



Exploring Female Agripreneurship: Insights from Grey Literature Using TCCM Framework

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Abstract: Women agripreneurs' expertise, abilities, and passion are some of the most effective strategies to improve their financial and social status. There is a wealth of systematic literature on women in entrepreneurship, as well as bibliometric reviews on women in entrepreneurship and sustainability. However, the systematic literature on women in agriculture or agribusiness on grey literature receives relatively little attention. The present study applies SPAR-4-SLR and TCCM frameworks to validate the research questions. Women frequently encounter disempowerment in terms of their participation, influence, and control over agricultural decision-making and income, which leads to the existence of gender disparity. Access to financial services could potentially reduce rural-to-urban migration by providing enhanced local economic opportunities. Suggestions provided for a supportive environment that values and respects the contributions of women in agriculture, facilitating the adoption of various technologies to break down barriers and reduce gender disparities. The investigation highlights the need for further research on the topics of female agripreneurship, female empowerment and digital technology, women's perspectives on technology and innovations in agriculture, and gender disparities in agripreneurship, all with the aim of achieving sustainable agriculture. The novelty of the study is the usage of the TCCM framework in the grey literature on women in agriculture and a proposed framework for technology-enhanced women's empowerment in agriculture.

Introduction

The three overarching strategic development goals (SDGs), including zero hunger, no poverty, and reducing inequalities, are all endorsed through (Food and Agriculture Organization [FAO], 2021). The fields of agribusiness, resource development, and environmental economics have all benefited greatly from the work of women (Unnevehr et al., 2021; Evans and Bohman, 2022; Offutt and McCluskey, 2022; Segerson et al., 2022). Evans & Bohman (2022) evaluated the contributions that women farmers provide to the agricultural sector and economy. Women's empowerment is the result of their participation and contributions in many fields, including agriculture, education, finance, ICT, etc. Women's entrepreneurship can have numerous forms; some of the most common include social, technological, international, and sports entrepreneurship

(Ratten, 2020). Economic empowerment for women involves rights and gender equality in current markets, individual and family decision-making, control over their own time, health, and lives, and control over production resources (Das and Guha 2016). If women are employed, they will be empowered, leading to personal and organizational success and growth. With the evidence from the Food and Agriculture Organisation 2030 agenda, women and indigenous people face risk, prejudice and marginalization in many circumstances. As women's labour is more focused on agriculture, we must again address landownership, work responsibilities, autonomy, and authority (Pattnaik et al., 2018; Chakraborty and Sutradhar, 2023). Women continue to face severe barriers to accessing agricultural resources, land, and production technological tools. Women's



contributions to agriculture are undeniably significant, yet they have received little attention (Mishra, 2023).

Literature Review

Women's entrepreneurship involves creative ideas and the art of starting an innovative business, whether it's a product, process, or service. When women initiate a business, they assemble all necessary resources, take risks, confront problems, employ others, and operate the business autonomously. (Kaur et al., 2018; Baral et al., 2023). Some variables motivate women agripreneurs (Madhumitha and Karthikeyan, 2020; Kumalasari and Rizal, 2023). Innovation drives women agripreneurs to be unique and successful (Moirangleima, 2016; Halim et al., 2020; Madhumitha and Karthikeyan, 2020). Family support, environmental support, and supervisory institutions help rural women entrepreneurs succeed (Kumalasari and Rizal, 2023). Further, various economic factors like government support, government policy on taxes, policy on startups and entrepreneurial finance, convenient accessibility to entrepreneurial finance and entrepreneurial education, research and development, professional and commercial infrastructure, and non-economic like social and cultural norms, new entry regulations, technology, market dynamics help to assess the success rate of women agripreneurs. Poverty reduction and rural development depend on women agripreneurs (Halim et al., 2020). Rural agripreneurs empower and enhance the living of rural landscape (Verma et al., 2018). Lans et al. (2013) said farm women are crucial to agricultural entrepreneurship. Mukembo et al. (2020) confirmed that decreased self-efficacy affected women's careers. Today, women entrepreneurs are offered numerous opportunities and their numbers are rising.

Increasing women's participation in agriculture is important for fostering women's economic independence within the context of agripreneurship or entrepreneurship (Valencia et al., 2021). Despite the growing interest in agriculture in the academy, more research into the role of women in agriculture is needed. There is much systematic literature on women in entrepreneurship (Cabrera and Mauricio, 2017; Baral et al., 2023) and a bibliometric review on women's entrepreneurship and sustainability (Raman et al., 2022). But there are very less studies of systematic literature on women in agriculture. There is a need for rigorous interdisciplinary research to validate the different findings and further similar initiatives that are documented in the grey literature (Kadzamira et al., 2024). Singh et al. (2024) used TCCM framework ('T' stands for theory, 'C' for context, 'C' for characteristics

and 'M' for methodology) to explore the entrepreneurial bricolage. Syed et al. (2024) explored the significance of age and entrepreneurship by applying TCCM framework. Through there are several approaches, TCCM is a novel approach in agribusiness women to enhance the comprehension of the research subject by exploring it from multiple viewpoints. More research is required to fully comprehend how women's opinions and experiences might improve agriculture and empower women. The purpose of this research is to investigate the ontological nature of women's contributions to agriculture using TCCM framework which was less explored in the previous research. With the evidence from the aforementioned evidences, the following Research Questions (RQ) are offered for further study.

RQ1: What methods and theories were used to evaluate women in agriculture in the previous studies from 2014 to 2024? and RQ2: What are the countries contributed in the grey literature? RQ3: What are the future research questions with the evidence from the previous research?

The main purpose of this research is to compile and analyse grey literature on the topic of women in agriculture by analysing using TCCM framework. The purpose of this investigation is to set an agenda for future research by generating research questions and a proposed model.

Review Methods

This paper aims to provide a systematic and broader view of women in agriculture in business management and accounting on grey literature using TCCM approach. The scientific articles collected have enough data to answer the research questions.

SPAR-4-SLR approach

Paul et al. (2021) proposed the SPAR-4-SLR approach (Scientific Procedures and Rationales for Systematic Literature Reviews). SPAR-4-SLR explains the 3 major "A" phases assembling, arranging, and assessing. The 6 minor phases include identification, acquisition, organization, purification, evaluation, and reporting. The detailed phases and their items are explained in Figure 1.

Phase 1 Assembling

In SPAR-4-SLR, data assembly refers to assembling pertinent information from existing secondary sources such as databases and published literature. Identification and acquisition are the two minor phases of assembly. Where the database Scopus is characterized as the dominant research field, research topics, source type, and source quality. Based on the objectives, the Scopus

database was chosen for data collection throughout the month of June 2024, from 2014 to 2024. According to (Zhao and Strotmann, 2015), the Scopus database contains the bulk of social science papers and has over 60% more coverage than the Web of Science (WOS) database. The following search string was used for this purpose: "Women in Agriculture" in all topic areas. This covers all of the major research themes included in the Scopus database in article titles, abstracts, and keywords. Initially, a total of 602 articles were retrieved.

prevalent theories, contexts (countries and industries), characteristics (interconnections of key variables), and methods (research approaches and analysis techniques) that have been addressed in prior studies pertaining to this subject matter. Further, to study the dimensions, methods, and theories used in the previous studies, all irrelevant source articles, conference proceedings, and book chapters are eliminated. Finally, the total number of samples with all the excluding criteria is limited to 34 open-access documents in terms of subject relevance.

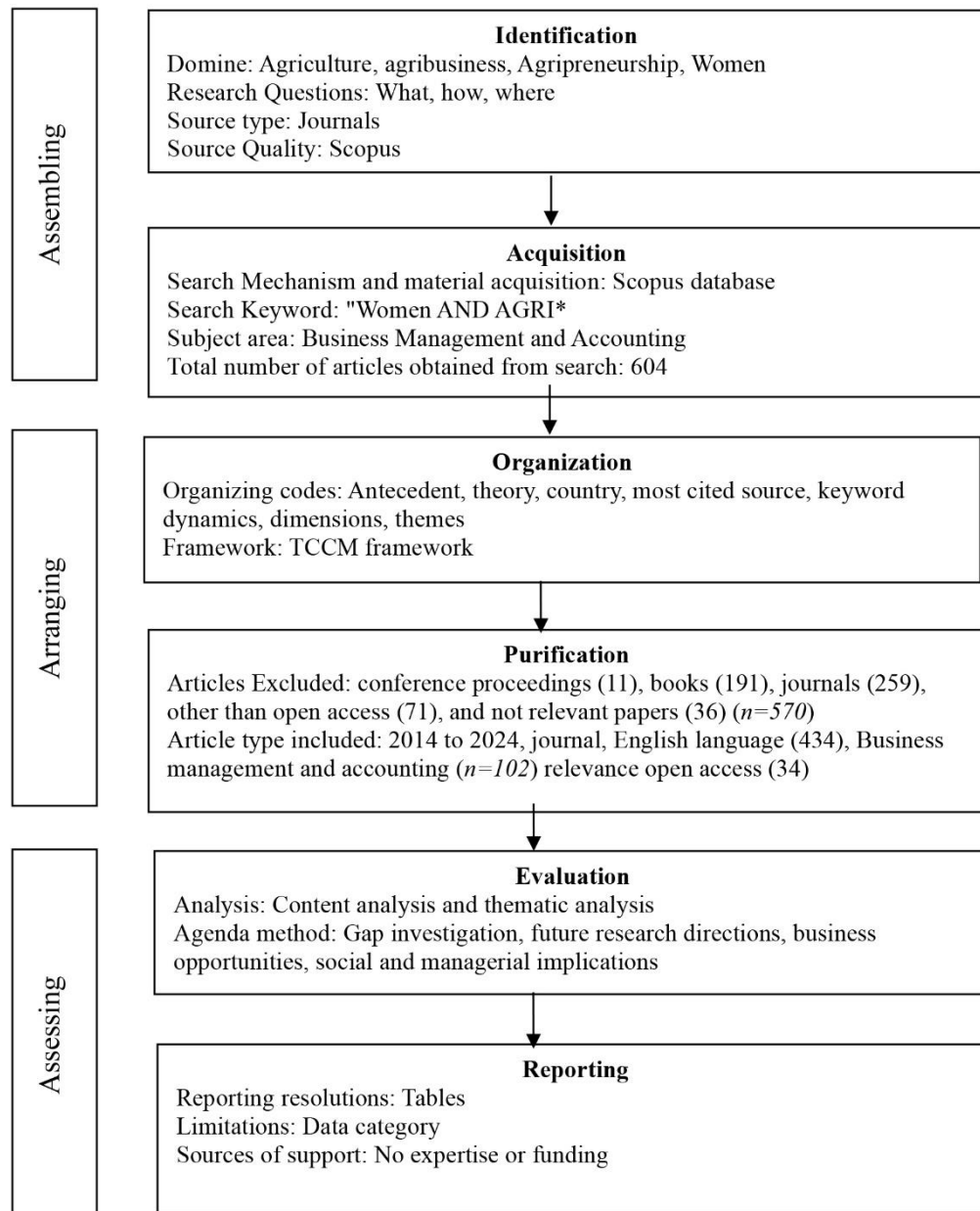


Figure 1. SPAR-4-SLR approach (Source: Authors).

Phase 2 Arranging

Arranging involves carefully arranging various elements in a logical and meaningful way to facilitate understanding, analysis, or communication of research findings. The TCCM framework Theory-Context-Characteristics-Methods (TCCM) (Paul et al., 2021) provides an all-encompassing comprehension of the

Phase 3 Assessing

Assessing in SPAR-4-SLR approach deals with evaluation and reporting. Based on the gap analysis this study suggested theories to be used in future studies, future research agenda, business opportunities in agriculture, and implications. The limitations of this study are also justified in the conclusion part.

Results

RQ1: What are the methods and theories used to evaluate women in agriculture in the previous studies from 2014 to 2024 using TCCM approach?

complex problems and societal concerns, concentrating on different data points, as depicted in figure 2. Theories focus on future research, test hypotheses, and explore new theories into original new theories. Various

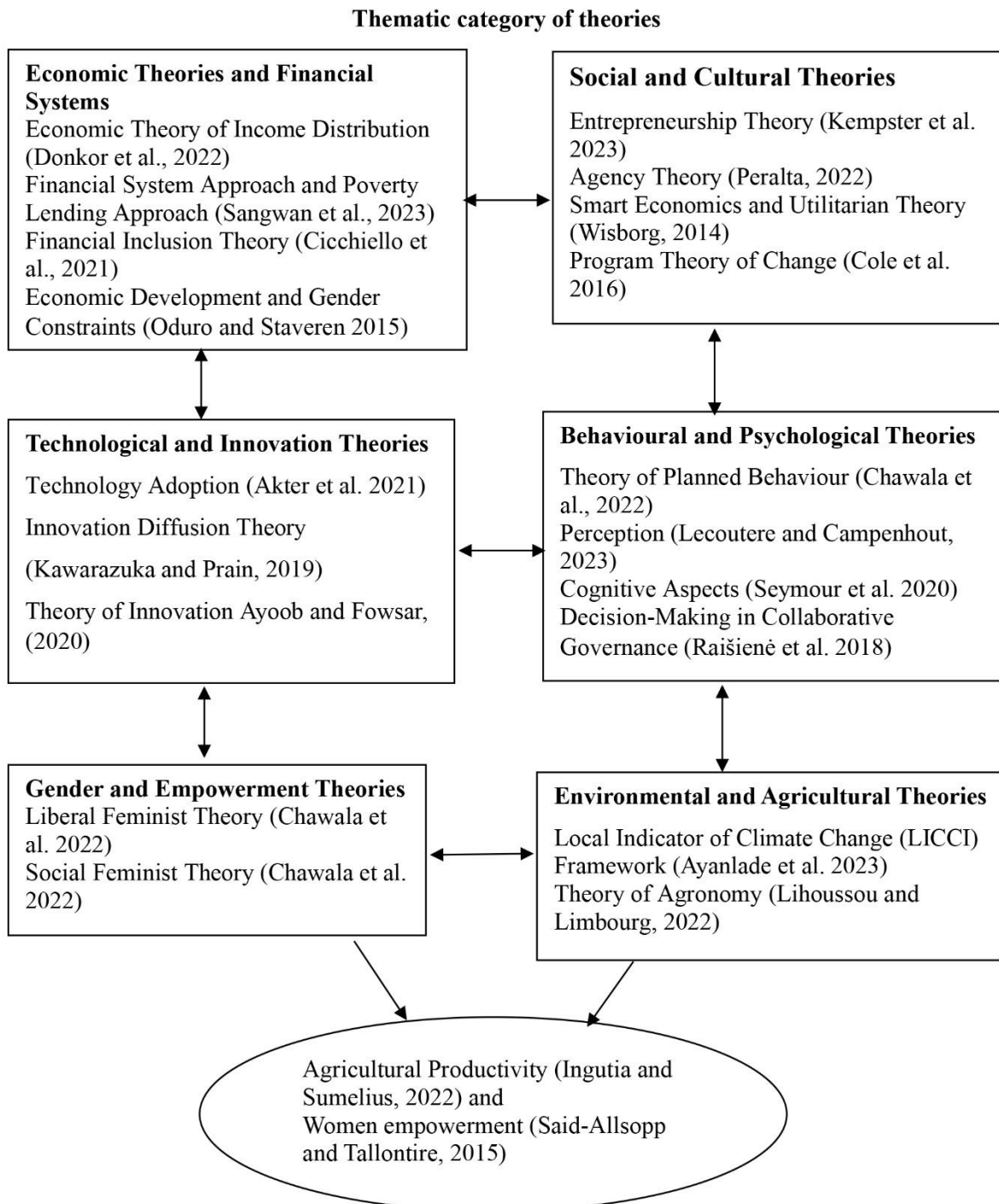


Figure 2. Thematic category of theories (Source: Authors).

Theories

Research question 1 deals with the methods and theories revolving around the selected articles. Karbo et al. (2024) considered farmers' behaviour in adopting technologies and expressly mentioned the use of a theory or theories. Models and frameworks were more prevalent in the literature compared to explicitly defined theories. Theories help to provide multiple "lenses" to view

theoretical frameworks such as Local Indicator of Climate Change (LICCI) (Ayanlade et al., 2023), entrepreneurship theory (Kempster et al., 2023), Theory of planned behaviour (Chawala et al., 2022); financial inclusion theory (Cicchello et al., 2021), Technology adoption theory (Aker et al., 2021) and Innovation diffusion theory (Kawarazuka and Prain, 2019) among others are utilized. Resource theory, also known as agricultural productivity theory, is used to measure the

agricultural inputs and outputs of products or services. The financial inclusion theory is directly related to inequality and the country's economic growth (Dawood et al., 2018). Bayes' theorem quantifies the likelihood of an event happening based on a given situation (Kiros and Abebe, 2020). Trait theory helps to identify human behaviour, and program theory involves the work process and the procedures expected in it. The least contributing theories are liberal feminist theory, social feminist theory and radical feminism. Hence, these theories can be used more in the future. The most recently used theories are the theory of adoption (Akter et al., 2021), the theory of innovation (Kawarazuka and Prain, 2022), the innovation diffusion theory, the liberal feminist theory, the social feminist theory, the theory of planned behaviour, and radical feminism. Future research that focuses on women's empowerment could consider social empowerment theory, social exchange theory, feminist empowerment theory, and community empowerment theory in agriculture, so the outcome of these studies can benefit women's empowerment and self-reliance. Various theories, like the innovation diffusion theory, technology acceptance model, theory of planned behaviour, attitudes, and perceptions, are utilized to assess the behavioural intention and actual usage of any agricultural technology adoption (Lecoutere and Campenhout, 2023).

Research Methods in Grey Literature

The methodology of research is the systematic and theoretical analysis of the approaches applied in the area of research. Most of the authors used statistical instruments such as correlation, regression (Ishida and Ishida, 2021), ordinary least squares (OLS) test and binary probit model (Ognjenovic et al., 2022). Furthermore, methods such as K-means cluster analysis were often used (Higgins et al., 2018), whereas theme analysis was used less often. Researchers used Mann-Kendall analysis (Ayanlade et al., 2023), NVivo for theme analysis (Kempster et al., 2023), logistic regression (Kiros and Abebe, 2020) and multivariate analysis (Peralta, 2022) among other statistical methods to arrive at their findings. With particular techniques including thematic analysis, panel data analysis, binary probit model and OLS regression, the studies sometimes embraced mixed methodologies, combining both qualitative and quantitative approaches. The current study shows four mixed-method studies, twenty-three quantitative studies, and seven qualitative investigations. In the framework of women in adopting farm technology, this exposes a notable discrepancy between the quantity of mixed-method and qualitative studies—such as case studies, conceptual frameworks, model creation, and

review articles. Testing gender-specific technology adoption hypotheses connected to the agricultural technologies employed by women requires thorough empirical study.

What are the countries that contributed to the grey literature?

Geographical Contexts

The studies encompass a vast array of countries, which have been categorized into distinct groups based on their homogeneity, such as African, Asian, European, and others. This categorization highlights the great range of geographical contexts represented in the studies. These countries have made significant contributions to the inclusion of women in the agricultural industry, whereas other parts of the world are not fully explored in this context.

Table 1. Geographical context of the grey literature.

African Countries	Asian Countries	European Countries	Others
Kwara and Nassarawa States in Nigeria	India	Czech Republic	United States
Kenya	Timor-Leste	Hungary	Vanuatu
Uganda	Japan	Poland	53 countries
South Africa	Sri Lanka	Slovakia	United Nations
Republic of Benin	Bangladesh	Lithuania	
Zambia	Vietnam	Macedonia	
Sub-Saharan Africa	Indonesia		
Ghana			

Table 1 depicts that the African and Asian countries are concentrating most on women in the agriculture context. Other developed countries have limited literature on gender-based studies in the context of Agriculture.

Results and Discussions

Women Empowerment

Gender significantly shapes agricultural adaptation strategies, often favoring males, who typically possess greater resources and decision-making authority (Ayanlade et al., 2023; Kempster et al., 2023; Peralta, 2022). Existing literature consistently underscores the profound influence of gender on the implementation of adaptation strategies in agriculture, revealing that men commonly enjoy privileged access to resources and retain primary decision-making roles as household heads.

Conversely, women frequently encounter disempowerment in terms of their participation, influence, and control over agricultural decision-making and income from crop sales (Peralta et al., 2022). Empowering women in agriculture is crucial, with targeted information interventions proving effective (Lecoutere and Campenhout, 2023). However, the expansion of microfinance institutions tends to favour wealthier clients, thereby neglecting poorer agricultural sectors, including aspiring women entrepreneurs who face significant financial challenges previously discussed (Sangwan et al., 2023; Cicciello et al., 2021). Access to financial services could potentially reduce rural-to-urban migration by providing enhanced local economic opportunities, as suggested by earlier research (Ognjenovic et al., 2022). Important for steady income generation, improvement of the level of life, and financial independence are the women aspirant agripreneurs financial inclusion by both government and non-governmental entities. Addressing income disparities should be a primary objective in the development of agri-food value chains to achieve sustainable rural economic growth (Donkor et al., 2022). Community involvement and the integration of both scientific and experiential knowledge are critical for advancing environmental conservation and agricultural practices. Efforts to equip women with necessary tools, technology, and locally developed innovations are crucial, aligning with recent studies (Ramsay et al., 2022). Moreover, single entrepreneurs and individuals engaged in family enterprises, particularly those with low skills or young entrepreneurs, face heightened poverty risks (Ognjenovic et al., 2022). Enhancing mobile money solutions and addressing structural barriers are essential for sustained financial inclusion, potentially stabilizing rural areas and reducing incentives for migration to urban centres, as highlighted in the grey literature (Cicchiello et al., 2021; Dawood et al., 2019). These findings underscore significant policy implications, highlighting the need for gender-sensitive agricultural programs, improved financial inclusion, and leveraging digital platforms to enhance market transparency and equitable price negotiations (Peralta, 2022; Lihoussou and Limbourg, 2022).

Women and Agriculture Technology

In recent years, technology has not been separated from human life and day-to-day activities in many aspects, like mobile devices, computers, laptops, etc. However, Massresha et al. (2021) support that a variety of factors influence the adoption of agricultural technology, including individual factors such as age,

gender, income, education, and family size, as well as secondary activities such as farmers' experience, perceived utility, risk aversion, and computer use. Technology adoption is a unique pathway to sustainable agriculture, embracing the commitment and firm grasp for a viable and enduring future (Mehta et al., 2021). The researchers have shown interest in various technologies used in agriculture, which include mobile applications (Barrios, 2023), machine learning (Amini and Rahmani, 2023), deep learning (Mendes et al., 2020), big data (Ngo et al., 2023), artificial intelligence (Javaid et al., 2023), smart agriculture (Adamides, 2020), the internet of things (IoT) (Naresh et al., 2021), global positioning systems (Stombaugh, 2018), decision support systems (Zhai et al., 2020), geographical information systems and remote sensing (Maracchi et al., 2020), data acquisition (Sharma et al., 2021), sensor-controlled automation (Paul et al., 2022), and variable rate technology (Šarauskiš et al., 2022) are being employed to enhance agricultural practices. The theories discussed on the acceptance of agricultural technology among women confront the feasibility of implementing different current technologies. Two well-known theories on the subject are the unified theory of acceptance and use of technology (UTAUT1) (Dehghani, 2018; O'Neill Somers and Stapleton, 2020) and the Technology Acceptance Model (Arun, 2021). Additionally, there is a second version (UTAUT2) (Gansser and Reich, 2021). The theories in the annexure table of the TCCM framework state that liberal feminist theory, social feminist theory, and radical feminism are the least contributed; hence, these theories can be used more in the future. The present study also found that men in agriculture have superior and more fulfilling opportunities to utilize technology compared to women, as evidenced by Achandi et al. (2018). Women face less ICT accessibility in the agricultural industry and possess less knowledge about climate-smart agriculture in comparison to men, which is in line with the previous literature (Gumucio et al., 2020; Tsige et al., 2020). The present study shows that there is a greater gap between mixed methods and qualitative studies like a case study, conceptual framework or models, theory building, and review article types such as bibliometrics, scoping reviews, and systematic literature reviews in the context of women in agribusiness and its various types for academicians and future researchers.

Women and Gender Disparity

The current review of the literature identifies various challenges faced by women due to gender disparity in agricultural activities, including limited awareness of

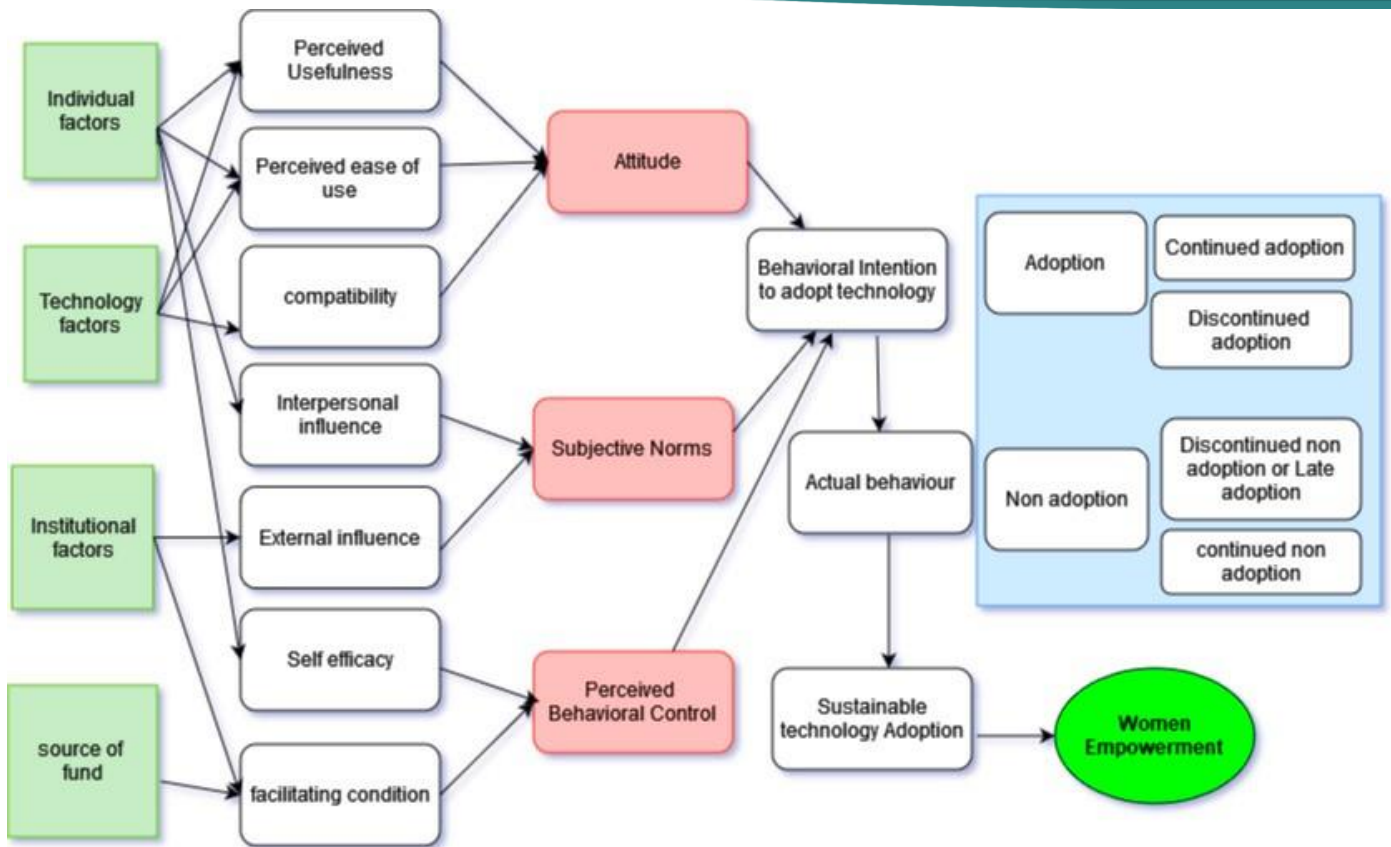


Figure 3. Proposed Framework on Technology Enhanced Women Empowerment in Agriculture.

financial inclusion and government schemes, inadequate disaster management strategies, insufficient education and training in agriculture, lack of research and technical support, and inadequate access to financial, marketing, technology and agripreneurial skills (Obianefo et al., 2021; Raza and Tang, 2022).

Reducing climate hazards depends mostly on ensuring women's fundamental land ownership rights. Globally, gender inequality is still a major problem influencing sustainable development goals (Valencia et al., 2021; Chawala et al., 2022). Though some nations have made progress, gender inequalities still exist in many different sectors, including business. Common in agriculture and allied sectors, women in agripreneurship have several chances throughout agricultural output and industrial facilities (Madhumitha and Karthikeyan, 2020; Garima et al., 2021; Singh et al., 2022). Dealing with gender inequality in agripreneurship suggests that government agencies, non-governmental organisations, and financial institutions to acknowledge and support these business prospects for women, so increasing knowledge of the available programmes and financial support (Jamri, 2020; Singh et al., 2022). Following past studies, governments should give education, technological training, and skill development programmes targeted on digital platforms as the top priority for marketing.

Practical Implications

Implementing policies that solve gender disparity will help to reach sustainable development in the agriculture industry. This recommends aggressive government intervention to improve the efficacy of education and training programmes for women in agriculture, so strengthening their skills and knowledge and therefore increasing career possibilities and economic empowerment (Andreson et al., 2021). Policies that support women's active engagement, gender equality in agriculture and strong support for female agripreneurs all of which governments must give top priority (Quisumbing et al., 2021). This can entail building encouraging legal systems and removing obstacles to women's way of participation in agricultural operations. Women's economic empowerment depends on their access to land. Hence, supporting laws and legal protections for property rights is absolutely vital (Gaddis et al., 2020; Santpoort et al., 2021). To give women secure land ownership, the government should enforce and enhance property rights. Improving the success of training courses and educational initiatives for women working in agriculture is really vital. Customised training courses can equip women with the required information and abilities to enhance their agricultural methods, therefore raising their income and production (Andreson

et al., 2021). By means of training and assistance programmes, women's access to technology can be greatly improved, therefore augmenting their income, market possibilities, and productivity. Training courses should concentrate on the pragmatic use of technology in agriculture so that women may make good use of these instruments. The encouragement of women entrepreneurs depends on helping them start and grow their companies. Providing credit, company development tools, and mentoring programmes access might result in higher income, more financial independence, and general well-being. By means of market and network connectivity, women can better sell their goods. Governments and NGOs can set up venues where women may network with suppliers and buyers. Development and application of gender-disaggregated data-collecting systems should be the government's top priorities. This will enable evidence-based policy decisions (Grabowski et al., 2021; Mkandawire et al., 2021), track advancement towards gender equality, and help to better grasp and handle the particular difficulties experienced by women in agriculture. Government should work with national organisations and NGOs to carry out thorough plans aiming at gender equality. These collaborations can guarantee the effective execution of gender-oriented agricultural programmes by means of extra resources, knowledge, and support (Quisumbing et al., 2021). Adopting these pragmatic consequences would help different nations efficiently solve the issues of gender disparity in agriculture, advance sustainable development, and build more inclusive and strong agricultural sectors. The main emphasis of technology developers should be on designing user-friendly interfaces that fit the current level of knowledge of women users and are easy to use. This can improve supposed utility and simplicity of usage. To establish a favourable atmosphere for the acceptance of technology, the government can guarantee the availability of required infrastructure, including internet connection and technical support.

Limitations and Conclusions

This paper concentrated on exploring female agripreneurship and an insight from grey research using the TCCM framework has some limitations. In the framework of women in adopting agricultural technology, this study exposes a notable disparity between the quantity of mixed-method and qualitative studies, including case studies, conceptual frameworks, model development, and review articles. The most significant results of this study are related to detailed empirical research testing gender-specific technology

adoption theories related to the agricultural technologies employed by women. Despite the significant theoretical and practical contributions, this study requires further empirical testing, particularly in the areas of agribusiness women and digital technology, women empowerment, farmer groups, attitudes towards technology, gender norms surrounding agricultural innovations, business models, and gender differences in agripreneurship. We need to develop more conceptual frameworks and conduct empirical testing that specifically addresses women's use of agricultural technology, their socioeconomic status, and the cultural differences between developed and developing countries. The results of this study concluded that the notable contribution of women in agriculture is a pathway to achieve sustainable development, women's empowerment, women's entrepreneurship, and reduced discrimination. The novelty of this research is the TCCM framework, which was less focused on the earlier grey literature. Creating financially inclusive opportunities and a supportive environment that values and respects making decisions independently and provides women's contributions in agriculture can help dismantle barriers and promote gender equality. This paper will be beneficial for academicians and policymakers to understand the available gap in the proposed field and help increase women's empowerment to achieve sustainability.

Future Directions

The themes discussed the potential questions for future researchers.

Theme 1: Sustainable Development

1. What critical factors contribute most effectively to the reduction of gender inequalities in sustainable development initiatives?
2. How do environmental, economic, social, psychological, cultural, and political factors interplay to mitigate gender bias and promote sustainability?
3. To what extent can future studies employ mediation and moderation analyses to elucidate the implications of these factors in enhancing gender equality?
4. What innovative strategies can be implemented to integrate gender perspectives into sustainability practices at both local and global levels?
5. How can policy frameworks be designed to simultaneously address gender disparities and sustainability goals in various socio-economic contexts?

Theme 2: Women and Gender Disparities

1. How can the intersection of gender and agricultural innovation be examined within the context of evolving family structures and labor mobilization patterns?

2. What does the concept of Feminization in Agriculture entail, and how do women's agricultural innovation processes differ across ethnic or age groups?
3. What mobile phone applications are available for financial transactions, information dissemination, and crop pricing specifically tailored to the needs of women in agriculture?
4. How can future experimental research focus on the intersection of financial inclusion with socio-economic and cultural factors to advance gender equality?
5. What are the impact factors affecting women in various roles, such as family businesses, farms, informal factory work, educated professionals, and beneficiaries of government schemes or support programs?
3. How do different geographical areas influence the factors involved in economic development and their subsequent impact on women's empowerment?
4. What is the relationship between health and empowerment, technology adoption and empowerment, access to information and empowerment, and the role of social media in promoting women's empowerment?
5. How can future studies, utilizing both qualitative and quantitative methods, further explore the variables of sustainable development, gender gaps, women's empowerment, and women's entrepreneurship?

Conflict of interest

The authors declare no conflict of interest.

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Theme 3: Women and Agricultural Technology

1. How can panel data and longitudinal studies be utilized to examine variables such as commercialization, technology access behavior, and the relationship between intentions and actual commercialization outcomes?
2. What are the moderating or mediating effects of the digital divide on technology access, including linguistic barriers, autonomy, and skill development in the adoption of agricultural technology?
3. In what ways are innovative farmers integrating new agricultural technologies, and what factors drive their adoption behaviours?
4. How do the attitudes and knowledge-practice relationships influence the adoption of smart agricultural technologies?
5. How do women's perceptions of agricultural technology adoption differ from those of men in both urban and rural settings, and what implications does this have for policy and practice?
6. What is the role of technology compatibility in shaping the perceived usefulness and ease of use of new technologies for women?
7. How do women's perceptions of agricultural technology adoption differ from those of men in both urban and rural settings, and what implications does this have for policy and practice?

Theme 4: Women's Empowerment

1. What are the primary barriers to women's empowerment, and how can sustainable strategies be developed to ensure long-term empowerment outcomes?
2. What factors are crucial in providing quality education for young women, and how does this education impact their empowerment?

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