



Continuity and change in women's agricultural technology adoption in Homa Bay District, Kenya, 1985–2022

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ABSTRACT

Women play a central role in food production, yet their adoption and use of agricultural technologies have continued to be shaped by unequal access to land, credit, extension services and other productive resources. This study evaluated the continuities and changes in technology adoption by women in food production in Homa-Bay District between 1985 and 2022. The study was guided by Post-colonial Feminism and Techno-feminism and adopted a historical research design. Data were obtained from archival records, oral interviews, key informant interviews, Focus Group Discussions and secondary sources. Purposive and snowball sampling were used to select 80 participants, comprising 56 individual respondents and 24 participants in three Focus Group Discussions. Qualitative data were analysed thematically and through content analysis. The findings show that women's access to agricultural technologies expanded during the period through the adoption of improved seeds, fertilizers, machinery, soil conservation practices, small-scale irrigation and information and communication technologies. However, important continuities remained. Male dominance in land ownership and control, limited access to credit, extension services and agricultural inputs, and unequal household decision-making continued to constrain women's ability to adopt and benefit from technologies. Agricultural liberalization and privatization also shifted access to inputs and services towards market-based systems, creating additional financial barriers. At the same time, women responded to these constraints through collective organization, adaptive use of technologies and the combination of new technologies with existing agricultural knowledge and practices. The study concludes that technological change expanded women's opportunities in food production but did not eliminate the historical gender inequalities shaping access to and control of agricultural resources and technologies. The study recommends secure land rights for women, gender-responsive extension and training, improved access to affordable credit and inputs, and support for women's collective initiatives and agricultural knowledge.

Keywords: Agricultural Technology, Food Production, Gender, Homa-Bay, Post-Colonial Feminism, Technology Adoption, Techno-Feminism, Women

I. INTRODUCTION

At the global level, including in North America and Europe, late-twentieth-century agricultural change was increasingly understood not only as technical innovation but also as a process shaped by markets, institutions, and unequal control over productive resources (Boserup, 1970; Wajcman, 2004). Across Africa, structural adjustment and commercialisation reorganised public agricultural support, while mobile communication opened new channels for information, marketing, and technical advice; women's gains nevertheless remained conditioned by unequal access to land, finance, and institutional authority (Nzomo, 1996; Martin & Abbott, 2011). In Kenya, these wider shifts were marked by the conclusion of the United Nations Decade for Women in Nairobi in 1985, subsidy withdrawal, privatised input markets, mobile-money expansion, constitutional reform, and devolution. In Homa Bay District, county programmes expanded training, climate-smart practices, and group-based support, but unequal control over land and household resources continued to shape women's adoption (United Nations, 1986; Mbithe et al., 2017; Kirui et al., 2013; County Government of Homa Bay, 2018).

The objective of this article is to evaluate continuities and changes in women's technology adoption and food production in Homa Bay District between 1985 and 2022, corresponding to the fourth objective of the underlying



doctoral study. It asks which colonial and early post-independence patterns persisted, which institutional and technological changes opened new opportunities, and why modernisation remained uneven. The analysis treats technology broadly to include material inputs and machines, information systems, financial platforms, soil and water practices, and the institutional arrangements that enable or restrict their use.

The principal argument is that the period combined technological diversification with continuity in the social organisation of access. Male dominance in registered landownership, women's dependence on user rights, male-centred training, and exclusion from formal extension and subsidies persisted. Structural adjustment converted state-mediated inequality into market-mediated inequality by making inputs and services dependent on purchasing power. Later reforms, including the Beijing Platform for Action, mobile telephony, the 2010 Constitution, devolution, and national modernisation programmes, expanded women's opportunities but did not fully alter property and household power relations.

The periodisation captures four phases. The first, 1985–1995, covers the post-Nairobi agenda, structural adjustment, and the withdrawal of state support. The second, 1995–2002, examines the Beijing agenda and the consolidation of liberalised input and service markets. The third, 2000–2010, traces the expansion of radio, mobile phones, mobile money, and new information networks. The fourth, 2010–2022, considers constitutional equality, devolution, climate-smart agriculture, subsidy programmes, and the modernisation agenda of the Uhuru Kenyatta administration. The phases overlap because policy change and technological diffusion occurred unevenly across households and localities.

1.1 Statement of the Problem

Women have historically played a central role in food production in Africa, particularly in activities such as land preparation, planting, weeding, harvesting, processing and storage. In Homa-Bay District, women's contribution to food production was also closely associated with their knowledge and use of agricultural technologies. However, this contribution did not translate into equal access to, control over, or benefits from agricultural resources and technologies. Colonial and post-colonial agricultural transformations altered existing production systems through changes in land tenure, labour organization, agricultural commercialization and the introduction of new technologies. These transformations increasingly positioned men as formal holders of land and as principal recipients of agricultural services, while women continued to provide much of the labour required for household food production. The thesis demonstrates that these historical patterns persisted into the post-independence period, with women's access to land, credit, extension services, agricultural inputs and other productive resources remaining constrained.

The problem became particularly significant between 1985 and 2022 as Kenya underwent major economic, institutional and technological transformations. Structural adjustment programmes and the subsequent privatization and liberalization of agricultural services reduced the role of the state in providing agricultural inputs and extension support. Access to agricultural technologies increasingly depended on purchasing power and the ability to obtain credit. For women who often lacked secure land ownership and formal collateral, this created additional barriers to accessing improved seeds, fertilizers, irrigation, machinery and other productivity-enhancing technologies. The thesis shows that women's reliance on informal or negotiated user rights to land remained a major constraint because insecure tenure discouraged long-term investment and also limited access to formal credit and institutional agricultural support. Women consequently tended to adopt technologies that were relatively affordable, low-risk and immediately useful for sustaining household food production.

At the same time, the period was not characterized only by continued exclusion. Important changes created new opportunities for women's technological engagement. Women's groups, savings arrangements, information and communication technologies, mobile phones and mobile money provided alternative channels for accessing information, finance, inputs and markets. Policy and institutional reforms, including the 2010 Constitution and the devolution of agricultural functions, also created new possibilities for women's participation in agricultural development. Climate-smart agriculture and other contemporary agricultural initiatives further expanded the range of technologies available to rural farmers. Nevertheless, the emergence of these opportunities did not automatically remove the structural inequalities that shaped women's access to and control over agricultural technologies. The thesis concludes that technological change between 1985 and 2022 was characterized by both adaptation and continuity: women increasingly engaged with new technologies, but their choices remained shaped by unequal land rights, limited financial resources, institutional barriers and gendered household relations.

The central problem, therefore, was not simply the absence of agricultural technologies among women farmers, but the unequal conditions under which women accessed, adopted, controlled and benefited from those technologies. Despite women's continued importance in food production, technological modernization did not produce equal technological opportunities. Instead, earlier gendered inequalities were reproduced and, in some instances, took new forms through market-based agricultural systems. Women responded to these constraints through selective adoption, collective resource mobilization, negotiated access to land and inputs, and the combination of indigenous knowledge



with introduced technologies. However, the extent to which these strategies enabled women to overcome structural barriers remained insufficiently understood.

Existing scholarship has provided important evidence on women, agricultural development, gendered resource access and technological change. However, much of this literature has examined particular technologies, agricultural programmes, policy periods or gender-related issues separately. Less attention has been given to the long-term historical relationship between technological change and women's food production within a specific local context, particularly how earlier gendered structures persisted, changed form, or were negotiated as Kenya moved from state-supported agricultural development through structural adjustment and liberalization to constitutional reform, devolution and contemporary digital and climate-smart agricultural initiatives. The thesis identifies this longitudinal, district-level gap, noting that previous scholarship often privileged macro-policy changes and national development frameworks while leaving women's everyday technological experiences fragmented and temporally disconnected.

It was this gap that necessitated the present study. The study therefore evaluates the continuities and changes in technology adoption by women in food production in Homa-Bay District between 1985 and 2022. By examining both persistent constraints and emerging opportunities, the study seeks to explain how women negotiated technological change within historically formed gender relations and changing agricultural institutions. The study is consequently concerned not only with whether technologies were adopted, but also with who gained access to them, under what conditions, how women adapted and used them, and why significant gender inequalities persisted despite technological and policy changes.

1.2 Research Objective

The objective of the study was to evaluate the continuities and changes in technology adoption by women in food production in Homa-Bay District between 1985 and 2022.

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Post-colonial Feminism

Post-colonial Feminism provides a useful framework for examining women's agricultural technology adoption because it locates gender inequalities within particular historical, social and institutional contexts. Rather than treating women as a homogeneous category, the perspective emphasizes how colonial histories, patriarchy, class, culture and post-colonial development processes shape women's access to resources and opportunities. Roberts (1996) cautions against treating women in the Global South as a single, uniform category whose experiences can be explained independently of their historical and social contexts. Similarly, Ragasa et al. (2013) draws attention to the marginalization of women's voices and knowledge within dominant institutional and development discourses. These arguments are relevant to agricultural technology adoption because women's experiences with technology are shaped by the social and institutional conditions within which technologies are introduced and accessed.

In the African agricultural context, post-colonial development processes did not necessarily remove gender inequalities inherited from earlier systems of land administration and agricultural organization. Boserup (1970) demonstrated that agricultural modernization could produce different outcomes for men and women because access to productive resources and technologies was already gendered. Agarwal (1994) further showed that women's control over land is central to their economic security and bargaining power. In Kenya, Too (2007) similarly found that women could have access to agricultural land without necessarily exercising ownership or effective control over it. Such conditions are important in understanding why women could contribute substantially to food production while remaining disadvantaged in decisions concerning agricultural investment and technology.

Post-colonial Feminism is therefore relevant to this study because it draws attention to the historical foundations of contemporary inequalities. The persistence of male-dominated land ownership, unequal access to agricultural institutions and women's dependence on negotiated access to land cannot be understood only in terms of individual household decisions. They are connected to wider historical processes through which land, agricultural services and productive resources were organized. Quisumbing et al. (2015) similarly demonstrate that unequal ownership and control of productive assets affect women's participation in agriculture and their ability to benefit from agricultural opportunities.

The perspective also avoids portraying women simply as victims of unequal structures. Post-colonial feminist scholarship recognizes women's agency and the different ways women negotiate restrictive social and economic conditions. In agricultural production, women have used collective organizations, savings groups, indigenous knowledge and informal networks to access resources that were not always available through formal institutions. This is particularly relevant to the present study because women's responses to technological change involved both adaptation



and negotiation. The theory therefore helps explain not only why inequalities persisted between 1985 and 2022, but also how women responded to and worked within those conditions.

In this study, Post-colonial Feminism is consequently used to explain the historical continuity of gendered inequalities in access to agricultural resources and technologies. It provides a basis for examining how earlier land, institutional and social arrangements continued to influence women's experiences even as agricultural policies, technologies and governance structures changed during the period under study.

2.1.2 Techno-feminism

The study is also guided by Techno-feminism, particularly the work of Wajcman (2004), which challenges the view that technology is neutral or independent of social relations. Techno-feminism argues that technology and gender relations are mutually shaped. The design, distribution, accessibility and use of technologies are influenced by existing social structures, while technological change can in turn modify relationships and opportunities.

This perspective is relevant to agricultural technology because access to an innovation does not necessarily mean equal ability to use or benefit from it. Agricultural technologies such as improved seeds, fertilizers, irrigation equipment, machinery, mobile phones and mobile financial services require varying levels of land, income, information, skills and decision-making authority. Wajcman (2004) therefore provides a useful basis for examining technology adoption as a social process rather than simply as the acceptance of a technical innovation.

The relationship between productive resources and technology is particularly important in the present study. Agarwal (1994) shows that women's land rights affect their bargaining power and ability to make productive decisions, while Ragasa et al. (2013) identify gender disparities in access to agricultural extension services. Quisumbing et al. (2015) similarly show that ownership and control of productive assets influence women's participation in agriculture. These findings support the techno-feminist argument that technological opportunities are mediated through existing social and economic relations.

Techno-feminism also provides a way of understanding women's agency in technological change. Women are not necessarily passive recipients of technologies introduced by governments, development agencies or markets. They can select technologies, modify their use and combine new technologies with existing practices according to their circumstances. This is particularly important in understanding the use of mobile phones and mobile money in rural agricultural communities. Martin and Abbott (2011) found that mobile phones could support rural livelihoods through communication and access to information, while Kirui et al. (2013) showed the importance of mobile money in facilitating financial transactions in rural areas. These technologies created new possibilities, but their benefits remained dependent on people's economic and social circumstances.

Techno-feminism therefore helps this study examine the changing technological opportunities available to women between 1985 and 2022, while also asking whether those changes altered the gender relations surrounding agricultural production. The theory does not assume that the introduction of a new technology automatically results in women's empowerment. Instead, it directs attention to who has access to the technology, who controls its use, what resources are required for adoption and who ultimately benefits from it. The two theoretical perspectives complement one another. Post-colonial Feminism explains the historical and structural roots of gender inequalities, while Techno-feminism explains how those inequalities influence women's access to, use of and benefits from technology. Together, they provide an appropriate framework for examining both the continuities and changes in women's agricultural technology adoption in Homa-Bay District between 1985 and 2022.

2.2 Empirical Review

2.2.1 Land Ownership, Productive Resources and Women's Technology Adoption

Land ownership and control are consistently identified in the literature as important determinants of women's agricultural participation and technology adoption. Boserup (1970) established that agricultural modernization does not affect men and women uniformly because the division of agricultural labour and access to productive resources are gendered. Agarwal (1994) subsequently demonstrated that secure land rights are important for women's bargaining power, economic security and capacity to undertake productive investments. These studies suggest that technological adoption cannot be separated from the question of who controls the resources on which technology is to be used. Research in Kenya provides similar evidence. Too (2007) found that women could access agricultural land without necessarily exercising ownership or effective control over it. This distinction is important because access to land for cultivation does not necessarily provide the authority required to make decisions concerning long-term agricultural investments. Quisumbing et al. (2015) further found that unequal ownership and control of productive assets affect women's participation in agricultural activities and their ability to benefit from market opportunities.

The literature therefore points to a persistent relationship between land rights and technology adoption. Women who lack secure control over land may have less incentive or ability to invest in technologies whose benefits accrue over a longer period. In addition, lack of formal land ownership can limit access to credit and other institutional services.



For women farmers, therefore, technology adoption is influenced not only by the characteristics of the technology itself but also by the resources and rights available to them. However, these studies largely establish the relationship between land and women's agricultural participation without tracing how this relationship changed over an extended historical period. The present study addresses this limitation by examining how women's access to land and other productive resources interacted with technological change in Homa-Bay between 1985 and 2022.

2.2.2 Agricultural Extension, Training, Credit and Input Support

Agricultural extension and training are important channels through which farmers obtain information about new technologies and production practices. Ragasa et al. (2013) found persistent gender disparities in agricultural extension, indicating that women do not always receive the same agricultural information or services as men. Where extension systems are oriented towards male household heads or formal landowners, women's substantial contribution to agricultural production may not translate into equivalent access to technical information. Access to credit and agricultural inputs presents a related challenge. Quisumbing et al. (2015) show that unequal control over productive assets affects women's ability to participate in agricultural markets and take advantage of agricultural opportunities. Land insecurity can also reduce women's ability to meet collateral requirements for formal credit. Consequently, women may know about a particular technology but remain unable to adopt it because they cannot obtain the necessary financial resources.

The problem became more pronounced with changes in agricultural support systems from the 1980s. Nzomo (1996) argues that structural adjustment had gendered consequences because reductions in public expenditure and changes in economic policy disproportionately affected economically vulnerable groups, including women. Mbithe et al. (2017) similarly associate structural adjustment with changes in Kenya's agricultural sector. The shift towards market-based provision meant that access to inputs and agricultural services became increasingly dependent on farmers' ability to pay. The literature therefore shows that extension, credit and input access are interconnected. Gender differences in access to one resource can reinforce disadvantages in another. Nevertheless, much of the existing research examines these factors separately or within particular programmes. Less attention has been paid to how their combined effect shaped women's technology adoption over the 1985–2022 period. This study addresses that gap by examining these institutional and economic factors together.

2.2.3 Structural Adjustment, Privatization and Agricultural Technology

Structural adjustment introduced a major change in the agricultural environment in which Kenyan farmers operated. Nzomo (1996) demonstrates that economic restructuring had gendered consequences, particularly where reductions in public expenditure increased the economic burden carried by women. Mbithe et al. (2017) similarly identify important changes in Kenya's agricultural sector associated with structural adjustment and changing agricultural policies.

For agricultural technology adoption, the significance of these reforms lies in the changing source of agricultural support. Under stronger state involvement, farmers could obtain some inputs and services through public agricultural programmes. With privatization and liberalization, farmers increasingly relied on markets for inputs, credit and technical services. This placed greater emphasis on purchasing power. The implications for women were significant because existing gender inequalities in land ownership, income and credit access affected their capacity to participate in the emerging market-oriented agricultural system. Structural adjustment therefore did not necessarily eliminate earlier forms of exclusion. Rather, it altered the conditions through which exclusion was experienced. This provides an important basis for examining continuity and change in Homa-Bay because the period after 1985 involved both persistent gender inequalities and changing mechanisms of access to technology.

2.2.4 Women's Collective Organization and Agricultural Technology

Women's collective organization has provided an important alternative mechanism for accessing productive resources. Women's self-help groups, savings associations and other collective arrangements have enabled women to mobilize financial resources, share information and participate in economic activities where individual access to formal institutions is limited.

The importance of collective organization is also consistent with the broader literature on women's empowerment and agricultural participation. Kabira's work on women and constitutional development in Kenya demonstrates that formal recognition of women's rights does not automatically remove the economic and institutional barriers that affect women's participation. Collective organization can therefore provide practical mechanisms through which women respond to such constraints. The relevance of collective action to technology adoption lies in its ability to reduce some of the costs and risks faced by individual farmers. Women can pool savings, obtain inputs collectively, exchange agricultural information and support one another in adopting technologies. However, collective arrangements do not necessarily eliminate structural inequalities in land ownership or household decision-making. They should



therefore be understood as one mechanism through which women negotiate technological and economic constraints rather than as a complete solution to those constraints.

2.2.5 Information and Communication Technologies and Agricultural Transactions

The emergence of ICTs introduced significant changes in rural agricultural activities. Martin and Abbott (2011) found that mobile phones were increasingly used by rural farmers to communicate, obtain information and support livelihood activities. Their findings are important because they demonstrate that mobile technology can reduce some information barriers associated with agricultural production.

Kirui et al. (2013) similarly identified the importance of mobile money in rural financial transactions. Mobile financial services reduced some of the difficulties associated with distance from formal financial institutions and enabled users to transfer and receive money more easily. For agricultural producers, such services created opportunities for purchasing inputs and participating in market transactions without depending entirely on physical access to financial institutions. The expansion of mobile technologies therefore represented an important change from earlier forms of agricultural communication. However, technology access remained socially differentiated. Income, education, literacy, ownership of mobile devices and gender relations could affect whether individuals were able to benefit from these services. The availability of mobile technology consequently did not automatically remove the inequalities that had affected women's access to earlier agricultural technologies. This literature is useful for the present study because it demonstrates technological change, but it does not sufficiently explain how ICTs fitted into the longer history of women's technology adoption in Homa-Bay. The present study therefore examines ICTs as part of a wider process of technological change rather than as an isolated development.

2.2.6 Policy Reform, Devolution and Agricultural Modernization

Policy changes from the 1990s onwards also altered the environment within which women accessed agricultural resources and technologies. The Beijing Platform for Action strengthened international commitments to women's access to productive resources, technology, training and financial services. In Kenya, these commitments were accompanied by continuing policy efforts aimed at improving women's participation in economic development. The promulgation of the Constitution of Kenya in 2010 provided a stronger legal basis for gender equality and women's rights. The subsequent implementation of devolution also changed the organization of agricultural services by giving county governments responsibility for functions such as agricultural extension, training and aspects of agricultural development. These changes created new institutional opportunities for addressing gender inequalities.

However, policy recognition does not necessarily produce equal access in practice. Land ownership, income, household decision-making and access to credit continued to affect women's capacity to benefit from agricultural programmes. The emergence of climate-smart agriculture and other modern agricultural technologies similarly created opportunities while requiring resources and technical knowledge that were not equally available to all farmers. The literature therefore suggests that policy and technological change should be examined alongside the social relations that determine access to them. This is particularly important in Homa-Bay, where agricultural modernization occurred alongside continuing inequalities in productive resources.

2.2.7 Synthesis and Research Gap

The empirical literature demonstrates that women's agricultural technology adoption is shaped by several interconnected factors. Boserup (1970) and Agarwal (1994) established the importance of gendered access to productive resources and land. Too (2007) and Quisumbing et al. (2015) provide evidence of continuing inequalities in women's ownership and control of productive assets. Ragasa et al. (2013) demonstrate gender disparities in agricultural extension, while Nzomo (1996) and Mbithe et al. (2017) show the gendered implications of structural adjustment and changes in agricultural support. Martin and Abbott (2011) and Kirui et al. (2013) demonstrate how mobile technologies and mobile money created new opportunities for rural information and financial transactions.

Despite these contributions, the literature leaves a historical and contextual gap. Existing studies largely focus on particular resources, technologies, institutions or periods, rather than examining how these factors interacted over time. There is also limited research that follows women's agricultural technology adoption through the major transitions from state-supported agriculture, structural adjustment and privatization to constitutional reform, devolution, digital technologies and contemporary agricultural modernization.

The present study addresses this gap by examining continuities and changes in women's technology adoption in food production in Homa-Bay District between 1985 and 2022. It brings together land access, agricultural extension, credit, input support, structural adjustment, women's collective organization, ICTs and policy reform within one historical analysis. This approach makes it possible to identify not only what changed, but also the gendered conditions that continued to shape women's capacity to adopt, control and benefit from agricultural technologies.



III. METHODOLOGY

3.1 Research Design

The study adopted a historical research design to examine continuity and change in women's adoption of agricultural technologies and food production in Homa Bay District between 1985 and 2022. The historical approach was appropriate because it enabled the study to trace technological change over time and relate women's experiences to wider transformations in agricultural policy, land relations, markets, institutions and gender relations. Rather than viewing technology adoption as an isolated event, the design enabled the researcher to examine how past structures and experiences shaped women's responses to subsequent agricultural innovations. The study was anchored in an interpretivist orientation, which allowed attention to be given to the meanings that women and other participants attached to technological and agricultural change. Historical documents were therefore examined alongside oral evidence in order to understand both formal policy developments and how these developments were experienced and negotiated in everyday agricultural production.

3.2 Study Area

The study was conducted in Homa Bay, historically referred to as Homa Bay District and currently part of Homa Bay County in western Kenya. The area was appropriate for the study because agriculture has historically constituted an important source of household livelihood and food production, with women playing a central role in cultivation and the management of household food supplies. At the same time, women's agricultural activities have been shaped by changes in land tenure, agricultural extension, market reforms, technological modernization and changing government policies.

For the wider doctoral study, fieldwork covered selected areas within Homa Bay, including Kabondo, Kasipul and Karachuonyo, where oral interviews and focus group discussions were conducted. These locations provided evidence from women farmers and other participants who had experienced changes in agricultural production and technology across different historical periods.

3.3 Study Participants and Sampling

The wider study involved 80 participants, comprising 56 individual interviewees and 24 participants drawn from three focus group discussions. Participants included women smallholder farmers, agricultural officers, local administrators, elders, leaders of farmers' cooperative societies, leaders of women's organizations and other knowledgeable persons whose experiences were relevant to the history of agricultural technology adoption in Homa Bay.

Purposive and snowball sampling techniques were used to identify participants. Purposive sampling enabled the researcher to select individuals who possessed relevant historical knowledge and experience concerning agricultural production, technological change, gender relations and agricultural institutions. Snowball sampling supplemented this process by enabling already identified participants to recommend other individuals with relevant historical knowledge and experience. Each of the three focus group discussions consisted of eight participants, giving a total of 24 FGD participants.

3.4 Sources and Data Collection

The study drew on both primary and secondary sources. Primary evidence consisted of oral interviews, focus group discussions and archival records. Oral interviews were conducted with participants who possessed direct experience or historical knowledge of agricultural practices, land relations, extension services, agricultural institutions and changing technologies. Focus group discussions were used to obtain collective perspectives and to explore shared and differing experiences of technological and agricultural change.

Archival research was undertaken principally at the Kenya National Archives, including relevant provincial and district records. The archival materials comprised annual and quarterly reports, agricultural reports, memoranda, correspondence, administrative records and development-related documents. These records were particularly important in reconstructing changes in state agricultural policy, extension services, input provision, structural adjustment and other institutional processes affecting agricultural production.

Secondary sources included books, journal articles, theses and dissertations, newspapers, government development plans, policy documents, county planning documents and other relevant published materials. These sources provided the wider historical and scholarly context within which evidence obtained from oral and archival sources was interpreted. The use of multiple sources enabled the researcher to compare official policy intentions with experiences at household and community levels. Oral accounts were therefore not treated in isolation but were examined alongside archival records, government documents and existing scholarship.



3.5 Data Analysis

Data were analysed qualitatively using thematic and content analysis. Thematic analysis involved identifying and organizing recurring themes emerging from oral interviews, focus group discussions, archival records and secondary sources. The major themes included women's access to land and productive resources, extension services and agricultural training, access to subsidies and credit, structural adjustment and privatization, women's collective organization, information and communication technologies, constitutional reform, devolution and changing forms of agricultural technology adoption. Content analysis was used particularly in examining historical records, policy documents, development plans and other written sources in order to identify changes in agricultural policy, institutional priorities and representations of women in agricultural development. Evidence was organized chronologically to facilitate analysis of continuity and change between 1985 and 2022. The study also employed corroboration and triangulation by comparing oral testimonies with archival evidence, government documents and relevant secondary literature. This was important in distinguishing formal policy statements from actual experiences and in strengthening the credibility of historical interpretations.

3.6 Ethical Considerations

Ethical requirements were observed throughout the research process. The researcher obtained the necessary institutional and research authorizations before undertaking fieldwork. Participants were informed about the purpose of the study and their participation was voluntary. Informed consent was obtained before interviews and focus group discussions were conducted, and permission was sought before electronically recording participants. Participants' rights, privacy and confidentiality were respected during data collection, analysis and reporting. Where necessary, participants were anonymized to protect their identities. The researcher also ensured that archival, documentary and published materials used in the study were appropriately acknowledged.

IV. FINDINGS & DISCUSSION

4.1 Findings

4.1.1 The 1985 Turning Point and Persistent Gendered Resource Access

The Nairobi World Conference, held from July 15 to 26, 1985, marked the culmination of the UN Decade for Women (1975–1985), which had been launched following the first World Conference on Women in Mexico City in 1975 and reviewed at Copenhagen in 1980 (United Nations, 1986, pp. 1–15). Scholars often regarded the conference as a turning point in global feminism. Moreover, it shifted international discourse from a welfare-oriented approach to a development and empowerment approach. The conference recognized women not merely as recipients of development assistance but as active participants, planners, policymakers, and contributors to economic and social transformation (United Nations, 1985). In this study, the conference is significant as it elucidates the persistence of gendered access to productive resources and its influence on technology adoption by women in food production.

4.1.2 Continued Male Dominance in Land Ownership

Gendered inequalities in access to productive resources continued to structure women's technology adoption in food production in Homa Bay District between 1985 and 2010. This was despite the Women's Decade conference held in Nairobi, which advocated for gender equality in access to productive resources such as land. Land ownership in most Kenyan communities continued to be overwhelmingly male-dominated, a legacy of colonial and post-independence adjudication systems that registered land in the names of male household heads while relegating women to secondary usufruct rights (Mireri, 2023, p. 109). This persistence in land ownership by men disadvantaged women's access to technologies to improve food production. According to Boserup, where control over land is concentrated in men's hands, modernization processes tend to reinforce male advantage rather than redistribute productive power (Boserup, 1970, pp. 53–55). However, by 1992, women began to own land because they were being issued national identity cards, enabling them to have land registered in their own names (E. Adel, personal communication, August 19, 2025). The assertion by Eric Adel refutes Boserup's view of women's land ownership, which had begun to take off albeit at a slow pace. However, the concept of women's ownership of land had still not been internalized by society or even women themselves due to the existence of patriarchy.

Secure land tenure functioned as the principal gateway to technological investment, access to credit, and participation in agricultural institutions. Agarwal observes that tenure insecurity discourages long-term investment in productivity-enhancing technologies, particularly among women farmers whose control over land is socially contingent (Agarwal, 1994, pp. 25–30). Women cultivated plots allocated by husbands or male relatives, often subject to reallocation based on household priorities. Such insecurity limited their willingness to invest in fertilizers, improved seeds, and soil conservation measures whose benefits accrued over time (Agarwal, 1994). Decisions regarding major



technological inputs were thus frequently controlled by male household heads, even when women provided the bulk of agricultural labour.

Financial resources followed similar gendered patterns of women's exclusion from land access and ownership. Formal agricultural credit systems required land titles or male guarantors, effectively locking most women out of institutional financing for food production. Access to credit facilities was a privilege of asset holders, who were mostly men (Goetz & Sen Gupta, 1996, p. 50). Women sought to overcome this challenge through rotating groups, where they used table banking and took loans from their savings to purchase farm inputs to improve production (M. Obudho, personal communication, September 20, 2025). However, while these measures supported short-term household needs and minor input purchases, they were insufficient for acquiring capital-intensive technologies such as irrigation equipment, tractor-hire services, or bulk purchases of fertilizers and seeds.

However, women demonstrated adaptive strategies in response to these structural constraints. These strategies included collective land leasing, shared input purchases, and negotiated household arrangements that enabled some degree of technological engagement (M. Obudho, personal communication, September 20, 2025). Kabeer's conceptualization of agency within constraint helps illuminate these practices as forms of survival and negotiation rather than structural transformation. These strategies expanded women's room for maneuver but did not fundamentally alter the underlying inequalities governing ownership and control of productive resources (Kabeer, 1994, pp. 301–304). Therefore, between 1985 and 2010, gendered access to productive resources remained a central continuity shaping women's technology adoption in food production in Homa Bay District. Land tenure insecurity and financial exclusion limited women's capacity for sustained technological investment, ensuring that modernization efforts produced uneven and gendered outcomes. Technological change was not determined solely by availability or policy reform but was mediated by historically rooted power relations that continued to privilege men's control over productive assets. Consequently, women's technological engagement remained largely incremental, adaptive, and oriented toward household survival rather than transformative agricultural advancement.

4.1.3 User Rights, Informal Access, and Household Negotiation

Women's access to land in Homa Bay District between 1985 and 2010 was largely mediated through informal user rights rather than secure ownership, reinforcing their structural vulnerability within agricultural production systems. These usufruct arrangements typically involved temporary cultivation rights granted by husbands, fathers, or male kin, contingent upon marital status, household harmony, and male authority (Anonymous interview participant, personal communication, August 15, 2025). Agarwal observes that user rights, while enabling day-to-day farming activities, do not confer decision-making power or long-term security necessary for sustained agricultural investment (Agarwal, 1994, pp. 263–265). Women's agricultural labour therefore continued within these informal systems, yet their control over productive resources remained precarious and negotiable.

Informal access and use rights to land profoundly shaped women's technological choices. The absence of secure tenure discouraged investment in technologies whose benefits accrued over extended periods, such as soil conservation structures, irrigation systems, improved livestock breeds, or agroforestry. Boserup's work on agrarian technological change demonstrates that farmers lacking long-term control over land prioritize low-cost, short-term strategies over productivity-enhancing innovations requiring sustained commitment (Boserup, 1970, pp. 53–55). Similarly, Prisca Too observes that a majority of the Nandi women had access to land but lacked control and ownership, which remained in the hands of their male kin (Too, 2007, p. 38). Women's lack of control and ownership of land led them to apply technologies in production sparingly because they feared losing access and use rights controlled by their male kin. Women thus overwhelmingly adopted technologies that minimized financial risk and could be abandoned without loss should access to land change (Anonymous interview participant, personal communication, August 15, 2025). Therefore, in spite of women's agricultural labour in Homa Bay District thriving within these informal systems, their control over productive resources remained precarious and negotiable.

In addition, user rights to land also limited women's autonomy over land use decisions. Although women were responsible for cultivating food crops, male household heads frequently retained authority over allocation of land, crop selection, and the use of modern inputs. Control over land confers broader economic power, including the ability to determine investment priorities and production strategies in that land (Deere & León, 2001, pp. 28–34). Moreover, control over land gives men the right to dispose of land from which their wives or other male relatives earn their livelihood. This arbitrary sale of land by husbands was so prevalent at the time that it led to President Moi issuing a decree in 1980 requiring that all family members should consent before any land transactions were undertaken (Too, 2007, pp. 38–39). Women in Homa Bay District reported that decisions to apply fertilizers, shift to improved seed varieties, or participate in development projects often required male approval, even when women provided the labour and bore production risks.

Informal access further excluded women from institutional support mechanisms tied to formal land tenure. Individual land titling created a situation where women were denied rights to land that had formerly been available to



them. Moreover, women had indirect access to land based on their relationship with a male relative, such as a husband, father, son, or brother (Too, 2007, pp. 38–39). Agricultural credit systems, cooperative memberships and government or non-governmental organization (NGO) farm-input programs commonly required proof of land ownership through possession of a title deed or long-term lease agreements, which women lacked (Too, 2007, p. 41). Credit was channeled through Agricultural Finance Corporation (AFC) which was established in 1963 to provide credit to farmers to improve cash-crop production, including coffee, tea, maize, and dairy farming. Moreover, co-operative societies and commercial banks also provided loans to farmers. However, credit availability was largely skewed in favour of large-scale farmers, who were mostly male, leaving women farmers unable to secure credit due to lack of collateral and male dominance in co-operative membership (Too, 2007, pp. 41–42). As a result, women in Homa Bay District depended on personal networks, informal savings groups, and reciprocal labour arrangements to obtain limited technological inputs. While these mechanisms enabled survival and modest productivity improvements, they rarely supported transformative technological change.

Despite these constraints, women actively negotiated access to land through kinship relations, social reputation, and reciprocal obligations. Kabeer's conceptualization of agency within structural constraint helps explain how women maneuvered within patriarchal systems to secure cultivation space and limited resources (Kabeer, 1994, pp. 301–304). However, these negotiations did not alter the fundamental informality of women's land access, leaving them perpetually exposed to loss and marginalization. This study, therefore, established that women's reliance on user rights and informal access to land constituted a central continuity shaping technology adoption in food production between 1985 and 2022. While such arrangements enabled daily agricultural production, they simultaneously constrained long-term investment, restricted autonomy over technological decisions, and excluded women from institutional support systems (E. Adel, personal communication, August 18, 2025). Technological engagement under these conditions remained cautious, small-scale, and survival-oriented, reinforcing gendered inequalities in agricultural modernization rather than overcoming them.

4.1.4 Resource Access and Long-Term Technological Investment

The persistence of gendered inequalities in access to productive resources significantly constrained women's capacity for long-term technological investment in food production in Homa Bay District between 1985 and 2022. Secure ownership of land and reliable access to financial capital are central prerequisites for adopting productivity-enhancing agricultural technologies whose benefits accumulate over time. Where such security is absent, farmers tend to prioritize short-term survival strategies over sustained investment. Agarwal's work on land tenure and economic decision-making demonstrates that tenure insecurity systematically discourages farmers, particularly women, from engaging in long-term technological improvements such as soil conservation structures, irrigation systems, improved livestock breeds, and agroforestry practices (Agarwal, 1994, pp. 25–30).

In Homa Bay, women's reliance on temporary user rights rather than permanent ownership translated into a persistent reluctance to invest in technologies requiring extended commitment. Women were far more likely to adopt low-cost, immediately beneficial inputs such as small quantities of fertilizer, improved seeds for a single season, or traditional soil fertility practices than to construct terraces, irrigation channels, or storage facilities that demanded sustained labour and financial input (W. Achieng, personal communication, August 15, 2025). The uncertainty surrounding continued access to specific plots made long-term investment economically irrational from women's perspectives, as improvements could be lost if land was reallocated or withdrawn.

Financial exclusion further reinforced this pattern. Access to formal credit systems remained closely tied to land ownership and asset possession, effectively excluding most women farmers. Goetz and Sen Gupta's analysis of gendered financial institutions illustrates how credit structures mirror property inequalities by privileging those with legally recognized assets, who were primarily men (Goetz & Sen Gupta, 1996). Without access to affordable long-term financing, women in Homa Bay depended on informal savings groups and small rotating credit schemes that could support minor purchases but not capital-intensive technological upgrades. Consequently, women's technological engagement remained constrained to incremental and reversible investments rather than transformative innovations.

The study further established that long-term investment decisions were often mediated by household power relations rather than purely economic rationality. Even where women generated income through market sales or informal enterprises, major technological expenditures typically required male approval. Deere and León's work on land control and household bargaining power explains how property ownership strengthens men's authority over investment priorities (Deere & León, 2001, pp. 10–15). In Homa Bay, this dynamic meant that household resources were frequently directed toward male-controlled commercial farming activities rather than women's food production technologies, limiting women's capacity to modernize their agricultural practices. This study, therefore, submits that gendered disparities in land ownership and financial access critically undermined women's capacity for sustained technological investment in food production between 1985 and 2010. Tenure insecurity and credit exclusion encouraged short-term, low-risk technological choices while discouraging long-term productivity-enhancing innovations. As a result,



technological change in women's food production remained gradual, uneven, and largely survival-oriented, reinforcing historical patterns of marginalization within agricultural modernization processes.

4.1.5 Institutional Continuity: Extension, Training, and Subsidies

Continuity in institutional marginalization remained a defining feature of women's engagement with agricultural technologies in Homa Bay District between 1985 and 2010, particularly through their persistent exclusion from formal agricultural support structures. This marginalization was most evident in the ongoing neglect of women farmers within state-led extension services designed to disseminate modern farming knowledge and inputs. Institutional marginalization remained a persistent feature of women's engagement with agricultural technologies in Homa Bay District between 1985 and 2010, particularly through their continued exclusion from formal agricultural extension services. Although extension systems were officially designed to disseminate modern farming knowledge, improved inputs, and technical training to rural producers, their operational structures largely reflected longstanding gender biases that privileged male farmers. From the colonial period onward, extension officers typically targeted male household heads, assuming them to be the primary decision-makers and agricultural innovators, a practice that endured into the post-liberalization era despite women's central role in food production (Bates, 1987).

Extension programs commonly organized training sessions, demonstration plots, and field days around male-dominated farmer groups or landowners registered in official agricultural records. Boserup's analysis of modernization processes shows that when institutional outreach is structured around male property ownership, women are systematically bypassed even when they constitute the majority of cultivators (Boserup, 1970, pp. 19–22). In Homa Bay, women frequently learned of new farming techniques indirectly through husbands, neighbors, or informal networks rather than through direct engagement with extension officers. This secondary access limited both the depth of technical knowledge acquired and women's ability to seek clarification, support, or follow-up guidance.

The gendered nature of extension services also influenced the types of technologies promoted and adopted (Ragasa et al., 2013). Training programs often focused on cash crops and commercial production systems largely controlled by men, while subsistence food crops cultivated by women received minimal technical attention. Bryceson's work on agrarian commercialization illustrates how institutional priorities tend to align with market-oriented production, thereby reinforcing male control over technologically supported agricultural spaces (Bryceson, 1990, pp. 22–28). Evidence from this study reflects this pattern, with women reporting that extension advice primarily targeted maize commercialization, fertilizer regimes, and market linkages connected to male-managed plots, while women's diverse food crop systems were left to rely on indigenous knowledge and experimentation. Non-governmental organizations and community-based initiatives began to fill some extension gaps during this period, yet their reach remained limited and uneven across the district. Formal state extension systems continued to dominate agricultural policy frameworks, and their gender-biased structures remained largely intact (W. Achieng, personal communication, August 15, 2025). Consequently, women's technological engagement continued to unfold within institutional environments that neither fully recognized nor adequately supported their central role in food production.

Agricultural training programs in Homa Bay District between 1985 and 2010 continued to reflect deeply embedded assumptions about gender roles in farming, with men positioned as the primary recipients of technical knowledge and innovation. Training sessions organized by government extension officers, development agencies, and agricultural projects were predominantly targeted at male household heads, cooperative members, and landowners, categories that systematically excluded most women farmers (Daily Nation, 1979). Boserup's analysis of agricultural modernization demonstrates that when institutional training frameworks are organized around male control of land and formal group membership, women are rendered peripheral participants regardless of their actual contribution to food production. This institutional bias persisted well into the liberalization period, even as women remained responsible for the majority of subsistence cultivation (Rocheleau & Edmunds, 1997).

The content of agricultural training programs further reinforced this gendered exclusion. Instruction frequently focused on cash crop production, commercial maize farming, fertilizer regimes, and market-oriented technologies associated with male-managed plots. Quisumbing et al.'s study on agrarian commercialization shows that training systems tend to privilege market-driven production sectors, thereby directing technical support toward men who dominate commercial agriculture (Quisumbing et al., 2015). In Homa Bay, women's diverse food crop systems, which sustained household nutrition and food security, received limited technical attention. As a result, women continued to rely on indigenous knowledge, peer learning, and experimentation to manage crops such as sorghum, cassava, millet, and vegetables, while formal technological innovation remained concentrated within male-controlled farming spaces.

Structural barriers compounded women's exclusion from training programs. Sessions were often held at administrative centers, demonstration farms, or market towns far from women's homesteads, requiring time and mobility that many women lacked due to domestic responsibilities and heavy agricultural workloads. Cultural expectations further restricted women's participation in mixed-gender training forums, particularly where male instructors dominated discussions (Agarwal, 1994, p. 400). Agarwal's analysis of institutional participation highlights



how formal inclusion policies often fail when social norms and time burdens are not addressed, a pattern clearly evident in Homa Bay where women's attendance remained minimal despite official openness.

Oral testimonies from women farmers vividly illustrate how male-centred training structures shaped everyday agricultural practice. An FGD revealed the following:

They always called the men when the officers came. They would say the farmers should gather at the chief's place, and it was the husbands who went. We women remained in the farms and in the homes. When the men returned, some explained a little, some said nothing. Sometimes they said the training was for big farming and selling, not for our small food crops. I heard about fertilizer use after crops failed on my plot because nobody showed me the right way. When I asked the officer once, he said I should talk to my husband since the land belongs to him. From that time, I just used the methods I knew from my mother (Council of elders focus group participants, personal communication, December 30, 2025). Male-centred agricultural training programs therefore functioned as a powerful mechanism through which historical gender inequalities in resource access and technological engagement were reproduced during the 1985–2010 period. By channeling technical knowledge primarily to men, institutions reinforced women's marginal position within agricultural modernization processes and constrained their capacity to fully engage with emerging farming technologies.

Limited access to government-supported agricultural input subsidies remained a persistent institutional barrier shaping women's technology adoption in food production in Homa Bay District between 1985 and 2010. Although subsidy programs were officially introduced to enhance smallholder productivity through affordable fertilizers, improved seeds, and pest control inputs, their design and implementation largely favored male landowners and formally registered farmers. The distribution of agricultural subsidies was commonly linked to land ownership documentation, cooperative membership, and attendance at extension meetings, all of which systematically excluded most women farmers who cultivated land through informal user rights. According to Homa Bay District Development Plan (1994–1996), subsidized fertilizer allocations were distributed primarily through registered farmer groups dominated by male household heads, with women listed mainly as dependents rather than beneficiaries. The plan noted that “priority in input allocation shall be accorded to registered landholders engaged in commercial maize production,” effectively marginalizing women whose food crop plots fell outside commercial frameworks (Republic of Kenya, 1996). This policy orientation demonstrates how subsidy mechanisms reproduced existing gender hierarchies under the guise of productivity enhancement.

This study has established that women frequently described subsidy access as mediated through husbands or male relatives, reinforcing dependence and limiting autonomy in technological decisions. Many women reported that even when subsidies reached the household, men controlled their use, often prioritizing cash crops or larger commercial plots over women's food production areas (Agricultural officers focus group participants, personal communication, October 10, 2025). This pattern resulted in women's continued reliance on traditional soil fertility methods or reduced application of modern inputs due to affordability constraints. This restricted access shaped women's technological engagement in significant ways. Without affordable inputs, many women were unable to experiment with improved seeds or fertilizer regimes that could enhance yields and soil fertility. Where inputs were purchased at market prices, quantities remained minimal, resulting in partial adoption with limited productivity gains. Over time, this reinforced cycles of low investment, low output, and technological stagnation within women-managed food plots (Quisumbing et al., 2015).

The researcher further noted that women developed adaptive responses to subsidy exclusion, including collective bulk purchasing through self-help groups, composting and organic fertilization practices, and strategic crop selection based on low-input requirements. While these strategies demonstrated resilience and innovation, they emerged as coping mechanisms within exclusionary institutional structures rather than outcomes of equitable policy support (W. Achieng, personal communication, August 15, 2025). Limited access to government input subsidies therefore functioned as a key mechanism through which institutional marginalization persisted during the 1985–2010 period. By linking technological support to male-dominated structures of land ownership and formal registration, subsidy programs reinforced gendered inequalities in agricultural modernization and constrained women's capacity to engage meaningfully with emerging farming technologies.

4.1.6 Structural Adjustment and Market-Led Exclusion, 1985–1995

Reduced state support: SAPs that were introduced in Kenya from the mid-1980s marked a major turning point in the organization of agricultural support systems and significantly reshaped women's engagement with food production technologies. These reforms, implemented under international financial restructuring frameworks, sought to reduce public expenditure, liberalize markets, and minimize state involvement in productive sectors. Although agriculture remained the most important sector of the Kenyan economy, the government nevertheless increased the cost of production in an attempt to spur agricultural production, especially for food crops such as maize, wheat and sugarcane. This resulted in the withdrawal of government subsidies on fertilizers and seeds, the downsizing of extension services,



and the restructuring of rural credit facilities for farmers (Mbithe et al., 2017). While these reforms were presented as necessary for economic efficiency and fiscal sustainability, their social consequences were unevenly distributed and deeply gendered.

A majority of women were involved in food production while men engaged in the production of cash crops. However, SAPs demanded an increase in the export of cash crops, which women did not control (Ochieng', 1974, p. 207). In Homa Bay District, women were still mere labourers and were not owners of the means of production, such as land, which belonged to men. Coffee, tea and cotton were largely grown with government support, so the emphasis on these crops did not favour subsistence farming which was done by women (M. Awuor, personal communication, December 12, 2025). District agricultural reports from the early 1980s indicated occasional government seed distributions during drought recovery periods and subsidized fertilizer sales through cooperative societies (Kenya National Archives, n.d.). With SAP reforms, such interventions were largely discontinued, leaving women farmers increasingly dependent on market purchases for technological engagement. Therefore, men who controlled land titles and cash crop income were better positioned to navigate privatized input markets, while women whose production focused on subsistence food crops faced severe constraints.

The effects of SAPs were felt during the 1990s more than any other period after they were introduced. The reduction in government expenditure hurt the poor and vulnerable groups such as women the most up to the late 1990s due to their previous dependence on subsidized social and economic services. The negative effects of SAPs were felt by the low-income population a majority of whom were women (Nzomo, 1996). The removal of subsidies coincided with a decline in women's use of fertilizers and HYV seeds across many households. The expectation that farmers would now purchase farm technologies independently clashed with women's limited control over household finances. As men prioritized investment in cash crops such as coffee, tea and cotton, women's food production farms were often neglected in the distribution of farm inputs. One extended oral account from a farmer in Rachuonyo, Caren Akinyi, vividly illustrated how SAPs reforms reshaped everyday agricultural practice:

The Nyanza Province annual report of 1994 further reflected institutional recognition of declining input usage among smallholder farmers. The report noted a "significant reduction in fertilizer application among subsistence producers following subsidy withdrawal," attributing the trend to rising costs and limited purchasing power (Kenya National Archives, 1994). Although the document did not explicitly make reference to gender, this decline affected women farmers who dominated subsistence food production. Moreover, the SAPs themselves were gender-biased in various ways. For example, through the promotion of cash crops for export, women farmers were greatly affected because they provided labour on the export crops that they did not own. Mining also affected access to agricultural land by women. Moreover, the promotion of private capital and the relaxation of labour regulations affected job security and working conditions, especially among workers at lower levels of employment, the majority of whom were women (Nzomo, 1996, p. 40).

Through this analysis, SAPs emerged not as temporary economic reforms but as a reinforcing continuity that reshaped earlier patterns of institutional marginalization into market-driven exclusion. The withdrawal of state support did not dismantle gender inequalities in agricultural development but reconfigured them through affordability barriers, privatized access, and intensified household power imbalances. By privileging registered landholders and commercially oriented producers, these channels positioned male farmers at the center of innovation flows while relegating most women to peripheral or indirect access. The discussion that follows therefore analyzes subsidy access as a structured diffusion process in which institutional criteria determined who received technological support, thereby shaping the pace, scale, and character of women's technology adoption in food production.

Privatization of inputs and services: Privatization of agricultural inputs and services constituted one of the most visible outcomes of liberalization reforms in Kenya from the late 1980s onward and profoundly reshaped women's access to food production technologies. Following the withdrawal of the state from direct input provision under SAPs, responsibility for supplying fertilizers, improved seeds, pesticides, and technical advisory services was transferred to private sector actors. This transition was justified by policymakers as a means of improving efficiency, reducing fiscal burden, and promoting competitive markets (Ochieng', 1974, p. 208). However, in Homa Bay District, privatization generated new structural barriers that intensified gendered inequalities in technological access. According to the Provincial Agricultural Development Report of 1992, government-managed fertilizer depots and cooperative input stores were closed across Nyanza Province. The report emphasized that private agro-chemical dealers were expected to fill the supply gap through market-driven distribution networks (Kenya National Archives, 1992, p. 10). While the number of input retailers increased in urban centers and trading hubs, rural villages experienced limited presence of suppliers, forcing farmers to travel long distances to purchase essential technologies. For women responsible for both farming and household labour, these spatial barriers significantly constrained access.

The Homa Bay District Development Plan, 1994-1996 acknowledged declining fertilizer uptake among smallholder farmers and noted concerns over "limited affordability under privatized pricing structures." The report suggested that subsistence producers were reverting to traditional soil fertility practices, indicating technological retreat

rather than advancement (Republic of Kenya, 1996). This trend was interpreted as evidence that privatization without compensatory support mechanisms undermined modernization efforts among marginalized groups.

Privatization also intersected with existing gender norms that restricted women's mobility and financial autonomy. Traveling to trading centers required time away from household duties and sometimes permission or financial support from male relatives. These social constraints further reduced women's capacity to engage with privatized input markets (Boserup, 1970). Therefore, privatization represented not a neutral economic reform but a structural reorganization that embedded technological access within unequal market relations. Where earlier institutional systems marginalized women through bureaucratic exclusion, privatized systems marginalized them through affordability barriers, spatial distance, and profit-driven service delivery.

Increased availability of agricultural technologies under privatization did not translate into equitable access. Modern inputs were present in greater variety yet remained functionally inaccessible to women responsible for food production. Thus, rather than democratizing technology, privatization consolidated its use among economically advantaged producers (Boserup, 1970). Through this analysis, privatization emerged as a reinforcing continuity that reproduced historical gendered inequalities in agricultural development under new market-based frameworks. Women's technological marginalization persisted not because technologies were absent but because structural conditions systematically restricted their ability to acquire and utilize them.

Affordability and differentiated adoption: Worsening affordability and access to agricultural technologies constituted one of the most significant outcomes of liberalization and privatization reforms in Kenya between 1985 and 2010. While modernization narratives suggested that market-driven systems would increase efficiency and availability of agricultural inputs, technological access became increasingly mediated by purchasing power, spatial proximity to markets, and control over household finances. For women farmers who engaged primarily in subsistence food production, rising costs and privatized distribution systems transformed modern agricultural technologies from developmental tools into largely unattainable commodities (Republic of Kenya, 1992). Following the removal of state subsidies under SAPs, prices of fertilizers, improved seeds, pesticides, and farm implements rose sharply. The Economic Survey of 1992 indicated that fertilizer prices more than doubled within three years of subsidy withdrawal, with subsequent fluctuations driven by international market forces (Republic of Kenya, 1992). These increases occurred within rural economies characterized by declining real incomes and rising living costs, further eroding women's capacity to purchase essential agricultural inputs.

Women's access to cash income further remained limited due to gendered divisions of labour and control over productive resources. Men continued to dominate commercial crop production and market transactions, while women's farming focused on household consumption. As agricultural technologies shifted into market spaces requiring immediate cash payments, women were structurally disadvantaged (World Bank, 1995). Technological engagement increasingly depended on negotiation within households, where male priorities often favored investment in income-generating crops rather than food security-oriented production systems. Scholars' analyses of gender and agricultural markets consistently demonstrate how price-based access mechanisms reinforce existing inequalities. Market reforms frequently ignore intrahousehold power relations that determine resource allocation (International Monetary Fund, 1994). However, women's limited control over assets restricts their participation in commercialization processes (Kabeer, 1994). For women in Homa Bay District, these theoretical insights were reflected in everyday agricultural practices, where women's technological adoption remained sporadic and dependent on male approval and financial support.

Correspondence from the Homa Bay District Development Committee in 1998 attributed the declining uptake of improved seeds and fertilizers among smallholder farmers to high prices and reduced purchasing power. The report warned that food production levels were stagnating despite broader technological availability within the private sector (Boserup, 1970). The researcher interpreted this contradiction as evidence that access, rather than technological presence, was the primary barrier to modernization among women farmers.

The cumulative effect of worsening affordability was technological stagnation within women's agricultural systems despite broader modernization efforts. Improved seeds existed, fertilizers were available, and technical knowledge circulated through markets, yet structural barriers prevented effective access. Technological change thus remained uneven, benefiting economically advantaged producers while excluding those responsible for household food security (International Fund for Agricultural Development, 2001). Worsening affordability thus represented not an unintended consequence but a structural outcome of market-driven agricultural reforms implemented without gender-sensitive safeguards. By relocating technological access into privatized markets without addressing income inequality and asset ownership, reforms systematically marginalized women farmers. From the foregoing discussion, worsening affordability and access emerged as central mechanisms through which liberalization reforms reinforced historical patterns of gendered marginalization in agricultural development. Women's limited engagement with modern technologies was not a reflection of unwillingness or cultural conservatism but the rational outcome of structural economic constraints.



4.1.7 The Beijing Agenda and Collective Adaptation, 1995–2002

In 1995, the Beijing conference was held, 10 years after the Nairobi Women's conference. It was the most influential of all the women's conferences with a total of 17,000 women from 189 member states and associate members and another 30,000 who participated in the parallel NGO forum on Women '95 that was held in Huairou (Quisumbing, 1995, p. 1). After two weeks of deliberations, the conference came up with the Beijing Declaration and Platform for Action (PFA) in which the delegates were convinced that women's empowerment and their full participation on the basis of equality in all spheres of society, including participation in the decision-making process and access to power were fundamental to promoting equality, development and peace for all (United Nations, 1995, pp. 859–865). The conference was built on the foundation laid by the Nairobi conference, by asserting the importance of women's empowerment and autonomy and improvements in their social, economic, and political spheres (Nyakwaka, 2013, p. 225).

The conference thus became one of the highlights of the new women's movements of the 1990s and succeeded the UN Women's Decade Conference that was held in Nairobi in 1985. Therefore, in order to achieve transparent, accountable government and administration and sustainable development in all areas of life, women were to be empowered socially, economically and politically. The conference's PFA thus laid the foundation to provide a comprehensive action plan for the enhancement of women's social, economic and political empowerment (Roberts, 1996). There was a lot of international goodwill from the donors that promoted consultancies, civic education and sensitization of women to explicitly link gender equality and women's rights. Nothing could be achieved without reordering relationships between women and men in order to realise full, equal partnerships for the overall good of society. Beijing advanced gender mainstreaming, the idea that policies, programs, and initiatives had to address the needs of both women and men in order to prosper (Owuor, 2016, p. 25).

The Beijing PFA, which had little reference to rural women as farmers in early drafts, evolved to reflect women's crucial contribution to food security as agricultural producers, managers of natural resources, and users of agricultural technology. However, the final draft stated unequivocally the role of women as key economic agents, contributing through both remunerated and unremunerated work at home, in the community, and in the workplace. It also emphasized the increasing dependence on women's incomes by a large proportion of the world's population, as the number and importance of female-headed households increase (Quisumbing, 1995, p. 2). The platform also recognized that the productive capacity of women should be increased through access to capital, resources, credit, land, technology, information, technical assistance, and training (Quisumbing, 1995).

4.1.8 Information and Communication Technologies, 2000–2010

The period between 2000 and 2010 marked a significant transformation in agricultural production systems in Kenya and across Africa, largely driven by the expansion of Information and Communication Technologies (ICTs), particularly access to and use of mobile phones, radio, and television. These technologies reconfigured access to agricultural knowledge, markets, and financial services, thereby reshaping gender relations in agrarian production. Mobile phone technology was first introduced in Kenya in 1992, but most of the population, especially in rural areas, did not own mobile phones because both the devices and airtime were too expensive. Access was therefore limited to urban elites (World Bank, 1995). However, mobile phone adoption became widespread in the early 2000s following market liberalization and reduced handset costs. The passage of the Communications Act in 1998 broke the Kenya Posts and Telecommunications' monopoly in communication, leading to the proliferation of mobile network providers such as Kencell (now Airtel) and Safaricom in 2000, which triggered broader access and affordability.

The integration of mobile phones into agricultural production was further accelerated by the emergence of Mobile Money Transfer (MMT) services. In Kenya, M-Pesa was launched in March 2007 as an MMT service (Omondi, 2020). The word pesa is a Swahili term that means money and the prefix 'M' refers to the use of a mobile phone to facilitate banking transactions. The launch marked a turning point in the use of mobile telephony to promote agricultural production since rural farmers were now able to transact from their mobile phones when purchasing farm inputs and marketing produce (Women farmer focus group participants, personal communication, August 13, 2025). Other mobile phone service providers followed suit by launching MMT. For example, Airtel launched Airtel Money (formerly ZAP) in February 2009 and YU mobile phone company launched YU-CASH in December 2009. Orange (formerly Telkom and Posta) was the fourth and latest entrant to introduce its MMT service called Orange Money in November 2010 (Kirui et al., 2013). The adoption and use of MMT services enabled farmers to purchase farm inputs such as fertilizers, seeds, and farm implements, lease farmland, and pay farm workers.

Mobile phones transformed agricultural practices by facilitating multiple functions critical to food production. A respondent who was a retired agricultural officer informed the researcher that through mobile phones, farmers began to call the agricultural officers directly whenever there was a disease outbreak and, after 2008, began to send pictures, enabling the officers to respond to farmers as quickly as possible. This oral testimony corroborates Martin and Abbott's findings, which indicate that mobile phones were used to store local market trends in calendars, use the speakerphone



function for group consultations with agricultural experts, take photos for agricultural demonstrations, and diagnose crop diseases (Martin & Abbott, 2011). These uses reflect the multifunctional nature of mobile devices in agricultural knowledge systems.

The introduction of mobile phones had profound implications for women's participation in agriculture. ICTs created new opportunities for women to access information, markets, and financial resources, thereby enhancing their agency within agricultural value chains. Mobile phones reduced women's dependence on intermediaries by enabling direct communication with buyers and suppliers. This increased their control over income and decision-making processes in food production. Furthermore, mobile technologies facilitated access to extension services, which had historically been male-dominated. However, the adoption of mobile phones among women was uneven. Studies show that gender disparities persisted in ownership, access, and usage of mobile technologies. Women were slightly less likely to own smartphones and often faced barriers such as lower literacy levels, limited financial resources, and cultural restrictions (Wyche et al., 2019, pp. 3–5). These disparities influenced the extent to which women could benefit from ICT-driven agricultural innovations.

The adoption of mobile phones contributed to broader socio-economic transformations in rural agricultural communities. ICTs enhanced productivity by improving access to timely and relevant information, thereby enabling farmers to make informed decisions regarding planting, harvesting, and marketing. Moreover, mobile technologies strengthened farmers' adaptive capacity to environmental challenges, particularly climate variability. Access to weather forecasts and climate-related information allowed farmers to mitigate risks associated with rain-fed agriculture (Muasa & Matsuda, 2019, pp. 2–3). However, the impact of mobile phones was not uniform. The effectiveness of ICTs depended on factors such as literacy, income, infrastructure, and institutional support. As such, while mobile phones had the potential to democratize access to information, existing socio-economic inequalities—particularly gender-based disparities—continued to shape their adoption and outcomes.

4.1.9 Constitutional Reform and Agricultural Modernization, 2010–2022

The 2010 Constitution and gendered access to innovation: The promulgation of the 2010 Constitution of Kenya marked a significant juridico-political reconfiguration of gender relations in agriculture, land tenure, and technological access. Within a postcolonial feminist and techno-feminist framework, the Constitution can be read not merely as a legal instrument but as an epistemic intervention that sought to reconstitute women as legitimate technological actors in agrarian development. By constitutionalizing gender equality, devolving agricultural governance, and strengthening land rights, the 2010 framework opened new institutional pathways through which women could potentially access agricultural technologies, credit systems, and extension services historically mediated through patriarchal and colonial administrative structures (Republic of Kenya, 2010).

Devolution under Chapter 11 of the Constitution of Kenya (2010) transferred key agricultural functions including extension services, input distribution, livestock support, and irrigation development to county governments (Kanyinga, 2016; Republic of Kenya, 2010). This restructuring has been widely interpreted in secondary literature as one of the most significant post-independence institutional reforms affecting rural livelihoods. Yash Ghai and Jill Cottrell Ghai argue that devolution “brings government closer to the people,” creating new entry points for historically marginalized groups, including rural women farmers (Ghai & Ghai, 2011). From a techno-feminist perspective, this proximity matters because technological access is not only about availability but about institutional proximity, responsiveness, and the reduction of bureaucratic distance between users and innovation systems (Wajcman, 2004, p. 89).

In practice, county agricultural systems have begun to institutionalize women's participation through ward-based extension officers, subsidized input distribution programs, and targeted agricultural value chain initiatives. In Homa Bay, women's groups are increasingly registered as beneficiaries of county agricultural grants and training programs on climate-smart agriculture, drought-resistant seed varieties, and small-scale irrigation technologies. The County Integrated Development Plan (CIDP) explicitly recognizes women and youth as priority beneficiaries of agricultural modernization programs, reflecting a gradual institutionalization of constitutional gender equality principles within local planning frameworks (County Government of Homa Bay, 2013, pp. 30–33).

Oral interviews suggest that women perceive devolution as an improvement in physical and institutional access to agricultural technologies, albeit with persistent limitations. According to Gladys Atieno, “Before, we had to travel far to ask for extension officers. Now they come near, sometimes even to the group meetings” (G. Atieno, personal communication, August 20, 2025). Similarly, “The county gave us training on new maize seeds, but getting enough fertilizer is still a problem” (M. Opat, personal communication, August 15, 2025). These narratives indicate partial actualization of constitutional promises through localized service delivery, while also revealing continued material constraints in input accessibility.

Focus group discussions further demonstrate that women's collective action remains central to navigating devolved agricultural systems. Women's groups often function as intermediary institutions between county governments



and individual farmers, aggregating demand for inputs, organizing training attendance, and coordinating access to county-funded irrigation equipment. One participant explained: “If you go alone, you are not considered. But if the group applies, the county listens” (Women’s cooperative focus group participants, personal communication, September 20, 2025). This reflects a continuity with precolonial collective labour systems, though now reconfigured within bureaucratic and rights-based governance structures.

In sum, the 2010 Constitution of Kenya represents a critical yet incomplete moment in the historical trajectory of women’s agricultural technological empowerment. Within a postcolonial feminist lens, it constitutes an epistemic shift that formally recognizes women as equal agricultural actors. Within a techno-feminist framework, it introduces institutional conditions that potentially expand access to technologies through devolution and rights-based governance. However, when situated against precolonial cooperative systems and colonial exclusionary regimes, it becomes evident that constitutional reform does not automatically resolve historical inequalities. Instead, it reconfigures them within new legal and bureaucratic forms that continue to mediate women’s access to agricultural technologies through layered systems of social capital, collective organization, and institutional negotiations.

Agricultural modernization under Uhuru Kenyatta, 2013–2022: Uhuru Kenyatta’s presidency (2013–2022) marked an important phase in the modernization of agriculture in Kenya generally, particularly Homa Bay County. This occurred through digital agriculture, climate-smart farming, irrigation projects, women’s groups, and devolved agricultural programs. Unlike the earlier administrations of Jomo Kenyatta, Daniel Arap Moi, and Mwai Kibaki, which focused mainly on settlement schemes, structural adjustment policies, and economic recovery programs, the Uhuru administration increasingly emphasized technological innovation, food security, agribusiness, and women’s empowerment within devolved governance structures. In Homa Bay County, where women formed the backbone of smallholder agriculture, these modernization policies significantly transformed agricultural production, marketing, and rural livelihoods.

Using postcolonial feminist and techno-feminist theories, this study argues that agricultural modernization in Homa Bay County reflected both continuity and change. Colonial and postcolonial land systems had historically marginalized women from land ownership and formal agricultural decision-making despite their central role in food production. During Uhuru Kenyatta’s presidency, women gained greater access to mobile banking, digital market information, irrigation technologies, improved seeds, and county agricultural training programs. However, access to these technologies remained unequal because ownership of land, financial resources, and productive assets continued to favour men (Gichobi & Kungu, 2024).

Interpretivist philosophy helps explain how women in Homa Bay County understood and negotiated these technological changes within their daily experiences. Oral interviews conducted in Kabondo and Kasipul revealed that mobile phones and M-Pesa transformed women’s access to agricultural markets by reducing dependence on middlemen and enabling direct financial transactions. One woman farmer from Kabondo explained during an oral interview conducted in June 2025 that before the spread of mobile technology, women sold produce through brokers who frequently manipulated prices, but during Uhuru Kenyatta’s presidency women increasingly received market information and payments directly through their phones. She nevertheless observed that many elderly women struggled to use digital applications because of low literacy levels and lack of technological exposure. This demonstrates that digital modernization simultaneously expanded opportunities and reproduced generational inequalities.

The Uhuru administration’s promotion of climate-smart agriculture significantly shaped women’s agricultural labour in Homa Bay County. This was because recurrent droughts, declining soil fertility, and changing rainfall patterns threatened household food security. Women adopted irrigation methods, improved seeds, kitchen gardens, and water harvesting technologies to sustain agricultural production (County Government of Homa Bay, 2018). Oral testimonies from women in Kabondo Kasipul revealed that although these innovations improved food production, women continued to carry the burden of domestic labour, childcare, and farm management (Anonymous interview participant, personal communication, June 20, 2025). One respondent explained that women attended agricultural training sessions while still performing planting, weeding, harvesting, cooking, and water collection responsibilities (Anonymous interview participant, personal communication, June 20, 2025). Techno-feminist analysis therefore shows that technology often redistributed labour rather than eliminating women’s work burdens.

Women’s groups and chamas became important mechanisms for accessing agricultural technologies in Homa Bay County. Through collective savings and county-supported empowerment projects, women acquired water pumps, poultry projects, fertilizers, and fishing equipment (County Government of Homa Bay, 2018, p. 45). Focus group discussions conducted among women’s groups in Suba and Rangwe indicated that collective action enabled women to overcome barriers associated with limited access to credit and land ownership. Women explained that as groups they could apply for county grants, share irrigation equipment, and market agricultural produce collectively (Women farmer focus group participants, personal communication, 2025). These findings demonstrate women’s agency in negotiating technological modernization within restrictive economic and patriarchal structures.



However, agricultural mechanization and commercialization continued to benefit men more than women because most land titles remained registered under male ownership. Women farmers in Homa Bay County explained that access to agricultural loans and mechanized equipment depended heavily on collateral and financial capacity, resources that many women lacked. Older women also argued that modernization weakened communal labour systems that had historically united women during planting and harvesting seasons (Women farmer focus group participants, personal communication, 2025).

In sum, Uhuru Kenyatta's legacy in women's agricultural modernization in Homa Bay County remains historically complex. His administration expanded technological access, climate-smart agriculture, and women's participation in devolved agricultural programs. Nevertheless, patriarchal land systems, unequal access to credit, and gendered labour burdens continued to limit women's full participation in agricultural modernization. Through postcolonial feminist and techno-feminist analysis, women in Homa Bay County emerge not as passive recipients of state development programs but as active negotiators of technological change within postcolonial rural Kenya.

4.2 Discussion: Continuity and Change across the *Longue Durée*

The most persistent continuity was the connection between land control and technological capacity. Women's user rights enabled cultivation but rarely provided the security required for long-term investments in irrigation, tree crops, machinery, or soil infrastructure. Title deeds also structured access to credit, subsidies, cooperative membership, and formal training. As a result, later technologies entered a social landscape in which women's productive responsibility remained greater than their authority over the principal resource on which adoption depended. A second continuity was institutional recognition. Public extension, training programmes, and input schemes repeatedly identified landowners, commercial producers, or household heads as their primary clients. Budget contraction after 1985 reduced even the limited contact women had received. Privatization did not neutralize this bias; it reorganized access around purchasing power, transport, market proximity, and the ability to buy in profitable quantities. Women on small food plots were therefore disadvantaged first by administrative criteria and then by commercial criteria.

The principal changes lay in the diversification of access channels. Women's groups, savings associations, non-governmental organizations, radio, mobile telephony, mobile money, and digital advisory services reduced dependence on a single extension officer or cooperative. The Beijing agenda and the 2010 Constitution also supplied a language of equality through which women could contest exclusion. These changes mattered, especially for information, market coordination, payments, and collective purchasing. Their effect was nevertheless conditioned by literacy, handset ownership, network coverage, income, land rights, and household decision-making. The period therefore does not support a linear narrative of modernization. Indigenous seed saving, manure, intercropping, and reciprocal labour continued alongside hybrid seed, fertilizer, pesticides, irrigation, mobile platforms, and climate-smart practices. Women assembled technological portfolios according to risk, affordability, ecological conditions, and social permission. Adoption was selective because survival required flexibility. The long-term historical pattern was one of hybridization: technologies changed, but gendered control over land, capital, and institutional legitimacy continued to shape their scale and benefits.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The study concludes that technology adoption by women in food production in Homa-Bay District between 1985 and 2022 was characterized by both continuity and change. Although the period witnessed the introduction and expansion of improved seeds, fertilizers, agricultural machinery, soil conservation practices, irrigation technologies and ICTs, women's access to and control over these technologies remained constrained by gendered access to land, credit, extension services and other productive resources. The study therefore finds that technological availability did not automatically translate into equal technological access or benefits for women. A major continuity was the persistence of male dominance in land ownership and control. Women continued to rely substantially on user rights and informal arrangements to access land, limiting their ability to make independent and long-term investments in agricultural technologies. Limited control over land also affected access to credit and other institutional agricultural services. The study also establishes continuity in institutional marginalization. Agricultural extension, training and input-support programmes did not consistently reach women on equal terms with men. The liberalization and privatization of agricultural inputs and services from the 1980s further shifted access towards market-based systems, making affordability an additional constraint for women with limited income and access to credit.

At the same time, important changes occurred. Women increasingly adopted and adapted improved seeds, fertilizers, soil-management practices, small-scale irrigation and ICTs. Mobile phones and mobile money created new opportunities for accessing information, communicating with agricultural actors and conducting financial transactions. Women also used collective organization and local knowledge to overcome some of the constraints associated with



individual access to agricultural resources and technologies. Overall, the study concludes that women's technological adoption during 1985–2022 was adaptive and selective rather than uniform. Women were active users and adapters of agricultural technologies, but their choices were shaped by historically rooted gender relations, limited control over productive resources and changing agricultural institutions. Technological change therefore expanded women's opportunities in some areas without fully removing the structural inequalities that had long influenced their participation in food production.

5.2 Recommendations

Based on these findings, the study recommends that the national and county governments strengthen women's secure access to agricultural land. Land policies and programmes should ensure that women are not merely users of agricultural land but have meaningful and secure rights that enable them to make long-term investments in food production. The Ministry of Agriculture and the County Government of Homa Bay should strengthen gender-responsive agricultural extension and training. Extension programmes should recognize women as primary food producers and ensure that information on improved seeds, fertilizers, soil management, irrigation and other technologies reaches women directly rather than relying mainly on male household heads. Financial institutions, government agricultural programmes and development organizations should improve women's access to affordable agricultural credit and inputs. Credit arrangements should take account of women's limited access to formal collateral, while input-support programmes should deliberately target women farmers.

The County Government and agricultural development agencies should also support women's groups and collective initiatives through training, affordable technologies, savings and credit programmes, and market linkages. Such initiatives can strengthen the collective strategies women have already used to overcome limitations in individual access to agricultural resources. Finally, agricultural modernization programmes should combine new technologies with women's existing agricultural knowledge and practices. The findings show that women did not simply abandon indigenous practices when new technologies emerged; they adapted and combined them with improved technologies. Agricultural programmes should therefore recognize women's knowledge and support technologies that are affordable, locally appropriate and relevant to household food production. Further research should examine how women's adoption of digital and climate-smart agricultural technologies is changing access to information, finance, inputs and markets in rural Homa-Bay and other parts of Western Kenya.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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