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The Contribution of Agricultural Extension to Empowerment of Women for Agricultural Development

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MSAY (10%): Provided technical guidance.
UA (10%): Contributed to gathering relevant literature.

Abstract
The study examined published works on the contribution of agricultural extension to the empowerment of women for agricultural development. It also explored the theoretical and practical implications. A systematic search in Scopus using relevant sets of keywords, including "agriculture extension", "capacity building", "women's empowerment", "women's agency",

“women farmers”, “gender” and “agriculture”, identified 77 pertinent articles published between 1987-2023. The findings revealed that research on women’s empowerment in agriculture through capacity building had grown steadily since 1987, with leading journals being Gender, Technology and Development and the Journal of Agricultural Education and Extension. Quisumbing, Mudege, and Ponnusamy emerge as prolific authors, while India boasts the most distributed studies. Beyond a comprehensive review, this work introduces a novel concept for understanding women’s empowerment in agriculture. The concept comprised of five extension methods designed to empower women farmers, emphasising informed decision-making and leveraging the various forms of capital. The new conceptual framework aims to drive a collaborative approach towards achieving Sustainable Development Goal 5 – Gender Equality. Additionally, the review offers a comprehensive systematic review of gender studies, particularly in agriculture. It highlights the need for intercultural studies to examine the effectiveness of the proposed framework across diverse cultural contexts and regions.

Introduction

Women constitute a vital force within the agricultural sectors across developing nations, making substantial contributions to both household and agricultural activities. Their pivotal role extends to staple food production, involving various agricultural chores (Chakma & Ruba, 2021; Zubair et al., 2023). Consequently, empowering women in agriculture fosters their economic independence and propels sustainable economic development (Anderson et al., 2021; Mobarok et al., 2021). This empowerment is not just beneficial for individual women but also critical for achieving the Sustainable Development Goals (SDGs) (Amran & Abdul Fatah, 2020; Wenda & Fon, 2021; Yount et al., 2019), specifically Goal 5 of Gender Equality.

An empowered woman with access to resources enables her to invest in innovative agricultural technology (Gichungi et al., 2023). This grants women decisional power over productive resources and is likely to result in the adoption of cutting-edge agricultural practices, such as climate-smart agriculture (CSA). This, in turn, improves food security and contributes to climate change mitigation (Doss et al., 2018; Shahbaz et al., 2022). However, a stark gender gap in access to education and training, resources, and credit, often leaves women’s needs and aspirations unheard, thus, impeding their progress and leading to lower productivity (Njuki et al., 2022). Non-gender-responsive agricultural extension services further exacerbate this issue by overlooking women’s contributions (Barry & Gahman, 2021; Farnworth et al., 2019; Lamontagne-Godwin et al., 2019). The indirect consequence of this unequal access to agricultural information is a vicious cycle of disempowerment. It hinders their ability to participate in decision-making, democracy, and personal development while increasing their vulnerability to societal inequality. Studies show that when women have equal access to production activities as men, agricultural production could increase, potentially reducing global undernourishment by 12 to 17 per cent (Gebre et al., 2021).

Decades of research have cemented the understanding that empowering women is crucial for advancing gender equality, sustainable development, and poverty reduction (Galiè et al., 2017; Leal Filho et al., 2023; Odera & Mulusa, 2020; Oyawole et al., 2021). A crucial aspect of this empowerment lies in fostering women’s potential and decision-making abilities, skills that are fundamental for achieving true empowerment. In this regard, capacity building targeted towards women in agriculture is vital. By providing

women with the necessary education, skills and resources, these capacity-building programs can not only enhance their decision-making abilities but also empower them to improve agricultural practices and productivity. This, combined with the expertise of skilled extension professionals, can enhance the approachability and relevance of agricultural extension services for women (Cook et al., 2021). By investing in extension services, women gain access to strategic avenues that allow them to overcome challenges related to their gender, age, ethnicity, and other unique needs as farmers and entrepreneurs (Witinok-Huber & Radil, 2021). Therefore, it is imperative to initiate further discourse on how agriculture extension can tailor its services to better equip and empower women in the agricultural sector.

Women's empowerment is a complex concept encompassing various aspects, including education, decision-making, labour market access, wages, and political participation (Medina & Herrarte, 2020). According to the Empowerment Theory proposed by Naila Kabeer, women's empowerment encompasses three aspects: resources, agency, and achievements (Kabeer, 1999). The introduction of the Women's Empowerment in Agriculture Index in 2013 has spurred a surge in research on women's empowerment in agriculture (Quisumbing et al., 2023). Despite this, studies have mainly focused on "agency" and "achievements" (Aprylasari et al., 2022; Gichungi et al., 2023; Mobarok et al., 2021; Wei et al., 2021), leaving a noticeable gap in research on the relationship between "resources" and "agency". Women's access to resources determines their ability to make wise choices and lead the lives they want. Therefore, understanding how agricultural extension services contribute to women's empowerment in various cultural contexts is crucial. Women's empowerment, in all its multifaceted complexity, requires further exploration and a deeper understanding of the intricate interplay beyond resource access, agency, and achievements.

Accordingly, this study investigates the contribution of agricultural extension to the understanding of women's empowerment in agriculture, emphasising their role in capacity building and exploring the theoretical and practical implications that may arise. To achieve this objective, the study addresses the following research questions:

(1) What is the current publication trend in the study of capacity building through agriculture extension and women's empowerment in agriculture?
(2) Who are the most active and influential contributors in the study of capacity building through agriculture extension and women's empowerment in agriculture?
(3) Which country has the most distributed studies in capacity building through agriculture extension and women's empowerment in agriculture?
(4) What is the concept and definition of capacity building through agriculture extension and women's empowerment?
(5) What new conceptual framework can be proposed for capacity building through agriculture extension and women's empowerment in agriculture?

Methodology

This study was conducted in Malaysia (latitude 4.2105°N and longitude 101.9758°E). This study employed the Six-Step Systematic Literature Review (SLR) methodology by

Mengist et al. (2020) to develop a new conceptual framework. A comprehensive search on Scopus, a widely recognised database for scholarly publications, was conducted using a combination of keywords of “agriculture or agricultural extension”, “capacity building or capacity-building”, “women’s empowerment”, “women’s agency”, “women farmers or rural women or female farmers”, “gender” and “agriculture or agricultural”.

The comprehensive search yielded 344 articles, which were subsequently subjected to a screening process. The first screening focused on evaluating titles for eligibility, adhering to predetermined inclusion and exclusion criteria. Articles deemed eligible for inclusion were those related to agriculture, food security, women farmers, women’s empowerment, development programs, women self-help groups (SHGs), microfinance or microcredit programs through agriculture extension programs, and agriculture-related community development. Articles excluded from consideration comprised those addressing non-agricultural topics, including nutrition or child nutrition, pregnancy and maternal care, health or disease, political or social development, disaster-related, non-women or women farmers, the tourism industry, and other microfinance or microcredit programs not affiliated with an agricultural extension program.

The inclusion and exclusion criteria resulted in the exclusion of 220 articles, leaving 124 articles for further consideration. The second screening involved an evaluation of the full abstract for eligibility. This process identified 77 articles that directly addressed the potential of agricultural extension in empowering women through capacity building. The remaining 47 articles did not fulfil the inclusion criteria and were excluded. A detailed depiction of the flow diagram in the systematic literature review is presented in Figure 1.

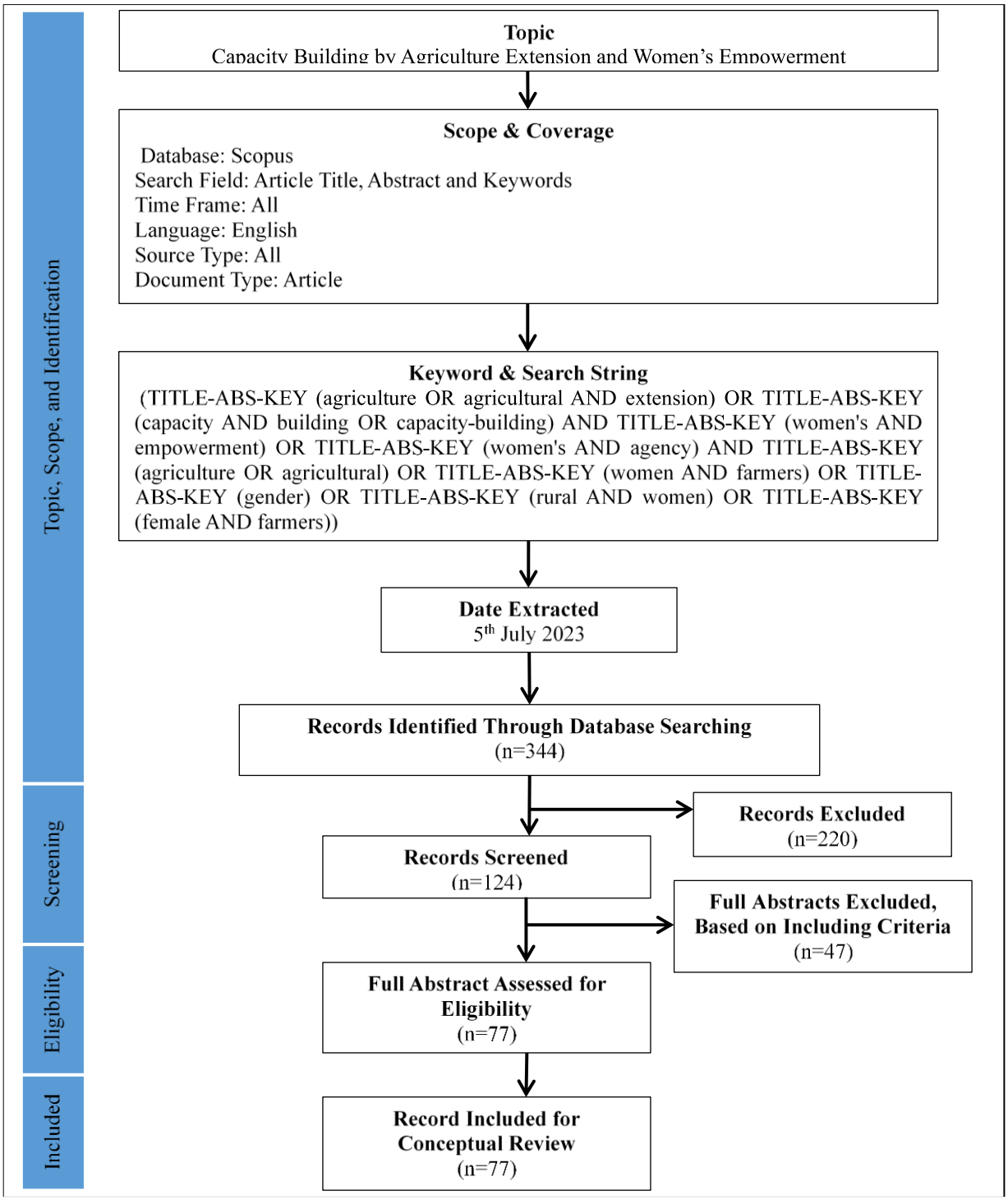


Figure 1: Flow diagram of article selection and screening process
Source: (Mengist et al., 2020; Page et al., 2021; Yusuf et al., 2022)

Measurement of variables

From the 77 selected articles, key information were extracted, including publication year, authors, titles, type of journal publication, abstracts, and article citations. Microsoft Excel 2013 was utilised for data synthesis and analysis. The extracted data were organised,

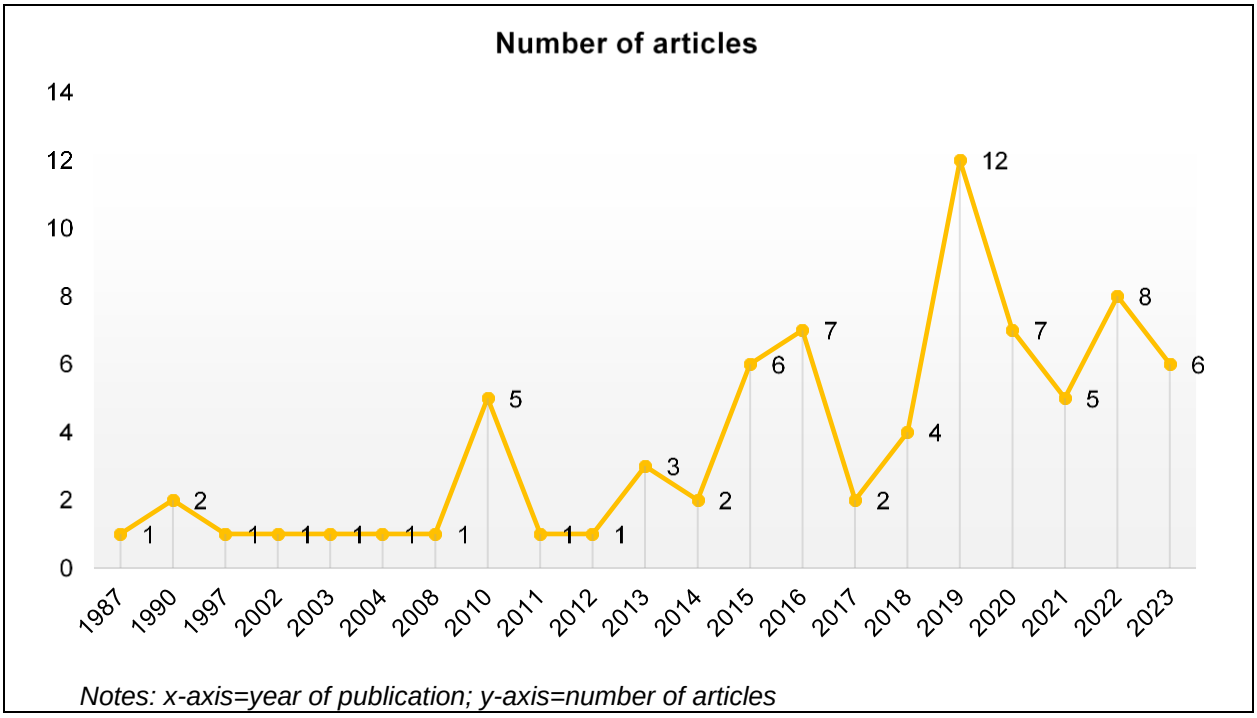
and pivot tables and graphs were created to identify trends and potentials regarding capacity building through agricultural extension and women's empowerment in agriculture.

Content Analysis

Trend in Publications of Women's Empowerment in Agriculture through Capacity Building via Agricultural Extension

Number of articles published in the Scopus database

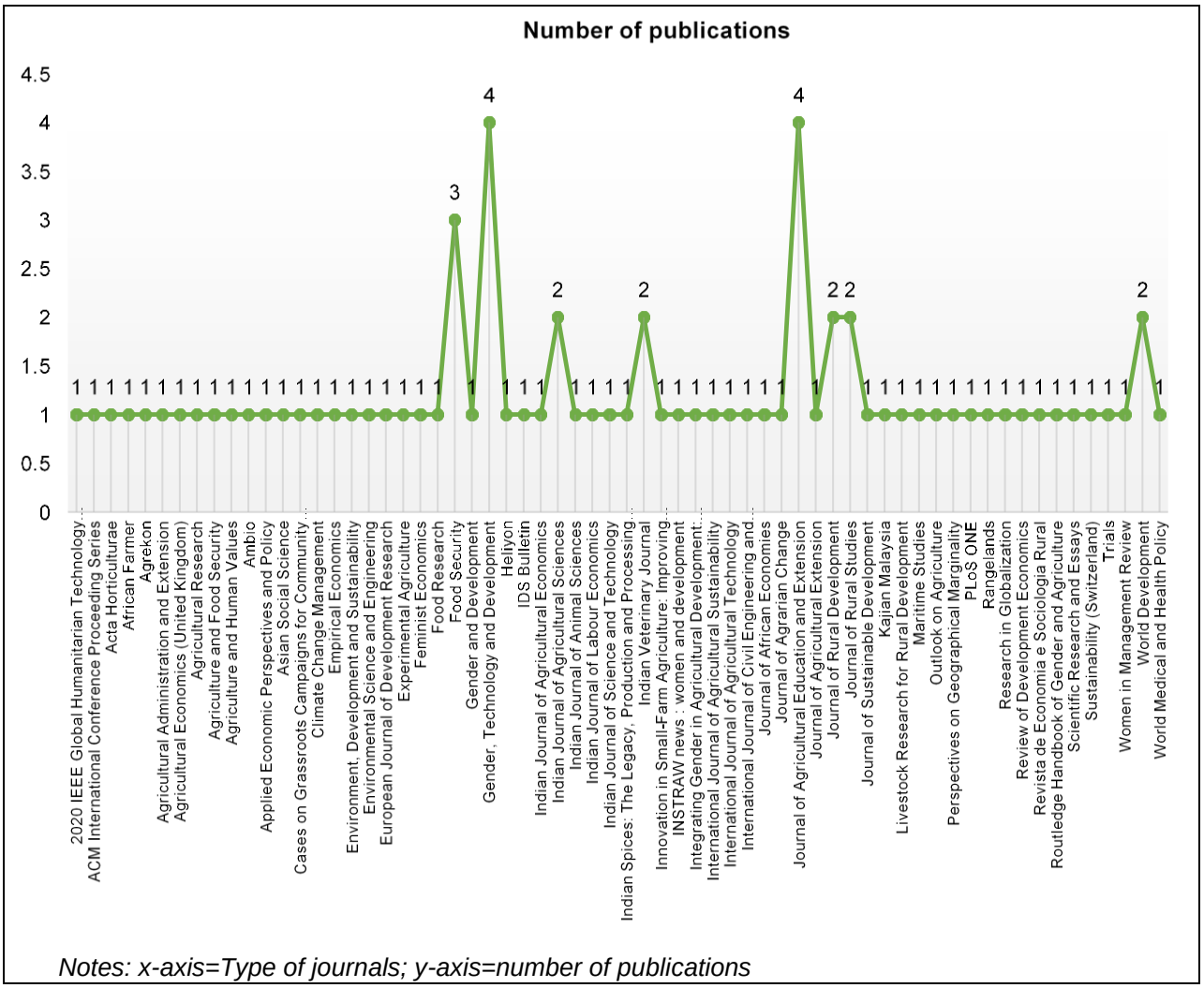
Figure 2 shows the timeline of research, spanning from 1987 to 2023. A gradual upward trend in publications related to capacity building in women's empowerment through agricultural extension is evident, culminating in a peak of 12 studies in 2019. This momentum, however, faced temporary setbacks in 2020 and 2021 likely due to the COVID-19 pandemic. Nonetheless, research activities were expected to rebound by the end of 2023.



Notes: x-axis=year of publication; y-axis=number of articles

Figure 2: Number of articles focusing on capacity building and women empowerment in agriculture extension (1987-2023)
Source: Scopus database, 2023

Leading the field in terms of publication volume were two journals: Gender, Technology and Development and the Journal of Agricultural Education and Extension, boasting four publications (n=4) apiece, as shown in Figure 3.

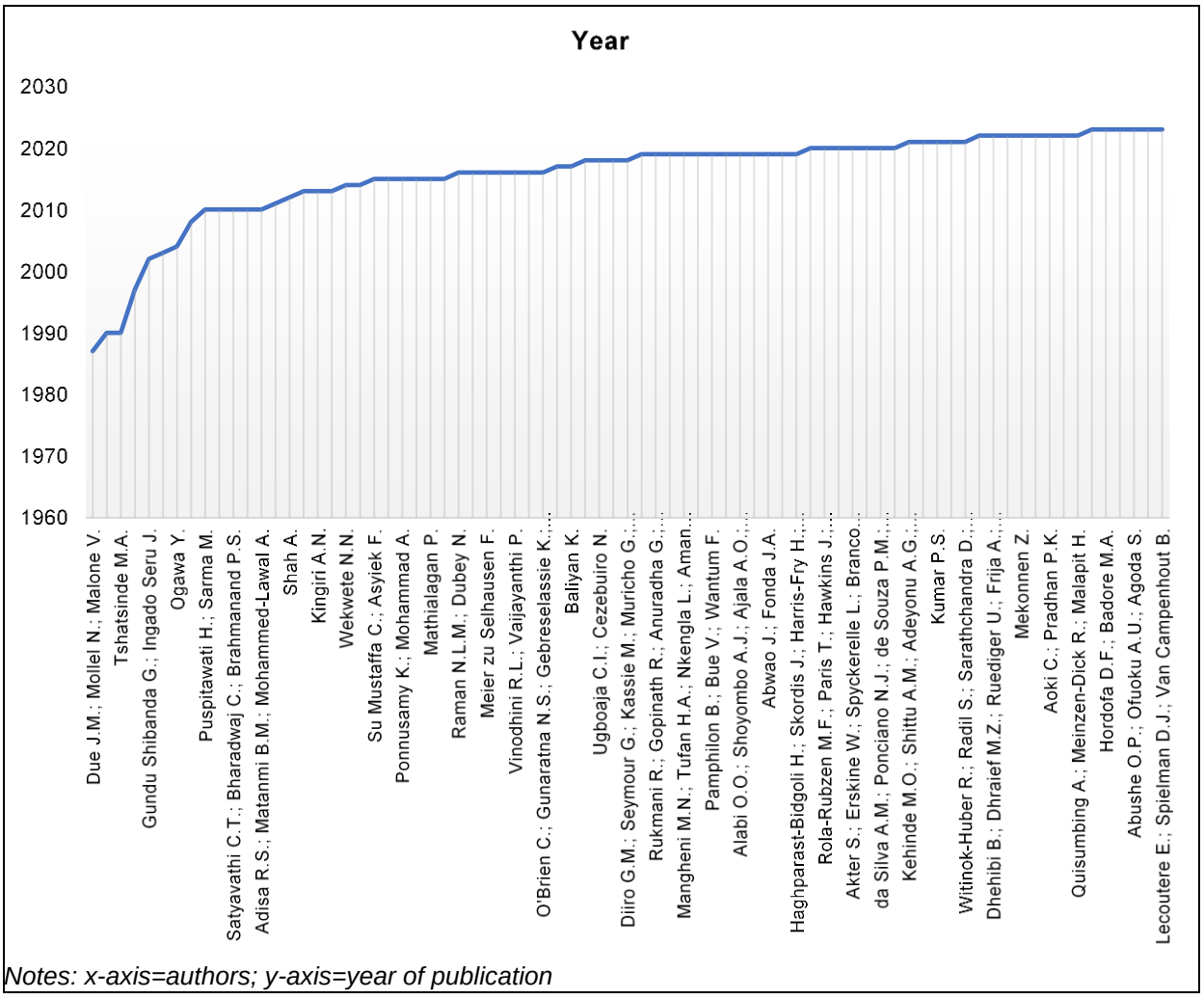


Notes: x-axis=Type of journals; y-axis=number of publications

Figure 3: Top leading journals
Source: Scopus database, 2023

Main contributions in publications of capacity building through agriculture extension and women's empowerment in agriculture

Figure 4 shows the distribution of lead authors among the identified publications. Quisumbing emerged as a prominent contributor, having authored three (3) articles in the database (Quisumbing et al., 2021, 2022; Raghunathan et al., 2019), followed by Mudege (Mudege et al., 2015, 2016) and Ponnusamy (Ponnusamy et al., 2017; Ponnusamy & Mohammad, 2015), with two articles each. The remaining authors contributed one article apiece.



Notes: x-axis=authors; y-axis=year of publication

Figure 4: Lead authors
Source: Scopus database, 2023

Table 1 presents the top 10 most cited publications exploring the potential of agriculture extension in empowering women in the agriculture sector through capacity building. Among the 77 identified publications, Diiro et al. (2018) emerge as the most highly cited with their article “Women’s Empowerment in Agriculture and Agricultural Productivity: Evidence from Rural Maize Farmer Households in Western Kenya”, garnering 77 citations. This is followed by Cohen et al. (2016) with “Understanding Adaptive Capacity and Capacity to Innovate in Social-Ecological Systems: Applying A Gender Lens” at 72 citations, and Meier zu Selhausen (2016) with “What Determines Women’s Participation in Collective Action? Evidence From a Western Ugandan Coffee Cooperative” at 52 citations.

Table 1: Top 10 highly cited articles on agriculture extension in empowering women through capacity building

Author	Title	Citation
Diiro et al. (2018)	Women's Empowerment in Agriculture and Agricultural Productivity: Evidence from Rural Maize Farmer Households in Western Kenya	77
Cohen et al. (2016)	Understanding Adaptive Capacity and Capacity to Innovate in Social-Ecological Systems: Applying a Gender Lens	72
Meier zu Selhausen (2016)	What Determines Women's Participation in Collective Action? Evidence From a Western Ugandan Coffee Cooperative	52
Stacey et al. (2019)	Enhancing Coastal Livelihoods in Indonesia: An Evaluation of Recent Initiatives on Gender, Women and Sustainable Livelihoods in Small-Scale Fisheries	44
Achandi et al. (2018)	Women's Access to Agricultural Technologies in Rice Production and Processing Hubs: A Comparative Analysis of Ethiopia, Madagascar, and Tanzania	42
Rola-Rubzen et al. (2020)	Improving Gender Participation in Agricultural Technology Adoption in Asia: From Rhetoric to Practical Action	36
Mudege et al. (2016)	Gender Norms and Access to Extension Services and Training among Potato Farmers in Dedza and Ntcheu in Malawi	32
Wekwete (2014)	Gender and Economic Empowerment in Africa: Evidence and Policy	31
Satyavathi et al. (2010)	Role of Farm Women in Agriculture: Lessons Learned	26
Song & Vernooy (2010)	Seeds of Empowerment: Action Research in the Context of the Feminization of Agriculture in Southwest China	25

Source: Scopus Database, 2023

Countries with the most publications in capacity building through agriculture extension and women's empowerment in agriculture

Table 2 shows the distribution of research output by country, with India leading at 21 publications. This is followed by Ethiopia and Nigeria, with six publications each, and Bangladesh and Indonesia contributed four publications each.

Table 2: Contribution by countries in research output on the potential of agriculture extension in empowering women in the agriculture sector through capacity building

Country	Counts	Country	Counts
India	21	Botswana	1
Ethiopia	6	Brazil	1
Nigeria	6	Burkina Faso	1
Bangladesh	4	Cambodia	1
Indonesia	4	Caribbean	1
Others	4	China	1
Kenya	3	Kenya	1
Malawi	3	Lebowa	1
Uganda	3	Liberia	1
Africa	2	Papua New Guinea	1
Malaysia	2	Solomon Island	1
Nepal	2	Tanzania	1
Tunisia	2	Timor-Leste	1
Afghanistan	1	Zambia	1

Source: Scopus Database, 2023

The findings imply a potential connection between women's empowerment in agriculture and capacity building facilitated by agricultural extension services. However, a significant gap exists in research exploring this avenue as a deliberate strategy for empowerment is evident. To the best of the authors' knowledge, few studies probe into the effectiveness of various capacity-building interventions in enhancing women's agricultural empowerment.

Table 4 offers a synthesis of findings derived from previous research on how agricultural extension programs impact women's capacity development across five cores of human capabilities. These five (5) capabilities form the "asset pentagon", as proposed in the Sustainable Livelihood Framework (Mariyono et al., 2021; Serrat, 2017).

Table 4: A synthesis of earlier studies on agricultural extension and its impact on women's capacity development within the "asset pentagon" framework

Human Capacity	Findings	Author
Human Capital	Seed potato management intervention boosted women farmers' skills, agricultural technology knowledge, and market access.	Oumer et al. (2014)
	Women in Mini Estate System (MES) and Cluster System (CS) adopted improved seaweed cultivation, boosting income, business awareness, and workplace management skills through various workshops and seminars.	Hussin et al. (2015)
	Access to improved technologies through extension advisory services can empower women in household decision-making.	Achandi et al. (2018)
	Small farmers increase household food availability with mixed cropping, requiring an improved agricultural extension system for nutrition sensitivity.	Rukmani et al. (2019)
Social Capital	Farmer groups empower women, yet research organisations must address underlying social issues causing gender inequality.	Mudege et al. (2015)
	Participation in self-help groups (SHGs) increases women's access to information and agricultural decision-making.	Raghunathan et al. (2019)
	Microfinance helps Dalit women's groups build social capital, improve decision-making, and start businesses with small loans.	Aoki & Pradhan (2022)
Physical Capital	Economic analysis of a single woman farmer in backyard poultry farming showed significant income with provided inputs (India case study).	Kumar (2021)
	Including strategies for better access to seeds, technologies, and extension services enhance the success of climate disaster mitigation.	Mangheni et al. (2019)
Financial Capital	Economic empowerment for women includes regulatory revisions, skills training, micro-credit schemes, technology utilisation, partnerships, cash transfers, childcare and skill training, and infrastructure improvement services.	Wekwete (2014)
	Aquaculture programs need finance, capacity building, support, monitoring, and information, benefiting women farmers for better efficiency and productivity.	Abwao & Fonda (2019)
Natural Capital	Training programs are essential for women to acquire agro-ecotechnology skills to improve their livelihoods and effectively conserve natural resources.	Maikhuri et al. (2011)
	Gender inequality in agriculture and policy could worsen the impact of climate change on households. Policy reforms should prioritise gender mainstreaming to empower women and enhance their ability to adapt.	Mekonnen (2022)
	Enhancing women's access to extension services and alternative livelihoods can increase their adoption of pest management technologies.	Gichungi et al. (2023)

Source: Scopus database, 2023

Development of a Novel Conceptual Framework for Capacity Building through Agriculture Extension and Women's Empowerment in Agriculture

The proposed conceptual framework integrates Kabeer's (1999) three-dimensional women's empowerment framework and the Capacity Building Ladder model by Coutts and Roberts (2003). By combining these models, the framework aims to examine how agricultural extension, through their capacity building efforts, empowers women in the agricultural sector.

Figure 6 shows the concept, a systematic approach where various agricultural extension methods contribute to the development of five key types of capital: human, social, physical, financial, and natural.

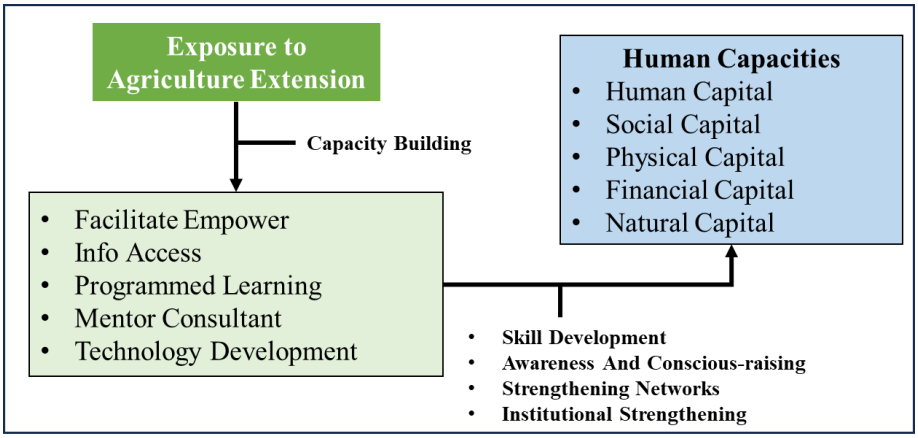


Figure 6: Systematic integration of agricultural extension methods for women's agricultural capacity building

The Capacity Building Ladder outlines five extension methods equipping women with the necessary tools and resources to cultivate the various forms of capital aimed at enhancing their skills, increasing awareness, and strengthening networks and institutions. Each method targets specific types of capital that foster their growth, as discussed below:

1) Facilitate Empowerment

"Facilitating Empowerment" involves developing women's skills and knowledge through group formation and participatory approaches. A facilitator guides women farmers in groups, encouraging active participation in capacity-building programs. This fosters the acquisition of new knowledge, skills, and competencies. Additionally, this approach also helps to develop social capital by expanding networks, encouraging collaboration, and involving women in decision-making processes to build confidence.

2) Information Access

"Information Access" emphasises providing women with essential information and resources through training, capacity-building programs, networking, and ongoing support networks. These initiatives elevate women's human capital by keeping them abreast of knowledge and technical skills. Additionally, it facilitates the exchange and

dissemination of information among women, promoting the development of social capital, encouraging collaboration, and establishing platforms for knowledge sharing.

3) Programmed Learning

"Programmed Learning" provides systematic and structured learning experiences for women in agriculture, fostering capacity building through targeted learning materials, interactive participation, and regular evaluation. This method contributes to the development of women's human capital by imparting skills and competencies. Additionally, it facilitates networking and knowledge exchange, indirectly enhancing their social capital. Through programmed learning, women gain insights into resources, funding opportunities and agricultural inputs, enabling them to make informed decisions for optimal resource allocation and utilisation.

4) Mentor Consultation

"Mentor Consultation" emphasises personalised guidance and mentorship for women in agriculture, promoting knowledge transfer, skills development, and confidence building. This approach contributes to human capital development through mentoring relationships. Additionally, it enhances social capital by strengthening networks and facilitating the exchange of ideas and experiences between mentors and mentees.

5) Technology Development

"Technology Development" acknowledges technology's transformative role in agriculture. This approach equips women with the necessary technical skills and resources through training, awareness-raising, and technical assistance, capacitating them with skills related to technology adoption, thereby enhancing their human capital. Additionally, innovative agricultural technologies contribute to financial capital development by improving productivity, generating income, and providing better market access. It also enhances women's natural capital by promoting sustainable practices and preserving natural resources.

Pathway to Women's Empowerment: How Agricultural Extension Builds Capacity

Figure 7 depicts the pathway for women's empowerment through agricultural extension. It outlines a sequence starting with access to resources culminating in increased agency. The pathway illustrates how women are empowered by providing them with the tools and knowledge that ultimately lead to greater autonomy and decision-making power.

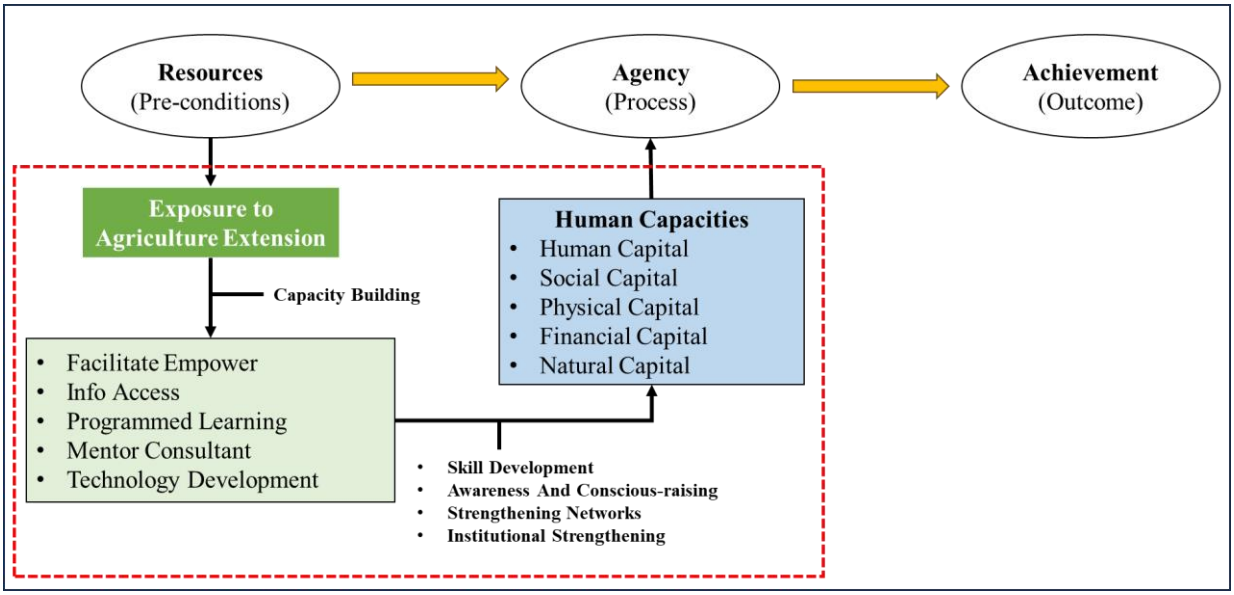


Figure 7: The pathway to women's empowerment from resources to agency in capacity building through agricultural extension

This study explores how agricultural extension acts as a powerful catalyst for women's empowerment. It centres on the idea that strengthening women's capacity unlocks their full potential and paves the way for equitable opportunities, rights, and decision-making. The study identifies five types of capital essential for women's empowerment: human, social, physical, financial, and natural. It then proposes five corresponding extension methods designed to build these capitals: Facilitate Empowerment, Information Access, Programmed Learning, Mentor Consultation, and Technology Development. Through these methods, women develop their skills and awareness, strengthen their networks and institutions and gain a deeper understanding of the agricultural landscape. This empowers them to make informed decisions, achieve better returns, and ultimately, unleash their full potential.

Conclusion and Recommendations

By capacitating women farmers with knowledge, skills, and abilities, they are empowered to make informed decisions and unlock their full potential as critical contributors to agricultural productivity, sustainability, and the well-being of rural communities. By recognising the interplay between extension methods and capital development, stakeholders can design targeted interventions that foster inclusive and resilient agricultural systems.

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