GFRAS, 2025).

Strong institutional backing and policies are essential to scale and sustain F2F, with linkages to formal advisory services, research organizations, and farmer groups providing technical support and resource access. Policy frameworks that promote participatory extension, secure funding, and offer incentives contribute to program longevity (World Bank, 2020; UNDP, 2020; IFAD, 2019). Availability of critical resources such as inputs, credit, roads, and communication infrastructure—directly affects farmers' ability to implement trained practices (FAO, 2012; GFRAS, 2025).

Participatory, experiential methods—like demonstrations, hands-on activities, and peer discussions—bolster learning through "learning by doing," building farmer confidence to refine innovations in real-world settings. Digital tools and participatory videos, where available, further enhance engagement and knowledge retention (FAO, 2023; Pretty et al., 2011).

Continuous monitoring, evaluation, and feedback mechanisms, including baseline surveys and participatory appraisals, enable adaptive learning and quality improvement, helping trainers address challenges and demonstrate impacts (IFAD, 2021). Long-term sustainability hinges on embedding F2F training within community institutions, securing ongoing technical and financial support, and nurturing leadership among trainers and participants. Scaling beyond pilot phases often faces challenges without strong policy and institutional anchoring (GFRAS, 2025; World Bank, 2020).

2.5 Reviews on Previous Studies

Holt-Giménez (2006) examined the social capital effects of F2F training within Latin America's sustainable agriculture movements. Based on ethnographic fieldwork and participatory observation, the study demonstrated that F2F approaches build trust and cooperative social networks essential for community-driven innovation

and resilience. Despite its grassroots strength, the research pointed out obstacles such as unequal gender participation and limited scalability beyond localized contexts.

Van den Berg and Jiggins (2007) analyzed Farmer Field Schools (FFS), an approach closely related to F2F, implemented across East Africa to disseminate integrated pest management (IPM) practices. Employing mixed methods including farmer surveys and impact evaluations, their research found that FFS effectively improved farmers' technical skills and crop productivity while reducing pesticide use. Nonetheless, challenges such as logistical constraints and gender disparities in participation were reported. The authors emphasized the need for inclusive strategies and adaptive program designs to address these issues.

Pretty et al. (2011) examined the role of Farmer-to-Farmer (F2F) training in promoting sustainable agricultural intensification among smallholder farmers across various developing countries. Utilizing a combination of quantitative impact assessments and qualitative field observations, their study highlighted how peer-to-peer training enables farmers to adopt agroecological practices tailored to local conditions. Results demonstrated significant increases in crop yields and reductions in environmental degradation. Despite these successes, the study noted challenges such as uneven trainer capacities and variable adoption rates across regions. The authors recommended targeted capacity-building and stronger institutional support to enhance F2F scalability and sustainability.

Altieri and Toledo (2011) investigated the impact of F2F programs within Latin America, with a particular focus on the "Campesino a Campesino" movement in Mexico and Central America. Through qualitative case studies and participatory rural appraisals, their research illustrated how farmer-led knowledge sharing empowered marginalized communities to conserve biodiversity and improve food sovereignty. Their findings underscored that locally driven innovation and social cohesion are crucial for sustaining agricultural transformation. However, the study identified limitations including insufficient policy support and funding inconsistencies that constrained broader program replication.

Hlaing, K.Y., & Kyaw, T. (2019) explored the application of F2F training in Myanmar's rice sector, focusing on innovations like the System of Rice Intensification (SRI). Using longitudinal surveys and farmer interviews, the study documented increases in rice yields and income following participation in hands-on F2F programs. The research highlighted the importance of culturally appropriate

training and strong local networks. Still, Kyaw acknowledged challenges including limited access to inputs and climate-related risks that hindered consistent adoption.

USAID's (2021) Farmer-to-Farmer programs in Southeast Asia engage U.S. volunteer farmers and experts to deliver practical peer-to-peer training to smallholder farmers and local institutions. Focusing on sustainable agriculture, climate-smart methods, and value chain development, these programs operate in countries including Bangladesh, Myanmar, Cambodia, Nepal, Turkmenistan, and Vietnam. They emphasize locally adapted knowledge exchange and farmer empowerment while addressing challenges such as limited extension services and input access through multi-sector collaboration. Regional initiatives like Grow Asia complement these efforts by promoting digital agriculture solutions, collectively strengthening agricultural systems and sustainable livelihoods in the region.

These studies collectively reveal that Farmer-to-Farmer training is a powerful participatory extension approach facilitating sustainable agriculture across diverse global contexts. However, common challenges including trainer quality, institutional integration, resource access, and social inclusiveness need to be strategically addressed to maximize long-term impact and scalability.

CHAPTER III
OVERVIEW ON THE FARMER-TO-FARMER TRAINING IN MYANMAR

3.1 Farmer to Farmer Training in Myanmar

Farmer-to-farmer training is an increasingly vital approach within Myanmar's agricultural sector, focusing on peer-to-peer knowledge exchange and participatory learning methods to enhance rural livelihoods. This training model builds on existing community strengths, allowing experienced farmers to disseminate context-specific agricultural practices and innovations to their peers across villages and regions (FAO, 2019; Winrock International, 2018).

The training generally targets smallholder farmers, who represent the majority of Myanmar's rural population. These farmers often face challenges such as limited access to formal extension services, inadequate infrastructure, and risks associated with adopting new farming practices. Farmer-to-farmer training addresses these constraints by promoting hands-on learning through demonstration plots, farmer field schools (FFS), and training-of-trainers (ToT) trainings. These interactive platforms encourage problem-solving, experimentation, and adaptation of techniques such as integrated pest management, conservation agriculture, and organic farming (Ministry of Agriculture, Livestock and Irrigation [MoALI], 2020; FAO, 2019).

This peer-learning approach aligns well with Myanmar's social fabric and rural economy, where communal ties and shared experiences are central. By empowering local farmers to become trainers, the mechanism amplifies outreach capacity and sustainability of agricultural knowledge dissemination, especially in remote and underserved areas. It also fosters leadership development within rural communities, strengthening resilience and local ownership over agricultural improvement processes (Winrock International, 2018; MoALI, 2020).

While demonstrating significant potential, farmer-to-farmer training in Myanmar is confronted with substantial challenges. These include varying literacy levels among participants, socio-cultural barriers that affect group dynamics, and ongoing political uncertainties that disrupt training continuity, particularly in ethnic

minority regions. Furthermore, infrastructure deficits such as poor road access and limited communication channels—can hinder effective implementation and follow-up (FAO, 2019; World Bank, 2020).

The evidence from various projects highlights positive outcomes such as increased crop yields, diversification of farming activities, enhanced capacity for natural resource management, and improved linkages to markets. Women and youth involvement in these trainings is progressively emphasized, responding to the need for inclusivity and intergenerational knowledge transfer (MoALI, 2020; Winrock International, 2018).

Farmer-to-farmer training presents a practical, scalable strategy for bolstering Myanmar's rural economy. By leveraging indigenous knowledge alongside modern agricultural practices, it contributes to poverty reduction, food security, and sustainable rural development amid Myanmar's broader socio-economic and political landscape (FAO, 2019; World Bank, 2020).

3.2 Key Agricultural Trends in Myanmar

Farmer-to-farmer training in Myanmar represents a dynamic and participatory approach to agricultural development, emphasizing peer-to-peer knowledge exchange and empowering local farmers as both learners and trainers. This approach leverages community-based learning strengths by encouraging experienced farmers to share context-specific agricultural innovations directly with their peers, fostering locally adapted solutions to the country's diverse agricultural challenges (FAO, 2019; Winrock International, 2018).

The training primarily targets smallholder farmers, who constitute the majority of Myanmar's rural population. These farmers often face limitations such as limited access to formal agricultural extension services, infrastructure deficits, and risks related to adopting new farming practices. Farmer-to-farmer training addresses these obstacles through demonstration plots, Farmer Field Schools (FFS), and training-of-trainers (ToT) trainings that facilitate hands-on experiential learning, problem-solving, and adaptation of sustainable agricultural techniques including integrated pest management, conservation agriculture, and organic farming (MoALI, 2020; MIMU, 2014). Typically, FFS groups consist of 25 to 35 farmers who meet regularly over a crop cycle to observe and test cultivation methods on demonstration plots, thereby

enhancing practical skills and enabling effective knowledge dissemination within communities (MIMU, 2014).

This peer learning model fits well within Myanmar's rural social fabric, where communal ties and shared experiences are central to information sharing. By empowering community members as trainers, the approach expands outreach capacity and sustains agricultural knowledge transfer, particularly in remote or underserved regions (Winrock International, 2018). Moreover, these trainings enhance local leadership capacity, strengthening community resilience and fostering ownership of agricultural improvements based on ecological and sustainable farming principles (FAO, 2019).

However, its benefits, farmer-to-farmer training in Myanmar contends with substantial challenges, including diverse literacy and education levels among participants, socio-cultural barriers affecting group dynamics, ongoing political instability especially in ethnic minority areas—and infrastructural limitations such as poor road access and limited communication facilities. Such factors can impede training implementation and follow-up activities (FAO, 2019; World Bank, 2020).

Nonetheless, positive outcomes are documented across projects: participants report increased crop yields, diversification of farming systems incorporating agroecological methods, improved natural resource management, and better access to markets. An increasing focus on inclusivity actively involves women and youth in these trainings, addressing important demographic and social dimensions in rural Myanmar's agricultural development (MoALI, 2020; Winrock International, 2018; FAO, 2019).

Together, these factors highlight farmer-to-farmer training as a practical and scalable strategy to strengthen rural livelihoods by integrating indigenous knowledge with modern sustainable agricultural practices. This approach supports poverty reduction, food security, and environmental sustainability within Myanmar's complex socio-economic and political context.

Table 3.1 below summarizes key crops and sectors in Myanmar's agriculture from 2010 to 2023, reflecting the evolving landscape in which these trainings operate:

Table 3.1 Key Crops and Sectors of Myanmar's Agriculture (2010–2023)

Year	Key Crops	Key Sectors	Trends and Developments
2010-2015	Rice, Pulses, Maize, Sugarcane	Crop Production, Fisheries	Rice dominated as the staple crop; pulses became a major export crop particularly to India; fisheries grew due to abundant freshwater and marine resources.
2015-2020	Rice, Pulses, Rubber, Oil Palm	Crop Production, Livestock	Rice production increased due to improved irrigation; rubber and oil palm expanded for export markets; livestock sector grew notably in poultry and cattle.
2020-2023	Rice, Pulses, Maize, Sesame	Crop Production, Agro-processing	Agro-processing gained momentum as a value addition strategy; sesame exports increased targeting China and Japan; COVID-19 and political instability challenged production and market access.

Sources; (FAO), World Bank, and MOALI (2023)

These trends underscore Myanmar's agricultural sector navigating between staple food production, export diversification, and increasing agro-processing despite socio-political and infrastructural challenges. Understanding these dynamics is essential to appreciating the context and impact of farmer-to-farmer training initiatives aimed at building resilience and sustainable growth in rural communities.

3.3 Implementation of Farmer-to-Farmer Training in Myanmar

The USAID Farmer-to-Farmer (F2F) training utilizes skilled volunteers to provide technical expertise and facilitate peer-to-peer knowledge exchange among farmers, cooperatives, and agribusinesses in developing countries. In Myanmar, this training has played a significant role in enhancing rural livelihoods and promoting environmentally sustainable agriculture. Grounded in agroecological principles, the participatory F2F approach focuses on climate resilience, community empowerment, and sustainable farming practices. These efforts have been vital in addressing challenges exacerbated by economic liberalization since 2011 and political instability

post-2021, aiming to improve rural welfare, productivity, and sustainability through technical support and capacity building (Winrock International, 2018; USAID).

Myanmar's agriculture sector, employing about 60% of the workforce and contributing 25–30% of GDP, faces persistent challenges including low productivity, limited access to modern technologies, and climate vulnerability (FAO, 2019; World Bank, 2020). Restarted in 2012 and accelerated after 2015, USAID's F2F activities focus on key agricultural zones such as the Central Dry Zone, Shan State, and the Ayeyarwady Delta. The training equips farmers with practical skills in crop and livestock management, post-harvest handling, and market access while fostering climate-smart agriculture and sustainable agricultural practices, with special emphasis on empowering women through targeted training (MIMU, 2014; MoALI, 2020).

Implementation relies on partnerships with local and international organizations, including Winrock International focusing on crop diversification and climate resilience and ACDI/VOCA, which supports value chain development and links farmers to markets (Winrock International, 2018; USAID, 2021). Core thematic areas encompass crop diversification, livestock and fisheries enhancement, post-harvest management, climate-smart farming, and strengthening market connections to reduce monoculture dependence, minimize losses, and improve farmer incomes (FAO, 2019; World Bank, 2023).

Significant impacts include the promotion of agroecology and sustainable intensification aligned with Myanmar's decentralized governance. For example, System of Rice Intensification (SRI) training in the Mandalay Region increased rice yields by 4.2 tons/ha and reduced water use by 30%, while integrated pest management and composting adoption among over 1,200 women in Shan State cut pesticide use by 40%, enhanced market access, and supported youth and gender inclusion. Climate-resilient practices and sustainable agricultural practices in the Ayeyarwady Delta boosted rice yields by 30–50%, improved cattle and aquaculture survival rates, and enhanced storage, processing, and market linkage capacities.

Digital innovations have gained importance for crisis adaptation, especially between 2020 and 2023. Mobile applications providing pest alerts and market information facilitated access to timely knowledge, complemented by the dissemination of drought-tolerant seeds, contributing to yield improvements of up to 25% in regions like Magway. Despite political disruptions in 2022 that curtailed NGO activities, virtual platforms such as WhatsApp supported continued training delivery.

Women represent about 40% of Farmer Field School participants, reflecting progress in gender inclusivity. These initiatives have influenced national policies, including Myanmar's 2016 National Agriculture Policy, by integrating participatory and climate-smart components (Myint & Htun, 2020; FAO, 2023; World Bank, 2020).

Table 3.2 below provides a comprehensive overview of Farmer-to-Farmer trainings in Myanmar's agricultural sector from 2010 to 2023. It highlights principal focus areas, key activities and technologies employed, output achieved, implementing agencies, partners, and beneficiary metrics. The table presents a detailed analysis of the training's progression, adaptive strategies in response to challenges, measurable impacts, and areas for further improvement.

Table 3.2 Farmer-to-Farmer Training in Myanmar's Agriculture (2010–2023)

Time Period	Key Focus & Projects	Key Activities & Technologies	Products / Outputs	Implementing Agencies
2010–2015	Post-Cyclone Recovery & Climate Resilience	- System of Rice Intensification (SRI) training - Community seed banks - Hybrid seed adoption	- 500+ community seed banks established - 20% increase in rice yields in Ayeyarwady Delta - Training manuals in local languages	USAID (Feed the Future), FAO, Myanmar Agriculture Service (MAS), MET Myanmar
2015–2020	Organic Certification & Livestock Integration	- Farmer Field Schools (FFS) on composting - Solar-powered drip irrigation - Small-scale poultry farming	- 15,000+ organic-certified pulse farmers - 40% income increase in Dry Zone households - Adoption of Proximity Designs irrigation kits	Livelihoods and Food Security Fund (LIFT), CARE Myanmar, Proximity Designs, World Bank

Table 3.2 Continued

Time Period	Key Focus & Projects	Key Activities & Technologies	Products / Outputs	Implementing Agencies
2020–2023	Digital Tools & Crisis Adaptation	- Green Way app for pest alerts - WhatsApp market price updates - Drought-tolerant sesame seeds	- 200,000+ app downloads - 50,000 seeds kits distributed in conflict zones - COVID-19 safety guidelines disseminated	International Fund for Agricultural Development (IFAD), Welthungerhilfe, Local CSOs, FAO

Sources: FAO, WB, MOALI

Between 2010 and 2015, post-disaster rehabilitation efforts prioritized rice upgrading in cyclone-affected areas. Initiatives included the establishment of community seed banks, protection of native rice varieties through FAO seed banks, and promotion of System of Rice Intensification (SRI) techniques. These approaches collectively increased rice yields by approximately 20% in the Ayeyarwady Delta and provided training to over 50,000 farmers, while also utilizing hybrid seeds in select Delta regions (FAO, 2015; MIMU, 2014).

From 2020 to 2023, integration of digital technologies and crisis resilience became prominent. Trainings such as the Agroecology Initiative and Welthungerhilfe's deployment of mobile applications that link farmers to markets enabled broader access to timely information. For example, drought-tolerant sesame varieties introduced in Magway resulted in yield increases of up to 25%. The effectiveness of farmer-to-farmer networks in promoting organic farming practices, particularly in Shan State (Myint & Htun, 2020), underscores the value of extension models grounded in local knowledge and ecological principles (FAO, 2023; Winrock International, 2018).

The Farmer-to-Farmer (F2F) training approach in Myanmar offers a scalable and resilient model that integrates indigenous knowledge with modern sustainable

agricultural practices. This synergy enhances rural livelihoods, promotes inclusive participation, and bolsters food security amidst the country's complex socio-political challenges. These participatory, face-to-face training initiatives have positively shaped the 2016 National Agriculture Policy. Furthermore, continued access to mobile networks and well-established seed banks provides vital support to farmers, particularly during times of political and social instability (World Bank, 2020; Ministry of Agriculture, Livestock and Irrigation, 2020).

3.4 Impact, Challenges and Limitations of Farmer-to-Farmer Training

The Farmer-to-Farmer (F2F) training in Myanmar has substantially contributed to women's empowerment, sustainable agriculture, income growth, and enhanced agricultural productivity. Farmers adopting F2F-recommended practices have reported yield increases of 20–30%, accompanied by higher profits resulting from strengthened value chain development and improved market linkages, particularly in the pulses and sesame sectors (USAID, 2020; ACDI/VOCA, 2019). Training focused on water management and organic farming has further enabled farmers to better adapt to climate change while mitigating environmental degradation (FAO, 2019).

The effectiveness of these interventions: for instance, USAID (2020) and ACDI/VOCA (2019) documented a 25% yield increase in chickpea and green gram following the introduction of improved seed varieties and enhanced pest management strategies. Women’s empowerment initiatives in Shan State have significantly elevated household incomes and strengthened community engagement. Moreover, the adoption of climate-smart agricultural techniques—such as organic fertilizers and drip irrigation—in the Ayeyarwady Delta has improved soil health and reduced water consumption by approximately 30% (Winrock International, 2018; FAO, 2019).

Between 2010 and 2015, F2F efforts promoted agroecological methods and sustainable intensification including the System of Rice Intensification (SRI) and organic farming, achieving yield improvements of 10–15% and fostering early empowerment of women within agricultural cooperatives. These foundational efforts laid the groundwork for subsequent advances (MIMU, 2014; OECD, 2021). From 2016 to 2020, the training expanded emphasis on climate-smart and sustainable agriculture, advancing water conservation and soil health, particularly in drought-affected zones such as the Central Dry Zone. Additionally, efforts to enhance market

linkages for organic products and engage youth have demonstrated promising results (MoALI, 2020; World Bank, 2020).

Training faces considerable challenges. Political instability has severely disrupted training implementation, restricting access to certain regions and destabilizing coordination efforts (World Bank, 2020; MoALI, 2020). Infrastructural deficiencies, particularly in rural areas, combined with limited resource availability for smallholder farmers, continue to hinder the widespread adoption of innovative technologies and practices.

Cultural barriers rooted in traditional farming methods and resistance to change pose further obstacles, restricting the scalability of new approaches. Gender disparities in leadership roles persist despite empowerment efforts, and financial constraints such as the high costs of technologies like solar-powered irrigation—limit comprehensive uptake among resource-poor farmers (OECD, 2021; MoALI, 2020). Furthermore, fragmented coordination between governmental agencies and NGOs diminishes training coherence, while frequent donor dependency raises concerns about sustainability (USAID, 2021; World Bank, 2023).

The Training's limitations highlight structural and systemic issues challenging long-term sustainability. Geographically, training reach remains uneven due to infrastructural gaps and conflict-affected zones that are difficult to access (MIMU, 2014; OECD, 2021). Donor-driven project cycles have resulted in short-term interventions with limited integration into national policy frameworks, reducing prospects for scalability and institutionalization.

Data constraints and insufficient longitudinal impact monitoring undermine the ability to fully evaluate training effectiveness and adjust strategies accordingly (UNDP, 2020). There is also a propensity for reliance on digital platforms post-pandemic; however, irregular internet connectivity and low digital literacy, especially among rural populations, constrain equitable access to such innovations. These factors collectively restrict the transition from pilot initiatives to widely adopted, sustainable agricultural extension models (World Bank, 2023; USAID, 2021).

Myanmar's Farmer-to-Farmer training initiatives have yielded meaningful improvements in agricultural productivity, women's empowerment, and sustainable farming practices, particularly through enhanced value chains and climate-resilient approaches. While digital advancements and inclusive training have supported early successes, persistent political instability, infrastructural gaps, cultural resistance, and

institutional misalignments continue to challenge training expansion and sustainability.

For the Training to realize its full potential, adaptive strategies emphasizing stronger alignment with national policies, diversified funding mechanisms, enhanced monitoring and evaluation, and resilient multi-stakeholder partnerships are essential. Prioritizing gender inclusivity, scaling climate-smart agroecological practices, and bridging digital divides will further reinforce the training's contribution to the long-term development and food security of Myanmar's rural communities (OECD, 2021; UNDP, 2020; World Bank, 2023).

3.5 The Background Information of Bogale Township

Bogale Township is in Pyapon District within Myanmar's Ayeyarwady Region, a fertile deltaic landscape formed by the branching Ayeyarwady River in southwestern Myanmar. This low-lying alluvial plain benefits from rich soils and an extensive system of rivers and creeks, which not only contribute to high agricultural productivity but also make waterborne transportation vital for the movement of people and goods (MIMU, 2019; World Bank, 2020).

The township serves as a key agricultural hub, contributing significantly to Myanmar's designation as the nation's "rice bowl." The population is predominantly rural, with over two-thirds of employed persons engaged in agriculture, forestry, or fisheries, reflecting the sector's foundational role in local livelihoods and the economy (Department of Population Myanmar, 2020; Wikipedia, 2025).

Rice cultivation dominates Bogale's agricultural landscape, occupying an estimated area of approximately 380,000 acres combined for the monsoon and dry seasons as of 2023. The region typically supports two rice-growing cycles annually: the monsoon season from June/July to November/December, which covers the majority of paddy lands, and the dry season from March to June, where higher productivity is often achieved through improved water management and cultivation techniques (MSU, 2017; MIMU, 2019).

Efforts to modernize production include the use of improved rice varieties and adoption of the System of Rice Intensification (SRI), which has demonstrated gains in yield and water-use efficiency, contributing to sustainable intensification. However, challenges such as saltwater intrusion, irregular irrigation during dry seasons, and

limited certified seed availability continue to constrain overall productivity (GNLM, 2024; FAO, 2023; MSU, 2017).

Alongside rice, farmers cultivate pulses, sesame, groundnuts, and various vegetables that assist in diversifying farm incomes and improving nutritional security. Although occupying smaller areas than rice, these crops have increasingly been targeted by value chain development programs designed to enhance their profitability and resilience to economic and climatic shocks (FAO, 2023).

Table 3.3 summarizes the agricultural production indicators in Bogale Township from 2010 to 2024, highlighting steady expansion in paddy cultivation from an estimated 350,000 acres in 2010 to approximately 380,000 acres by 2023, followed by a slight estimated decline in 2024. Pulses and oilseeds have also shown gradual growth over this period, rising from around 35,000 acres to 46,000 acres. These trends reflect the township's continued emphasis on rice as the staple crop alongside diversification efforts within its agricultural sector (FAO, 2024; Department of Population Myanmar, 2020; MIMU, 2019).

Table 3.3: Agricultural Production Indicators in Bogale Township (2010–2024)

Year	Paddy Cultivation (acres)	Pulses & Oilseeds (acres)	Maize Cultivation (acres)
2010	350,000 (est.)	35,000 (est.)	5,000 (est.)
2015	365,000 (est.)	40,000 (est.)	6,000 (est.)
2019	375,000	42,500	7,200
2023	380,000 (combined seasons)	45,000	Limited data
2024*	~370,000 (estimated)	46,000	Limited data

Sources: (FAO, 2024; Department of Population Myanmar, 2020; MIMU, 2019)

Central to Bogale’s agricultural development is the Farmer-to-Farmer (F2F) program, which offers participatory, peer-led extension services vital for knowledge

dissemination, capacity building, and climate-smart agriculture promotion. F2F initiatives emphasize experiential learning through demonstration plots, farmer field schools (FFS), and community-based training, tailoring technical information to the local context and fostering sustainable farming methods including integrated pest management and water conservation (FAO, 2019; Winrock International, 2018).

Since the catastrophic impact of Cyclone Nargis in 2008, F2F programs have been instrumental in post-disaster recovery by supporting farmers to rebuild agricultural productivity, diversify cropping systems, and improve resilience to climatic stressors. These participatory approaches have enhanced adoption rates of improved practices by involving farmers, especially women and youth, as key actors and peer educators, effectively multiplying outreach and fostering local leadership (UNDP, 2020).

Recent adaptations within the F2F framework incorporate hybrid training approaches that blend traditional face-to-face methods with digital outreach tools such as WhatsApp and mobile apps. These innovations have become especially critical in overcoming barriers imposed by political instability and the COVID-19 pandemic, ensuring continued technical support and market information flow (USAID, 2021).

Table 3.4 presents a summary of Farmer-to-Farmer (F2F) training efforts in Bogale Township across key agricultural sectors, highlighting achievements such as expanded cultivation of improved crop varieties with 10–20% yield gains, enhanced smallholder livestock production despite input cost challenges, and growth in fisheries and aquaculture supported by mangrove ecosystems. The participatory F2F training has contributed to improved integrated pest and water management, organic and climate-smart farming practices, leading to better yields, reduced pesticide use, and greater water efficiency.

Table 3.4: Summary of Farmer to Farmer (F2F) Training in Bogale Township

Sector	Description	Key Achievements
Crop Production	Focused on monsoon and dry-season rice, pulses, oilseeds, and vegetables	Expanded area under improved varieties, 10-20% yield gains
Livestock	Smallholder poultry, pig, cattle; limited commercial farming	Supplemental income source; challenges from input costs
Fisheries & Aquaculture	Inland/coastal fishing; aquaculture supported by mangroves	Vital for nutrition and economy, expanding production
Farmer to Farmer training (F2F)	Participatory training on integrated pest, water, organic and climate-smart farming	Yield improvement, pesticide reduction, water-use efficiency
Climate Resilience and Recovery	Post-Nargis value chain development, climate adaptation and capacity building	Enhanced incomes, greater farmer empowerment

Source: MSU (2017); FAO (2023); UNDP (2020); World Bank (2020; Winrock Int'l (2018); USAID (2021)

Rice remains the backbone of Bogale's agriculture, with the fertile deltaic conditions favoring high production outputs. The monsoon season, supported by natural flooding and abundant moisture, accounts for the largest cultivated area. Dry-season rice production is increasingly reliant on irrigation infrastructure and higher-yielding varieties. The System of Rice Intensification (SRI) has gained traction among farmers, improving yields while conserving water and inputs, supporting both economic and ecological sustainability (FAO, 2019).

Although rice commands most of the land and attention, diversification into pulses and oilseeds supported by focused extension efforts and value chain strengthening projects provides important risk reduction and income supplements for

farm households. Constraints remain, particularly access to quality seeds, irrigation during dry periods, and market fluctuations that impact profitability (FAO, 2023).

Livestock production in Bogale supports small-scale subsistence farmers and commercial producers. Poultry and pig rearing predominate, offering a ready source of cash and nutrition. Increasing feed costs and disease management issues challenge sector viability, requiring ongoing extension and veterinary support (Mizzima, 2023).

Complementing livestock, fisheries and aquaculture harness Bogale's extensive aquatic resources. The nearby mangrove ecosystems play a dual role in biodiversity conservation and as vital breeding grounds, sustaining fishery yields. Aquaculture, particularly shrimp and freshwater species cultivation, has emerged as a significant source of employment and income, integrating with broader regional seafood markets (World Bank, 2020).

The Farmer-to-Farmer (F2F) program and associated Farmer Field Schools (FFS) have profoundly influenced Bogale's agricultural trajectory. Employing participatory, experiential learning models, these programs build farmer capacity to adopt integrated pest management, organic agriculture, improved water management, and climate-smart practices. Empowerment of women and youth through these participatory approaches has been a key success factor, fostering inclusive development and community resilience (Winrock International, 2018; FAO, 2019).

CHAPTER IV
SURVEY ANALYSIS

4.1 Survey Profile

Bogale Township, located in the Ayeyarwaddy Region of Myanmar, has an agriculture-based economy where approximately 66% of the employed population is engaged in agriculture, forestry, and fishing sectors. It stands as one of Myanmar's largest rice-producing areas, featuring two main cropping seasons: the rainy season from June to December and a shorter, more productive season from March to June. Rice farming in the township is bolstered by local processing factories, which serve as significant sources of employment for the community.

Following the devastating impacts of Cyclone Nargis, Bogale Township has prioritized sustainable agricultural development, with farmer-to-farmer (F2F) training initiatives playing a key role in the recovery phase. These F2F programs focus on enhancing farmers' knowledge and skills regarding sustainable farming techniques, emphasizing resilience against climate change.

The success of these initiatives depends on strong collaboration among international organizations, including UN agencies, local NGOs, and government agricultural departments, fostering a well-coordinated approach to recovery and development efforts. The F2F training has effectively improved crop yields, reduced post-harvest losses, and increased farmers' incomes, thereby significantly contributing to the resilience and livelihood restoration of communities affected by Cyclone Nargis.

This study aims to explore the challenges and opportunities associated with the Farmer-to-Farmer training approach in promoting sustainable agricultural practices in Bogale Township. To meet the objectives of this study, survey questionnaires were administered to participants involved in the F2F training projects conducted between 2022 and 2024. A total of 200 respondents were included in this survey.

4.2 Survey Design

This study employs descriptive and analytical methods to examine the challenges and opportunities of the Farmer-to-Farmer (F2F) training approach in promoting sustainable agricultural practices among participants in Bogale Township. The survey was conducted from February to June 2025.

Respondents were proportionally drawn from 10 villages across 5 village tracts to capture the diversity of farming communities in the township. A stratified random sampling method ensured representation from each village relative to the number of farming households. Primary data were collected through structured questionnaires administered via face-to-face interviews.

The survey further assessed knowledge dissemination practices by asking respondents whether and how widely they shared training knowledge with peers. Barriers to participation in training and adoption of sustainable practices were also investigated, alongside farmers' attitudes toward future training needs and potential improvements. Data collection took place to ensure relevance to ongoing agricultural development efforts in Bogale Township. Collected data were carefully coded and entered statistical software for analysis using both descriptive and inferential statistics to identify key trends and relationships.

4.2.1 Determination of Sample Size

The sample size was determined using Yamane's (1973) formula, based on a total farmer population (N) of 379 and a 5% margin of error (e), resulting in a calculated sample size of 195. To ensure robustness, 200 farmers were ultimately selected.

$$n = \frac{N}{1+Ne^2}$$

n = Sample Size

N = Total Population(farmers) = 379

e = Error Margin (0.05)

From above value of sample size "n" was calculated as follows;

$$n = \frac{379}{1+(379 \times 0.05^2)}$$

$$= \frac{379}{1+(379 \times 0.0025)} = 195$$, therefore, the required total sample at the survey area is 200 farmers were selected for the study.

4.3 Survey Result

Bogale Township, there are 71 village tract and 589 total village. Among these villages, the total of 10 villages across 5 village tracts were included, encompassing 1,035 households with a total farmer population of 379. From these, 200 respondents were proportionally selected for the survey in table (4.1) as follows.

Table (4.1) Selected villages in Bogale Township

Sr. No	Village Tract	Village Name	Total HH in village	Total Farmer	Respon-dents
1	Hay Man	Ohn Pin Su	98	29	20
2	Hay Man	Huar Khaung Chaung 1	87	26	20
3	Hay Man	Htone	110	36	20
4	Hay Man	Aye Ywar	86	39	20
5	Kyun Hteit	La Thar Chaung	240	58	20
6	Sat Kyun	Za Mu Aye	54	22	20
7	Sat Kyun	5 Kwet (East)	112	47	20
8	Nga Pi Chaung	Kun Yar Kan Gyi	104	61	20
9	Nga Pi Chaung	Ywar Tan Shey	48	25	20
10	Thit Hpyu Chaung	Hlaing Gu	96	36	20
	Total		**1035**	**379**	**200**

Source: Survey data, 2025

4.3.1 Demographic and economic background of Respondent Households

The demographic characteristics of the respondents, as presented in Table 4.2, provide a comprehensive overview of the gender, age, and educational status, farming practices and main sources of income of 200 households surveyed. The greatest number of respondents in the study were aged between 40 and 59 years, with 89% being male and 68% being female. Most had basic or middle-level education, with 38% having basic reading skills or completed primary education, 34% having middle school education, and 22% having completed high school.

Family size ranged from 5 to 10 members, with 71% of respondents having more than 10 members. Nearly half of the households had 2 to 3 family members

participating in farm labor, while 5% reported 6 to 8 members. Monsoon rice cultivation was the most common farming practice, with 60% of respondents practicing it.

Table (4.2) Demographic and socio-economic background of Respondent Households

Description	Frequency	Percent (%) (n = 200)
Age Group (year)		
< 30	4	2 %
31 – 39	32	16 %
40 – 49	56	28 %
50 - 59	80	40 %
Above 60	28	14 %
Gender		
Male	178	89 %
Female	22	11%
Education Level		
Monastery education	2	1 %
Basic reading skills or Primary	76	38 %
Middle	68	34 %
High	44	22 %
Bachelor	10	5 %
Family Size		
> 5	38	19 %
5 – 10	143	71 %
Above 10	19	10 %
Farm Labor from Family Member		
0	12	6 %
1	48	24 %
2 – 3	92	46 %
4 – 5	38	19 %
6 – 8	10	5 %

Table (4.2) Continued

Description	Frequency	Percent (%) (n = 200)
Types of Farming		
Monsoon Rice Only	120	60 %
Winter crop Only	10	5 %
Monson + Winter crop	46	23 %
Monsoon + Winter + Summer Rice	18	9%
Others	6	3 %
Years of Farming		
>5 Years	22	11%
5 - 10 Years	56	28%
11- 15 Years	51	26%
16 - 20 Years	45	22%
Above 20 Years	26	13%
Main Sources of Income		
Agri production (Farming)	138	69%
From Trading (Groceries, Vendors etc.)	14	7%
Non-Farm Labor	18	9%
Remittance	10	5%
Government / Private Company Staff	22	11%
Others	8	4%
Cultivate Land in Monsoon Season (2024)		
Under 5 acres	86	43%
Above 5 acres	114	57%

Source: Survey data, 2025

The mainly of respondents had substantial farming experience, with 28% farmed for 5 to 10 years, 26% for 11 to 15 years, and 22% for 16 to 20 years. Agricultural production was the predominant source of income, accounting for 69% of respondents. During the 2024 monsoon season, 57% of farmers cultivated more than 5 acres, indicating a predominantly middle-aged, male farming population with moderate education levels, primarily engaged in monsoon rice farming.

4.3.2 Farmer-to-Farmer Training Participation, Preferences, and Experiences

The Farmer-to-Farmer Training participation, preferences and experiences of the respondents, as presented in Table 4.3, provide a detailed description. According to the survey findings, all respondents reported attendance, reflecting strong engagement within the local farming community. Information regarding the Farmer-to-Farmer (F2F) training was predominantly disseminated through exchange visits and various media platforms, including farmer channels, Facebook, and Viber groups.

In terms of training modality preferences, most participants favored in-person sessions, accounting for 67%, while 18% preferred online platforms. The implementation of F2F programs was chiefly attributed to International Non-Governmental Organizations (INGOs) and Local NGOs, which were recognized by 68% of respondents, whereas smaller proportions identified the Department of Agriculture, agricultural companies, and other entities as organizing bodies.

Table (4.3) Farmer-to-Farmer Training Participation, Preferences, and Experiences

Sr. No.	Survey Questions	Category	No. of Respondents (n = 200)	Percentage (%) (100)
1.	Have you participated in a farmer-to-farmer training?	Yes	200	100
		No	0	0
2.	How did you learn about the training?	Farmer Field School	46	23
		Exchange visit	82	41
		Media (farmer Channel, Facebook, Viber etc.)	52	26
		Lesson learns workshop	20	10
3.	What kind of training do you prefer?	In person	134	67
		Online (through media, zoom, channel etc.)	36	18
		Others…	30	15
4.	Who organized the training you attended?	DoA	24	12
		INGO/ LNGO	136	68
		Agri-related company	26	13
		Others…	14	7
5	What topics were covered in the training?	Good agricultural practices (SRI, CSA, crop rotation etc.)	90	45
		Pest and disease (IPM)	40	20
		Pesticide awareness	24	12
		Seed Production	32	16
		Post-harvesting	10	5
		Others…	4	2
6	What was the duration of the training?	1>	34	17
		1 to 3	96	48
		4 to 6	64	32
		Above 6	6	3

Source: Survey data, 2025

The training curriculum encompassed diverse topics, with 45% of participants reporting coverage of good agricultural practices such as System of Rice Intensification (SRI) and Climate-Smart Agriculture (CSA). Pest and disease management was addressed in 20% of trainings, and seed production featured in 16% of the programs.

Training duration varied, with the largest share (48%) of sessions lasting one to three days, 32% participating in training courses of four to six days, and 17% engaging in shorter sessions lasting less than one day. These findings suggest that most F2F trainings were designed as concise, practical engagements.

This indicates that the Farmer-to-Farmer trainings in Bogale Township have attained widespread participation, with information effectively disseminated primarily through experiential learning and various media channels, and a strong emphasis placed on in-person training formats predominantly facilitated by non-governmental organizations.

4.3.2 Application of Farmer-to-Farmer Training, Knowledge Sharing, and Challenges in Sustainable Agricultural Practices

Table 4.4 presents the application of Farmer-to-Farmer training, knowledge dissemination practices, and the challenges encountered in adopting sustainable agricultural practices, as evidenced by the survey findings.

Table (4.4) Application of Farmer-to-Farmer Training, Knowledge Sharing, and Challenges in Sustainable Agricultural Practices

Sr. No.	Survey Questions	Category	No. of Respondents (n = 200)	Percentage (%) (100)
1.	Have you applied the techniques learned from the training in your farming practices?	Yes	198	99
		No	2	1
2.	If yes, what changes have you observed?	High Yield	147	74
		Crop quality	153	77
		High income	136	68
		Reduce input cost	112	56
		Others…	0	0
3.	If not, what difficulties do you have from applying the knowledge gained?	Labor shortage	2	1
		Do not access to machinery	1	0.5
		High input cost	2	1
		Access to good quality seed	2	1
		Others….	-	4
4.	Have you shared the knowledge gained with other farmers?	Yes	200	100
		No	0	0
5	If yes, how many farmers have you trained or advised?	10 - 30	54	27
		31- 60	118	59
		61- 90	20	10
		Above 100	8	4
6	What are the challenges you face in adopting sustainable agricultural practices?	Weak in water management system	18	9
		Climate change (Flood, drought etc.)	36	18
		Conflict	64	32
		Lack of awareness and knowledge	26	13
		Policy & regulatory uncertainties	38	19
		Financial constraints (access to agri-loan)	14	7
		Others	4	2

Source: Survey data, 2025

A survey revealed that 99% of respondents applied the techniques acquired from Farmer-to-Farmer training in their farming practices, demonstrating a high rate of adoption. Only 1% did not implement the knowledge gained, citing challenges such as labor shortages, limited access to machinery, elevated input costs, and constrained availability of quality seed. Positive outcomes reported by participants included enhanced crop quality, increased yield, higher income, and reduced input expenses. Knowledge dissemination was comprehensive, with all respondents sharing the acquired techniques with other farmers.

However, respondents identified several obstacles to the adoption of sustainable agricultural practices, including conflict, policy and regulatory uncertainties, climate change impacts, lack of awareness, deficiencies in water management systems, and financial constraints. These findings underscore the importance of addressing structural, environmental, and financial challenges to further promote the effective adoption of sustainable farming practices.

4.3.3 Constraints, Opportunities, Improvements, Motivations, and Support Needs in Farmer-to-Farmer Trainings

Table 4.5 summarizes the survey respondents' perspectives on the constraints, opportunities, desired improvements, motivations, and essential support needed to enhance participation in Farmer-to-Farmer trainings and the adoption of sustainable agricultural practices.

Table (4.5) Constraints, Opportunities, Improvements, Motivations, and Support Needs in Farmer-to-Farmer Trainings

Sr. No.	Survey Questions	Category	No. of Respondents (n = 200)	Percentage (%) (100)
1.	What are the major constraints in attending farmer-to-farmer trainings?	Due to demands of farm work	58	29
		Childcare	24	12
		Household responsibilities	54	27
		Training/knowledge sharing center is too far	24	12
		Finance constraints	34	17
		Others…	6	3
2.	What opportunities do you see in farmer-to-farmer trainings?	Improve crop quality	200	100
		Access to improved technology	200	100
		Improve income	200	100
		Access to market opportunities	200	100
		Improve collaboration and coordination among farmers and other stakeholders	200	100
		Others…	0	0
3.	How can farmer-to-farmer trainings be improved?	Hands-on training (Farmers participatory approach)	200	100
		Providing guideline books, pamphlets/leaflets and posters etc.	166	83
		Others…	34	17

Table (4.5) Continued

Sr. No.	Survey Questions	Category	No. of Respondents (n = 200)	Percentage (%) (100)
4	What motivates you to participate in sustainable agricultural practices?	Desire to increase farm productivity	200	100
		Improve household income	200	100
		Protect the environment	190	95
		Learn new skills and knowledge	200	100
		Influence from community or peers	180	90
		Others…	0	0
5	What types of support would help you adopt sustainable agricultural practices more effectively?	Access to affordable credit or loans	200	100
		Technical training and capacity building	120	60
		Improved access to quality seeds and inputs	200	100
		Better market access and information	200	100
		Support from local government or organizations	200	100
		Others…	0	0

Source: Survey data, 2025

The survey findings indicate that respondents universally emphasize the necessity of comprehensive support mechanisms to effectively adopt sustainable agricultural practices. Specifically, 100% of participants identified access to affordable credit or loans, improved availability of quality seeds and inputs, enhanced market access and information, and consistent support from local governments or organizations as critical support elements. Additionally, 60% acknowledged the importance of technical training and capacity building as part of this support framework.

Farmers overwhelmingly recognize the substantial value and opportunities provided by Farmer-to-Farmer (F2F) training. All respondents affirmed that these programs are instrumental in improving crop quality, facilitating access to improved agricultural technologies, increasing household income, expanding market opportunities, and strengthening collaboration and coordination among farmers and other stakeholders.

Despite these opportunities, practical constraints significantly limit farmers' participation in F2F training. The primary reported barriers include the demands of farm work (29%), household responsibilities (27%), financial constraints (17%), childcare obligations (12%), and the considerable distance to training or knowledge sharing centers (12%). Other minor constraints were reported by 3% of respondents.

To enhance the effectiveness and inclusivity of F2F training, farmers expressed a clear preference for hands-on, participatory training approaches, which were unanimously (100%) favored. Additionally, 83% considered the provision of tangible instructional materials—such as guideline books, pamphlets, and posters as valuable enhancements to training delivery. A minority (17%) mentioned other forms of improvement.

Motivations for engaging in sustainable agricultural practices are multifaceted, rooted in a combination of economic, environmental, and social factors. All respondents identified the desire to increase farm productivity, improve household income, and acquire new skills and knowledge as primary motivators. Environmental concerns, particularly the intention to protect the environment, motivated 95% of participants, while community or peer influence was noted by 90%.

Therefore, the survey underscores that while Farmer-to-Farmer trainings present critical opportunities for agricultural advancement, farmers face tangible challenges that must be addressed. Effective adoption of sustainable practices relies not only on knowledge transfer but also on addressing these constraints through enhanced support services, participatory and practical training modalities, and the provision of necessary resources.

4.3.4 Assessment of Training Utility, Follow-Up Support, and Outcomes among Farmer-to-Farmer Training Participants

Assessment of Training Utility, Follow-Up Support, and Outcomes. The findings from Table 4.6 indicate a highly positive assessment of the Farmer-to-Farmer (F2F) training among the 200 respondents surveyed.

Table (4.6) Assessment of Training Utility, Follow-Up Support, and Outcomes among Farmer-to-Farmer Training Participants

Sr. No.	Survey Questions	Category	No. of Respondents (n = 200)	Percentage (%) (100)
1.	How useful do you find the information shared during the farmer-to-farmer training?	Very useful	130	65
		Somewhat useful	70	35
		Not very useful	0	0
		Not useful at all	0	0
2.	Have you encountered any difficulties in understanding the training content?	Yes	0	0
		No	200	100
3.	Do you feel confident teaching or share the knowledge you gained with other farmers?	Yes, very confident	200	100
		Somewhat confident	0	0
		Not confident	0	0
4	What type of follow-up support would help you apply the training better?	Regular visits from trainers	200	100
		Group meetings with other farmers	200	100
		Access to printed or digital materials	190	95
		Phone or online support	200	100
		Others…	0	0
5	How has farmer-to-farmer training affected your farming practices?	Significantly improved	182	91
		Somewhat improved	18	9
		No change	0	0
		Made it more difficult	0	0
6	Would you recommend farmer-to-farmer training to other farmers in your community?	Yes	200	100
		No	0	0

Source: Survey data, 2025

The participants found the information shared during the F2F training to be useful, with 65% rating it as very useful and the remaining 35% as somewhat useful. No respondents considered the training information to be not useful or difficult to comprehend, demonstrating the clarity and relevance of the training content.

All respondents (100%) reported no difficulties in understanding the training content and expressed full confidence in teaching or sharing the knowledge gained with fellow farmers, reflecting effective knowledge transfer and empowerment.

Participants unanimously emphasized the need for continuous follow-up support to enhance the application of training. This included regular visits from trainers, group meetings with other farmers, and phone or online support, each endorsed by 100% of respondents. Access to printed or digital instructional materials was also highly favored, with 95% identifying it as essential, underscoring the value of diverse and sustained support mechanisms.

The training had a significant positive impact on farming practices, with 91% of respondents indicating that it led to substantial improvements, while the remaining 9% reported moderate improvements. No participants reported no change or adverse effects, highlighting the effectiveness of the training.

Reflecting their strong endorsement, all respondents (100%) expressed willingness to recommend Farmer-to-Farmer training to other farmers in their communities, signaling widespread satisfaction and belief in the program's benefits.
The survey reveals that the Farmer-to-Farmer trainings are highly valued by participants, with clear utility, strong comprehension, and confident dissemination of knowledge.

4.3.5 Perceptions Opportunities and Challenges of Farmer-to-Farmer Training in Bogale Township

The survey indicates that Farmer-to-Farmer (F2F) training in Bogale Township is effective in facilitating knowledge exchange, strengthening social networks, and fostering community cooperation. Many participants reported improvements in farm income, reflecting the program's positive impact on livelihoods. However, some respondents expressed neutral views, suggesting that the benefits of the program may not be uniformly experienced.

The study also identifies key challenges, including limited access to transportation and internet connectivity, which hinder participation. Concerns about

the varied quality of trainers further highlight the need for standardized training and professional development. While the training content is regarded as practical and relevant, climate change-related events pose significant barriers to applying new knowledge.

4.3.5.1 Opportunities Created by Farmer-to-Farmer Training

The survey assessed the perceived opportunities created by Farmer-to-Farmer training among participants. The results showed a generally positive perception of the opportunities created by F2F training, with a mean value of 3.8 across all attributes, indicating a positive attitude towards the training. The survey results indicate varying levels of agreement and agreement among respondents.

The study found that F2F training has significantly facilitated the exchange of local knowledge among farmers, fostering peer-to-peer learning and sharing traditional farming wisdom. Most participants felt that F2F training has strengthened social networks and cooperation within their community, highlighting the program's success in knowledge transfer and community cohesion. A smaller percentage disagreed, suggesting that more direct interventions might be needed. The program also opened new market opportunities, with 45% agreeing and 18% strongly agreeing that it opened new market opportunities for their farm products. A significant portion of respondents were neutral, suggesting that market access might be an area with varied impact. Table (4.7) shows the Perceptions Opportunities of Farmer-to-Farmer Training in Bogale Township.

Table (4.7) Opportunities Created by Farmer-to-Farmer Training

(SD: Strongly Disagree, D: Disagree, N: Neutral, A: Agree, SA: Strongly Agree)

Sr. No	Opportunities Created by Farmer-to-Farmer Training	SD %	D %	N %	A %	SA %	Mean
1.	F2F training has facilitated the exchange of valuable local knowledge among farmers.	0	0	11	55	34	4.1
2.	F2F training has strengthened social networks and cooperation within my community.	0	9	18	64	9	3.7
3.	F2F training has opened new market opportunities for my farm products.	1	5	31	45	18	3
4.	F2F training has improved my access to essential agricultural resources (e.g., seeds, fertilizers).	3	9	27	48	13	3.6
5.	F2F training has increased my awareness of sustainable agricultural practices.	0	1	26	51	22	3.9
6.	F2F training has helped me to improve my farm income	3	12	18	38	29	3.8
	Total Mean Value						**3.8**

Source: Survey data, 2025

F2F training improved access to essential agricultural resources, such as seeds and fertilizers, indicating that the training helps farmers overcome barriers to accessing critical inputs. However, a higher percentage of respondents were neutral, suggesting that the adoption of sustainable practices might vary. This training improved farm income, with a substantial number of participants believing that it helped them improve their farm income. However, only 3% strongly disagreed and 12% disagreed, with 18% neutral.

The survey results show that Farmer-to-Farmer training is successful in creating opportunities for farmers, facilitating knowledge exchange, strengthening social networks, and improving income. However, there are areas for further focus or supplementary interventions, and a strong consensus among participants is evident about the beneficial opportunities created by F2F training, with a mean score of 3.8.

4.3.5.2 Challenges Faced in Farmer-to-Farmer Training

The study shows in Table- 4.8 that limited access to transportation and internet connectivity is the most significant challenge faced by farmers in F2F training.

Table (4.8) Challenges Faced in Farmer-to-Farmer Training

Sr. No	Challenges Faced in Farmer-to-Farmer Training	SD %	D %	N %	A %	SA %	Mean
1.	Limited access to transportation and internet connectivity hinders my participation in F2F training.	3	11	24	30	32	3.8
2.	Lack of sufficient funding and resources limits the effectiveness of F2F trainings.	8	12	20	27	29	3.4
3.	Time constraints and competing farm responsibilities make it difficult to attend F2F training.	17	32	25	16	10	2.5
4.	The information shared during F2F training is sometimes not practical or applicable to my farm.	32	39	21	7	1	1.7
5.	The quality of the trainers varies greatly, impacting the usefulness of the training.	5	10	13	44	28	3.8
6.	Climate change related events make it hard to implement the knowledge gained from F2F training.	17	19	10	34	20	3.0
	Overall Mean Value						**3.0**

Source: Survey data, 2025

The respondents (30% Agreed, 32% Strongly Agreed) reported that this hinders their participation in training opportunities. The lack of sufficient funding and resources was not seen as a major limiting factor by most respondents, but it was not considered a primary challenge. Time constraints and competing farm responsibilities were also not considered a dominant difficulty.

The practicality and applicability of the information shared was not considered a significant challenge, with a considerable majority of respondents disagreeing that the information was sometimes not practical or applicable to their farm. This indicates a high relevance of the training content to farmers' actual needs.

The quality of trainers was a notable concern for many farmers, with a significant proportional feeling that the quality of trainers varies greatly, impacting the usefulness of the training. This suggests a need for standardized training, continuous professional development, or stricter selection criteria for F2F trainers to ensure consistent quality.

Climate change-related events were another significant practical barrier, with a high percentage of respondents reporting that climate change-related events make it hard to implement the knowledge gained from F2F training. This highlights the vulnerability of agricultural practices to climate variability. Only 17% Strongly Disagreed, 19% Disagreed, and 10% were Neutral. Table (4.8) shows the Perceptions of Challenges of Farmer-to-Farmer Training in Bogale Township.

The survey shows that farmers face significant challenges in Farmer-to-Farmer training due to limited access to transportation, internet connectivity, and climate change impacts. The quality of trainers is also a significant area for improvement. However, practicality, time constraints, and lack of funding are not major obstacles. Addressing these challenges could improve the effectiveness and reach of these training courses.

4.3.6 Sustainability and Future of Farmer-to-Farmer Training

The survey surveyed participants on the sustainability and prospects of Farmer-to-Farmer training. The results showed a strong positive outlook on the future and sustainability of F2F training, with a mean score of 3.8 across all attributes. The survey's findings highlight the importance of sustainability in farming practices.

In Table 4.9 it shows that most farmers believe that the Free-to-Farm (F2F) approach is a sustainable approach to agricultural development, with 81% of respondents believing it is effective. A significant number of farmers are willing to continue participating in F2F training, indicating a strong desire for ongoing engagement. A high rate of recommendations to other farmers is also a strong indication of the program's perceived value and success. Digital tools and online platforms are seen as a potential tool to enhance the reach and impact of F2F training,

with 55% agreeing and 24% strongly agreeing. This indicates an openness among farmers integrating technology into the training model. Only a small minority are hesitant.

Furthermore, 59% of respondents believe that F2F training should be integrated with other agricultural development programs, indicating a recognition of the potential for synergy and a desire for a more holistic approach to rural development. However, 9% strongly disagree, 5% disagree, and 18% are neutral, indicating varied opinions on this integration.

Table (4.9) Sustainability and Future of Farmer-to-Farmer Training

Sr. No	Sustainability and Future of Farmer-to-Farmer Training	SD %	D %	N %	A %	SA %	Mean
1.	I believe F2F training is a sustainable approach to agricultural development.	1	6	12	49	32	4
2.	I am willing to continue participating in F2F training in the future.	5	10	13	44	28	3.8
3.	I would recommend F2F training to other farmers in my community.	1	16	10	40	33	4
4.	Digital tools and online platforms can enhance the reach and impact of F2F training.	1	10	10	55	24	3.9
5.	F2F training should be integrated with other agricultural development programs.	9	5	18	59	9	3.6
6.	Climate change related events make it hard to implement the knowledge gained from F2F training.	7	10	10	51	22	3.7
	Total Mean Value						**3.8**

Source: Survey data, 2025

Climate change-related events are also a significant challenge for farmers, with 51% and 22% agreeing that climate-related events make it difficult to implement the knowledge gained from F2F training. This ongoing concern impacts the practical

application and long-term effectiveness of the training, potentially affecting its sustainability if not addressed.

The results show a positive outlook on the sustainability and future of Farmer-to-Farmer training. Farmers are enthusiastic about its sustainability and willingness to continue participating. They are also keen on leveraging digital tools to expand their reach. The desire for integration with other development programs suggests a vision for comprehensive rural support. However, concerns about climate change's impact on learning implementation remain critical for the training's practical benefits. The findings suggest a strong foundation for the continued success and evolution of F2F training initiatives.

CHAPTER V
CONCLUSION

5.1 Findings

Based on the survey conducted with 200 farmers in Bogale Township of Myanmar's Ayeyarwady Region, valuable insights were gathered regarding the socio-economic background of farming households, their participation in Farmer-to-Farmer (F2F) training programs, and the key opportunities and challenges they face.

Most survey respondents were men, accounting for 89% of participants, reflecting a predominantly male engagement in farming activities. Age distribution showed that 40% were between 50 and 59 years old. Educational attainment was generally modest with 38% having basic or primary education, 34% middle school, and only 5% university-level education. This level of education may influence the ability of households to fully engage with advanced agricultural techniques and innovations promoted through F2F training.

Household sizes ranged from 5 to 10 members (71%), with 36% reporting more than 10 members. Farming labor typically involved 2–3 family members. Farming practices were largely focused on monsoon rice cultivation (60%), with others practicing combining monsoon and winter cropping. Agriculture was the primary income source for 69% of respondents, while others derived income from trading, non-farm labor, remittances, or employment outside farming. The average landholding size varied, with most farmers cultivating between 4 and 6 acres.

Regarding participation in Farmer-to-Farmer training, all respondents reported attending such programs, with most learning about training through exchange visits (41%), media platforms including Facebook and Viber (26%), and farmer field schools (23%). A clear preference for in-person training (67%) over online sessions (18%) was noted. International and local NGOs (68%) primarily organized these training courses, which often lasted between one and three days. Common training topics included good agricultural practices, pest management, seed production, and pesticide awareness.

The adoption rate of techniques learned through F2F training was remarkably high at 99%, with farmers reporting benefits such as increased crop yield (74%), improved crop quality (77%), higher income (68%), and reduced input costs (56%). Knowledge sharing was also comprehensive, as all participants disseminated information to other farmers, with 59% advising 31 to 60 peers.

However, challenges persist in applying sustainable agricultural practices, including conflicts (32%), climate change effects such as floods and droughts (18%), policy and regulatory uncertainties (19%), and limited awareness or knowledge (13%). Despite these constraints, farmers remain motivated by the desire to increase productivity, improve household income, protect the environment, gain new skills, and peer influence.

Constraints affecting participation in training included farm work demands (29%), household responsibilities (27%), financial limitations (17%), distance to training centers (12%), and childcare (12%). To improve training effectiveness, farmers unanimously preferred hands-on, participatory approaches and 83% recommended providing printed guideline materials such as pamphlets and posters.

Support needs for successful adoption of sustainable practices were strongly emphasized. All respondents identified access to affordable credit, quality seeds and inputs, better market information and access, and local government or organizational support as critical. Additionally, 60% highlighted the need for ongoing technical training and capacity building.

Regarding training utility, 65% found the information very useful, and the remainder somewhat useful. No difficulties were reported in understanding content, and all respondents felt confident in teaching others. There was a unanimous call for continuous follow-up support through regular trainer visits, group meetings, printed or digital materials, and phone or online assistance. Most respondents (91%) indicated that F2F training significantly improved their farming practices, and all would recommend the program to others.

Farmers generally perceived F2F training positively, acknowledging its role in facilitating local knowledge exchange, strengthening community networks, improving farm income and resource access, opening new market opportunities, and promoting sustainable agriculture. The average positive rating stood at 3.8 out of 5. Nonetheless, variations in perceived impact and adoption reflect heterogeneous farmer circumstances.

Key challenges identified included limited access to transportation and internet connectivity, variability in trainer quality, and climate-related disruptions affecting the practical use of training knowledge. Funding and time constraints were less frequently cited, and the training information was widely viewed as practical and relevant.

Sustainability perceptions were strong, with 81% considering F2F training a viable approach to agricultural development. A similar share expressed willingness to continue participation and to recommend the training. There was notable openness (79%) to integrating digital tools to enhance training outreach, and support for aligning F2F initiatives with other agricultural development programs (68%). However, 73% acknowledged that climate change impedes the application of learned practices, signaling an urgent need for climate resilience integration.

The study highlights a farming community actively participating in and benefiting from Farmer-to-Farmer training programs, despite challenges related to socio-economic factors, infrastructure, climatic risks, and systemic issues. Continued focus on participatory and inclusive training methods, accessible support services, improved infrastructure, financial and market facilitation, and enhanced climate-smart agriculture practices are key to sustaining and expanding the positive impacts of F2F initiatives in Bogale Township and similar rural contexts in Myanmar.

5.2 Suggestions

According to the survey results, several suggestions can be provided to enhance Farmer-to-Farmer (F2F) training programs and support sustainable agricultural development in Bogale Township. The findings highlight that insufficient infrastructure and limited connectivity pose major barriers to effective training and knowledge dissemination. Therefore, investing in rural infrastructure, including transportation and mobile internet services, is essential to improve access to training centers and digital resources. Collaboration among local authorities, national government agencies, and international development organizations is crucial to address these gaps.

To improve the quality and reach of F2F training, strategic establishment of accessible training centers is necessary, along with the implementation of comprehensive “Train-the-Trainer” programs. These programs should focus on enhancing trainers’ technical knowledge, teaching skills, and communication

methods. Continuous mentorship and peer learning opportunities for trainers will help maintain high training standards and promote adaptive learning.

The survey indicates that farmers highly value ongoing support after initial training. Consequently, formalizing follow-up mechanisms such as regular on-site visits, group meetings, community learning hubs, and dedicated phone or online support lines will strengthen knowledge application. Providing farmers with accessible printed and digital instructional materials further supports this effort.

Climate change remains a significant challenge; thus, integrating climate-smart agricultural practices into training including drought-resistant crops, water-efficient irrigation, flood management, early warning systems, crop diversification, and agroforestry is critical. Empowering communities to develop localized climate adaptation plans will improve resilience to specific environmental vulnerabilities.

Market access and economic viability are also vital for sustaining adoption. Therefore, linking sustainable practices with market opportunities through value-added processing, direct marketing, negotiation skills, and supply chain understanding should be emphasized. Financial literacy and access to credit tailored to farmers' needs will help overcome financial constraints related to input costs.

Inclusivity is important, and F2F programs must actively engage all farming segments, including women, youth, marginalized groups, and landless farmers, to ensure equitable benefits. Strengthening partnerships among governmental agricultural departments, NGOs, private sector actors, and research institutions will enhance resources and expertise available for training. Integrating F2F programs with scientific research and advocating for supportive policies can further improve effectiveness and sustainability.

Lastly, addressing broader systemic issues such as conflict resolution, improved access to machinery, and policy uncertainties will build resilience in farming communities. By strategically utilizing digital tools alongside in-person training and providing incentives for lead farmers, the programs can foster motivation and locally lead knowledge dissemination.

The study in Bogale Township reveals clear pathways to overcome challenges and capitalizes on opportunities for sustainable agricultural growth. With sustained support from government bodies, NGOs, and development partners, these recommendations can empower farming communities and promote resilient, market-oriented agriculture in Bogale and similar rural areas across Myanmar.

REFERENCES

ACDI/VOCA (2019). *Value Chain Development in Shan State*. Case studies on market access improvements and women's empowerment.

Asian Development Bank (2023**)** – *Post-Pandemic Education Recovery in Asia*

Altieri, M. A., & Toledo, V. M. (2011). The agroecological revolution in Latin America: Rescuing nature, ensuring food sovereignty and empowering peasants. *Journal of Peasant Studies*, 38(3), 587-612.

Altieri, M. A. (2009). Agroecology, small farms, and food sovereignty. *Monthly Review*.

Altieri, M. A., et al. (2015). Agroecology and the design of climate-resilient farming systems. *Agronomy for Sustainable Development*.

Altieri, M. A., & Toledo, V. M. (2011). The agroecological revolution in Latin America: Rescuing nature, ensuring food sovereignty and empowering peasants. *Journal of Peasant Studies*, 38(3), 587-612.

Altieri, M. A. (2018). *Agroecology: The Science of Sustainable Agriculture*. CRC Press.

Aung & Lwin (2021) – *Online Learning Challenges in Myanmar*

Belton, B., Hein, A., Htoo, K., Kham, L. S., Nischan, U., & Reardon, T. (2017). *The emerging quiet revolution in Myanmar's aquaculture value chain*. Aquaculture, 484, 75-86.

Davis, K., et al. (2012). Farmer Field Schools: A participatory approach to sustainable agriculture. *Journal of Agricultural Education*.

FAO (2014): *Climate-Smart Agriculture in the Ayeyarwady Delta*.

FAO. (2016). *Farmer Field Schools: From agricultural extension to adult education*. Food and Agriculture Organization of the United Nations.

FAO. (2017). *The future of food and agriculture: Trends and challenges*. Food and Agriculture Organization of the United Nations.

FAO. (2018). *Sustainable Agricultural Development in Myanmar: Challenges and Opportunities*. Food and Agriculture Organization of the United Nations.

FAO. (2018). *The future of food and agriculture: Alternative pathways to 2050*.

FAO. (2021). *Sustainable agricultural practices in Kenya: Case studies*.

FAO Reports on Sustainable Agriculture – *Provides insights into adoption rates and effectiveness*.

Feder, G., Murgai, R., & Quizon, J. B. (2004). The acquisition and diffusion of knowledge: The case of pest management training in farmer field schools, Indonesia. *Journal of Agricultural Economics, 55*(2), 221-243.

Holt-Giménez, E. (2006). *Campesino a Campesino: Voices from Latin America's Farmer to Farmer Movement for Sustainable Agriculture*. Food First Books.

Hlaing, K. Y., & Kyaw, T. (2019). Farmer-to-Farmer Extension: A Case Study of System of Rice Intensification (SRI) in Myanmar. *Journal of Agricultural Extension*, 23(2), 45-58

IFAD. (2019). *Rural development report: Creating opportunities for rural youth*.

IFAD Reports (2019)– *Discusses cost and impact on income.*

IFAD (2022): *Agroecology and Conflict Resilience in Myanmar*.

Kiptot, E., & Franzel, S. (2012). Gender, agroforestry, and food security in Africa. *Current Opinion in Environmental Sustainability*.

LIFT Fund (2020): *Impact of Farmer Field Schools on Organic Certification*.

Lukuyu, B., et al. (2012). Disseminating improved livestock feeding practices via F2F in East Africa. *Agricultural Systems*.

Ministry of Agriculture, Livestock and Irrigation (MOALI). (2019). *Agricultural Development Strategy for Ayeyarwady Region*. Naypyidaw: MOALI.

Myint, T., & Htun, A. (2020). The Role of Farmer-to-Farmer Networks in Promoting Organic Farming in Shan State, Myanmar. *Asian Journal of Agriculture and Rural Development*, 10(1), 12-25.

Myanmar Ministry of Education (2017) – *Education Development in Myanmar*

Myanmar Education Consortium (2023**)** – *Education Reforms and Challenges in Myanmar*

OECD **(**2021). *Myanmar Agricultural Policy Review*. Discussion of F2F's alignment with national agricultural strategies.

Pretty, J., Toulmin, C., & Williams, S. (2011). Sustainable intensification in African agriculture. *International Journal of Agricultural Sustainability*, 9(1), 5-24.

Pretty, J. (2018). *Sustainable Agriculture and Food Systems*. Routledge.

Pretty, J. (2003). Social capital and connectedness: Issues for sustainable agriculture. *Land Use Policy*.

Pretty, J., et al. (2006). Resource-conserving agriculture increases yields in developing countries. *Environmental Science & Technology*.

Thant, M., & Win, K. (2021). Integrated Pest Management through Farmer-to-Farmer Learning in Mandalay, Myanmar. *International Journal of Pest Management*, 67(3), 234-245.

UNDP. (2020). *Scaling up agroecology for food system transformation*.

UNDP. (2020). *Sustainable Agriculture and Rural Development in Myanmar*. United Nations Development Programme.

UNESCO (2013) – *The Future of Teaching and Learning: A Global Perspective*

UNESCO (2021) – *Education During COVID-19: Lessons Learned*

USAID (2015)**:** *Feed the Future Myanmar: Annual Report*.

USAID (2021). *Farmer-to-Farmer Programs in Southeast Asia*.https://www.usaid.gov

USAID Farmer-to-Farmer Program Reports (2010-2023) – *Covers global case studies and Myanmar-specific projects.*

USAID (2020). *Impact Assessment of F2F in Myanmar*. Report on yield increases and Income growth among participating farmers.

USAID Farmer-to-Farmer Program (2023). *Official overview of global F2F objectives and activities.* USAID F2F

Van den Berg, H., & Jiggins, J. (2007). Investing in farmers - The impacts of Farmer Field Schools in relation to integrated pest management. *World Development*, 35(4), 663-686.

Welthungerhilfe (2021): *Digital Agriculture During COVID-19*.

Winrock International **(**2020). *Myanmar F2F Program Report*. Detailed insights into volunteer assignments and outcomes in the Central Dry Zone.

Winrock International (2021). *Climate-Smart Agriculture in Ayeyarwady Delta*. Case study on water conservation and soil health improvements.

World Bank. (2008). *Agriculture for development: World Development Report*.

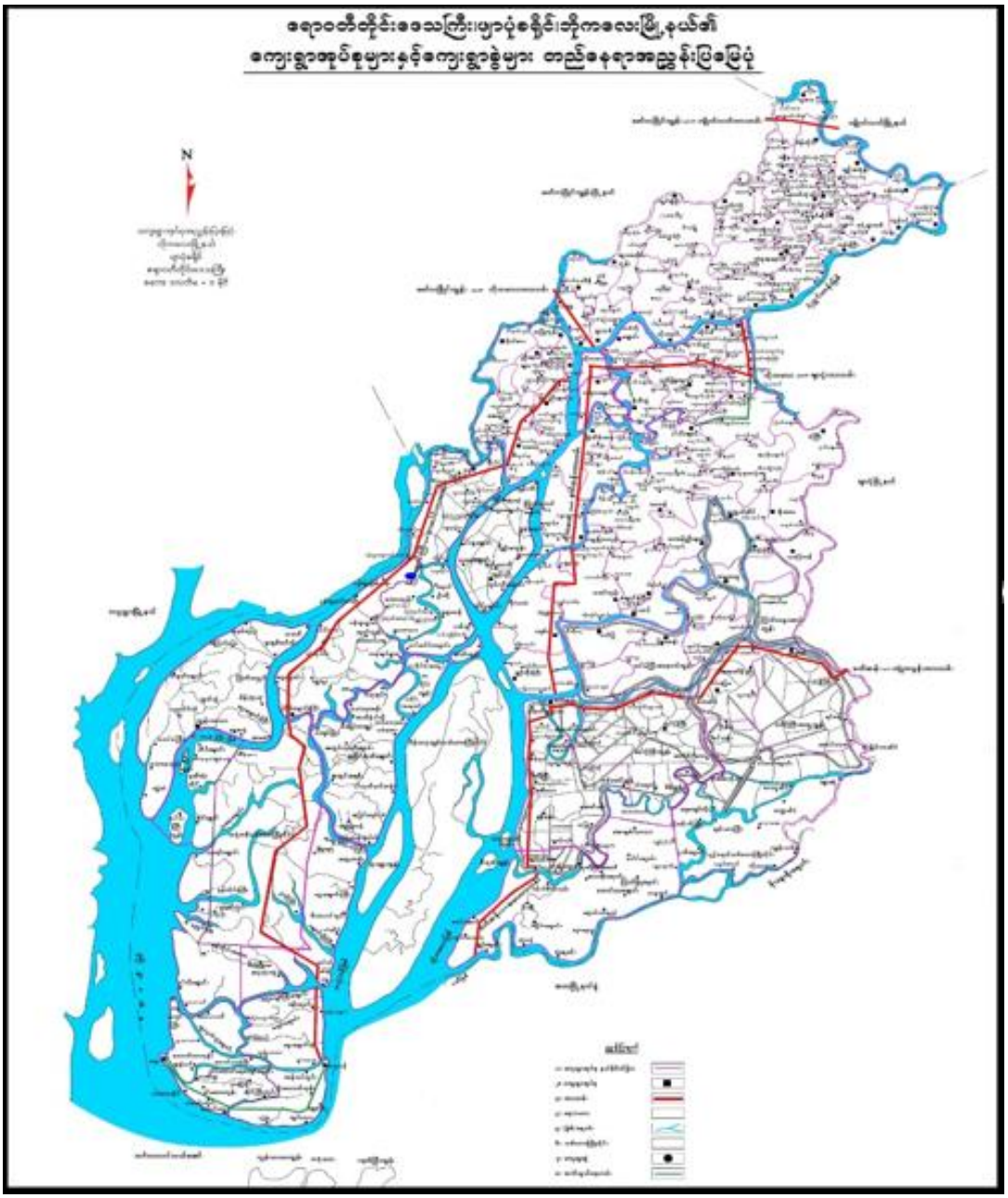
World Bank. (2017). *Myanmar Agricultural Development*: *Constraints and Opportunities*.

World Bank (2018) – *Blended Learning in Developing Countries*

World Bank. (2020). *Sustainable Agriculture and Rural Development in Myanmar*. Washington, DC: World Bank.

APPENDIX

Figure : Geographical Layout of Villages and Village Tracts in Bogale Township



A STUDY ON SUSTAINABLE AGRICULTURAL DEVELOPMENT PRACTICES USING A FARMER-TO-FARMER TRAINING APPROACH (CASE STUDY: BOGALE TOWNSHIP)

PART (1)

Please make a Check on each of the following questions, indicating your answer.

Section A: General Information of the respondents (Farmers)

Township – Bogale

Village tract

- Hay Man
- Thit Hpyu Chaung
- Set Kyun
- Nga Pi Chaung
- Kyun Nyo Gyi

Village name –

- Ohn Pin Su
- Htone
- Kyun Yar Kan Gyi
- Hlaing Khu
- Za Mu Aye
- Hnar Khaung Chaung Lay
- Aye Ywar
- Ywar Tan Shey
- 5 Kwet (East)

Participant type

- ToT received farmer
- Multiplier farmer

Types of respondents

- Household head
- Spouse
- Other family members

Age group:

- Under 30 years
- 30 – 39 years
- 40 – 49 years
- 49 – 59 years
- Above 60 years

Gender:

- Male
- Female

Educational Level:

- Monastery education
- Basic reading skill or Primary
- Middle
- High
- Bachelor

Household size:

- Under 5 members
- 5 – 10 members
- Above 10 members

Are you a farmer?

- Yes
- No

How many years have you been engaged in farming?

- Under 5 years
- 5 – 10 years
- 11- 15 years
- 16- 20 years
- Over 20 years

What type of farming do you primarily practice?

- Monsoon
- Winter
- Both
- Others…….

What are your main sources of income? (Check all that apply)

□ Agri-production (Farming)

□ From trading (groceries, vendors etc.)

□ Non-farm labor

□ Remittance

□ Government/ private company staff

□ Others

How much land do you cultivate last year (2024) Monsoon season?

- Under 5 acres
- Above 5 acres

Survey on Farmer-to-Farmer Training Participation and Impact

1. Have you ever participated in a farmer-to-farmer training?
    - Yes
    - No

2. How did you learn about the training? (Check all that apply)
    □ Farmer Field School
    □ Exchange visit
    □ Media (e.g., farmer channel, Facebook, Viber group)
    □ Lesson learning workshop
    □ Others: _____

3. What kind of training do you prefer?
    - In person
    - Online (e.g., media, Zoom, channel)
    - Others: _____

4. Who organized the training you attended? (Check all that apply)
   □ DoA
   □ INGO/LNGO
   □ Agri-related company
   □ Others: _____

5. What topics were covered in the training? (Check all that apply)
   □ Good agricultural practices (SRI, CSA, crop rotation, etc)
   □ Pest and Disease Management (IPM)
   □ Pesticide Awareness
   □ Seed Production
   □ Post-harvesting
   □ Others: _____

6. What was the duration of the training?
   _____ days

7. Have you applied the techniques learned in your farming practices?
   - Yes
   - No

8. If yes, what changes have you observed? (Check all that apply)
   □ Higher yield
   □ Better crop quality
   □ Higher income
   □ Reduced input cost
   □ Others: ____ _____

9. If no, what difficulties do you face in applying the training? (Check all that apply)
   □ Labor shortage
   □ Lack of access to machinery
   □ High input cost
   □ Limited access to quality seeds
   □ Others: _____

10. Have you shared the knowledge gained with other farmers?
    - Yes
    - No

      If yes, approximately how many farmers have you trained or advised?

      _____ persons

11. What challenges do you face in adopting sustainable agricultural practices? (Check all that apply)

    □ Poor water management system

    □ Climate change (flood, drought, etc.)

    □ Lack of awareness and knowledge

    □ Policy and regulatory uncertainties

    □ Financial constraints (e.g., access to agri-loan)

    □ Others: _____

12. What additional training topics would you like to receive?

    _____

13. What are the major constraints in attending farmer-to-farmer trainings? (Check all that apply)

    □ Demands of farm work

    □ Childcare responsibilities

    □ Training center too far

    □ Financial constraints

    □ Others: _____

14. What opportunities do you see from farmer-to-farmer trainings? (Check all that apply)

    □ Improved crop quality

    □ Access to improved technology

    □ Increased income

    □ Better market opportunities

    □ Improved collaboration among farmers and stakeholders

    □ Others:……

15. How can farmer-to-farmer trainings be improved? (Check all that apply)
    □ Hands-on training (farmer participatory approach)
    □ Providing guidelines, pamphlets, leaflets, posters
    □ Others: _____

16. What motivates you to participate in sustainable agricultural practices? (Check all that apply)
    □ Desire to increase farm productivity
    □ Improve household income
    □ Protect the environment
    □ Learn new skills and knowledge
    □ Influence from community or peers
    □ Others: _____

17. What types of support would help you adopt sustainable agricultural practices more effectively? (Check all that apply)
    □ Access to affordable credit or loans
    □ Technical training and capacity building
    □ Better access to quality seeds and inputs
    □ Improved market access and information
    □ Support from local government or organizations
    □ Others: _____

18. How useful do you find the information shared during the farmer-to-farmer training?
    - Very useful
    - Somewhat useful
    - Not very useful
    - Not useful at all

19. Have you encountered any difficulties in understanding the training content?
    - Yes
    - No

      If yes, please specify: _____

20. How confident do you feel about sharing the knowledge you gained with other farmers?
    - Very confident
    - Somewhat confident
    - Not very confident
    - Not confident at all

21. What kind of follow-up support would help you apply the training better? (Check all that apply)
    □ Regular visits from trainers
    □ Group meetings with other farmers
    □ Access to printed or digital materials
    □ Phone or online support
    □ Others:…….

22. How has farmer-to-farmer training affected your farming practices?
    - Significantly improved
    - Somewhat improved
    - No change
    - Made it more difficult

23. Would you recommend farmer-to-farmer training to other farmers in your community?
    - Yes
    - No

      If yes, please explain: _____

Section F: Perceptions Opportunities and Challenges of F2F Training

Instructions: Please rate the following statements using the scale below:

1 = Strongly Disagree **2 = Disagree** **3 = Neutral**

4 = Agree **5 = Strongly Agree**

1: Opportunities Created by Farmer-to-Farmer Training

No	Opportunities Created by Farmer-to-Farmer Training	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
1	F2F training has facilitated the exchange of valuable local knowledge among farmers.	1	2	3	4	5	
2	F2F training has strengthened social networks and cooperation within my community.	1	2	3	4	5	
3	F2F training has opened new market opportunities for my farm products.	1	2	3	4	5	
4	F2F training has improved my access to essential agricultural resources (e.g., seeds, fertilizers).	1	2	3	4	5	
5	F2F training has increased my awareness of sustainable agricultural practices.	1	2	3	4	5	
6	F2F training has helped me to improve my farm income	1	2	3	4	5	

2: Challenges Faced in Farmer-to-Farmer Training

No	Challenges Faced in Farmer-to-Farmer Training	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
1	Limited access to transportation and internet connectivity hinders my participation in F2F training.	1	2	3	4	5	
2	Lack of sufficient funding and resources limits the effectiveness of F2F trainings.	1	2	3	4	5	
3	Time constraints and competing farm responsibilities make it difficult to attend F2F training.	1	2	3	4	5	
4	The information shared during F2F training is sometimes not practical or applicable to my farm.	1	2	3	4	5	
5	The quality of the trainers varies greatly, impacting on the usefulness of the training.	1	2	3	4	5	
6	Climate change related events make it hard to implement the knowledge gained from F2F training.	1	2	3	4	5	

3: Sustainability and Future of Farmer-to-Farmer Training

No	Sustainability and Future of Farmer-to-Farmer Training	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
1	I believe F2F training is a sustainable approach to agricultural development.	1	2	3	4	5	
2	I am willing to continue participating in F2F training in the future.	1	2	3	4	5	
3	I would recommend F2F training to other farmers in my community.	1	2	3	4	5	

4	Digital tools and online platforms can enhance the reach and impact of F2F training.	1	2	3	4	5	
5	F2F training should be integrated with other agricultural development programs.	1	2	3	4	5	
6	Climate change related events make it hard to implement the knowledge gained from F2F training.	1	2	3	4	5	

Suggestions on F2F training:

1. Do you have any additional suggestions or comments regarding sustainable agricultural development and farmer-to-farmer trainings?

   ……

   ……

Thank you for your time and participation!