



Review Article

Market Access and Adoption of Climate Smart Agriculture: A Systematic Review

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ABSTRACT

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Market access is an important determinant influencing farmers' adoption decisions by affecting prospective profitability, access to modern inputs, availability of information and extension services, and exposure to production and price risks. This systematic review is a synthesis of the evidence on the relationship between market access and CSA adoption in various agroecological settings. According to the PRISMA guidelines, five databases were used in the search: USDA Agricola, Semantic Scholar, DOAJ, EBSCOhost, and Google Scholar from which a total of 55 peer-reviewed studies were retrieved from 2015 to 2024. The results suggest that improved market access, as represented by lower transaction costs, better market information, proximity to markets, and better integration into the value chain in general, is conducive to the adoption of CSA. On the contrary, limited access to credit facilities, infrastructure and institutional support, poor market linkages and geographical isolation still hinder adoption, especially among resource-limited smallholders. The existing evidence is disjointed, and there was little research that focused on the individual influence of the various dimensions of market access on CSA adoption. Focused investigations by addressing this gap, particularly in the coastal areas of developing countries, would provide clear insights for policy formulation to enhance CSA adoption through improved market access.

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Introduction

Agriculture is one of the most significant income sources for many least developed and developing countries, providing livelihood opportunities for individuals worldwide (Siswantoro and Gandhi, 2025). However, climate change is happening at an accelerated rate, and is threatening crop production, reducing productivity and intensifying food and nutritional insecurity (Neupane et al., 2022). In particular, food production is hampered by global warming, pest outbreaks and soil degradation during the growing phases of several crops, which ultimately leads to poor productivity (Brar and Vashist, 2020; Dietz et al., 2021). Smallholder farmers are negatively impacted by frequent and sudden climate change as they have less adaptive capacity, particularly those living in disaster-prone regions (Hussein et al., 2024). These climate vulnerable people are constantly dealing with the severe effects of climate change and it is now more important than ever to redesign the agricultural systems and bring changes to conventional practices.

Climate-Smart Agriculture is defined as an integrated approach, introduced by the FAO in 2010, to manage crop, livestock, forests, and fisheries in a way that guides agriculture adaptation to climate change, ensure food security, and foster sustainability (Palombi and Sessa, 2013). CSA has three interrelated pillars: Productivity, adaptation, and mitigation (FAO, 2019). The primary goals of CSA are to sustainably increase agricultural productivity and farmers' income, improve resilience of farming systems and climate change, and reduce greenhouse gas emissions (Ma and Rahut, 2024). While many strategies for sustainable agricultural development exist, the implementation of CSA is essential for smallholder farmers in developing countries like Bangladesh, where climate risk is high, resources are limited (Berhanu et al., 2024; Ewulo et al., 2025). Moreover, CSA practices have proved to provide significant benefits over conventional practices. CSA practices which improve soil health and reduce the vulnerability to climate change, include agroforestry, legume cropping, seasonal calendars, crop calendars, drought-tolerant crop varieties, intercropping, weed

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management, zero tillage, mulching, conservation agriculture, water management, stress-tolerant crop types, and integrated soil fertility and nutrition management (Adimassu et al., 2025; Dawid et al., 2021; Issahaku et al., 2021; J. Li et al., 2024). Although CSA has shown promise in developing nations, a major concern for CSA is the lack of clarity about what it stands for; as it encompasses a wide range of practices and strategies (Zougmore et al., 2018). Such ambiguity makes the operationalization of CSA more challenging for smallholder farmers (Autio et al., 2021). Moreover, CSA operations at the field level can be complicated as they need to integrate multiple practices for quantifying and evaluating results (Berhanu et al., 2024).

Adoption is often considered as the individual decision to understand, accept, and use of a new practice or technology in a particular system (Orr, 2003; Rogers, 2003). A wide range of socio-economic, institutional, and environmental determinants has been identified in different dimensions, which can influence the adoption rate of CSA practices. Age, education, gender, income, farm experience, access to credit and market, extension services, and secure land tenure system can have an impact on decision-making (Maguza-Tembo et al., 2017; Negera et al., 2022; Tilahun et al., 2023; Waaswa et al., 2024). Despite the numerous efforts to support farmers with new technologies, weak governance, infrastructural limitations, lack of social relations, high input cost, limited awareness, and exposure to climate shocks often reduce the level of adoption among smallholder farmers (Agyekum et al., 2024; Barman et al., 2019; Autio et al., 2021; Finizola E Silva et al., 2024; Jellason et al., 2021).

Market access is a critical component in agricultural development and CSA adoption research, and it defined as the farmer's ability to enter and participate in agricultural markets (Perosa et al., 2024). It influences farmers' adoption decisions on both input- and output-side levels (Ma and Rahut, 2024). Although, researchers use a variety of proxy measures to evaluate market access, distance-based metrics are the most common, as they are simple to quantify, and measure a location's physical distance to transportation facilities and markets. Despite the critical role of these metrics to track the efficiency of the market, they fail to account for the infrastructure quality and market frequency (Ali, 2021; Amankwah, 2023). A recently published paper highlights that different aspects of market access such as access to extension and advisory services, access to finance and credit services, and access to relevant market information need to be taken into consideration thus it is impossible to minimize a single index (Berhanu et al., 2024). A more nuanced understanding of market access makes it difficult to

compare findings and draw clear policy implications (Ewulo et al., 2025).

Adoption of Climate-Smart Agriculture and market access are vital and interlinked research areas, which are required for improving agricultural productivity and climate resilience (Tariku and Kebede, 2024). Moreover, various factors of market access affect CSA adoption, which is important to know for formulating effective interventions (Jellason et al., 2021). According to transaction cost theory, market access can reduce transaction costs that facilitate farmers' adoption of new agricultural practices (Williamson, 1979). Proximity to markets can reduce transportation costs that enable farmers to move on CSA practices (Tesfaye et al., 2021). Poor market access, which renders farmers more vulnerable to climate change impacts, can hinder the adoption of CSA (Ewulo et al., 2025). In contrast, a lack of market access has been recognized as a major constraint on the choice of CSA among smallholders in rural settings (Autio et al., 2021).

This systematic review is essential to identify the research gap in current studies regarding market access and the adoption of climate-smart agriculture. Though a wide range of studies has discussed adoption and market access individually, there is a lack of studies that integrate the influence of various market access indicators on CSA adoption in different agro-ecological condition. The prime objective of this review is to examine the relationship between market access and the adoption of climate-smart agriculture practices, identify the major determinants, research gaps and barriers. This review is expected to consolidate pertinent information regarding market structures and their linkages with CSA technologies, which are required for effective policy formulation.

Materials and Methods

A systematic literature review follows a specified methodology to find relevant and credible materials to achieve a certain target or a research question (Gupta et al., 2018). This present study employed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method to find out the effect of market access and its relation with the adoption of different CSA practices. The principal points from 27 checklists proposed by the PRISMA protocol were maintained and followed while screening, excluding, and writing the review (Moher et al., 2009).

Eligibility criteria

Peer-reviewed journal articles from 5 sites were selected, namely USDA Agricola, Semantic Scholar, DOAJ, EBSCOhost and Google Scholar which discussed

CSA practices, their adoption, and how market access can have an impact on adoption levels worldwide, published from 2015 to 2024 (Chart 1). Studies written in English were considered for this systematic review.

Search Strategy

A search string was developed for the two selected electronic databases. The main keywords were 'Adoption', 'impact', 'CSA', and 'market Access'. For, USDA Agricola was searched using TI: ((adoption AND "climate smart agric*") OR (agric* AND market)), specifying subject areas such as *Articles, Markets, Models, Issues and Policy, Prices, and Surveys* within 2015–2024. For Semantic Scholar, the query was ("impact climate smart agriculture") OR ("adoption

climate smart agriculture" AND "Market") with filters set to *Agriculture and Food Science* within the 2015–2024 period. DOAJ searches applied the string Abstract: (adoption AND "climate smart agriculture") OR (adoption AND agriculture AND market) restricted to the same time range. EBSCOhost queries used similar combinations of adoption, CSA, and market terms. Finally, for Google Scholar, the search string used was intitle: ("adoption" AND "climate smart agriculture" AND "market access"). The asterisks were used to get all possible variations from a keyword, whereas Boolean operators 'OR' as well as 'AND' were used to get the maximum possible studies and further narrow down to only the relevant studies with the keywords, respectively.

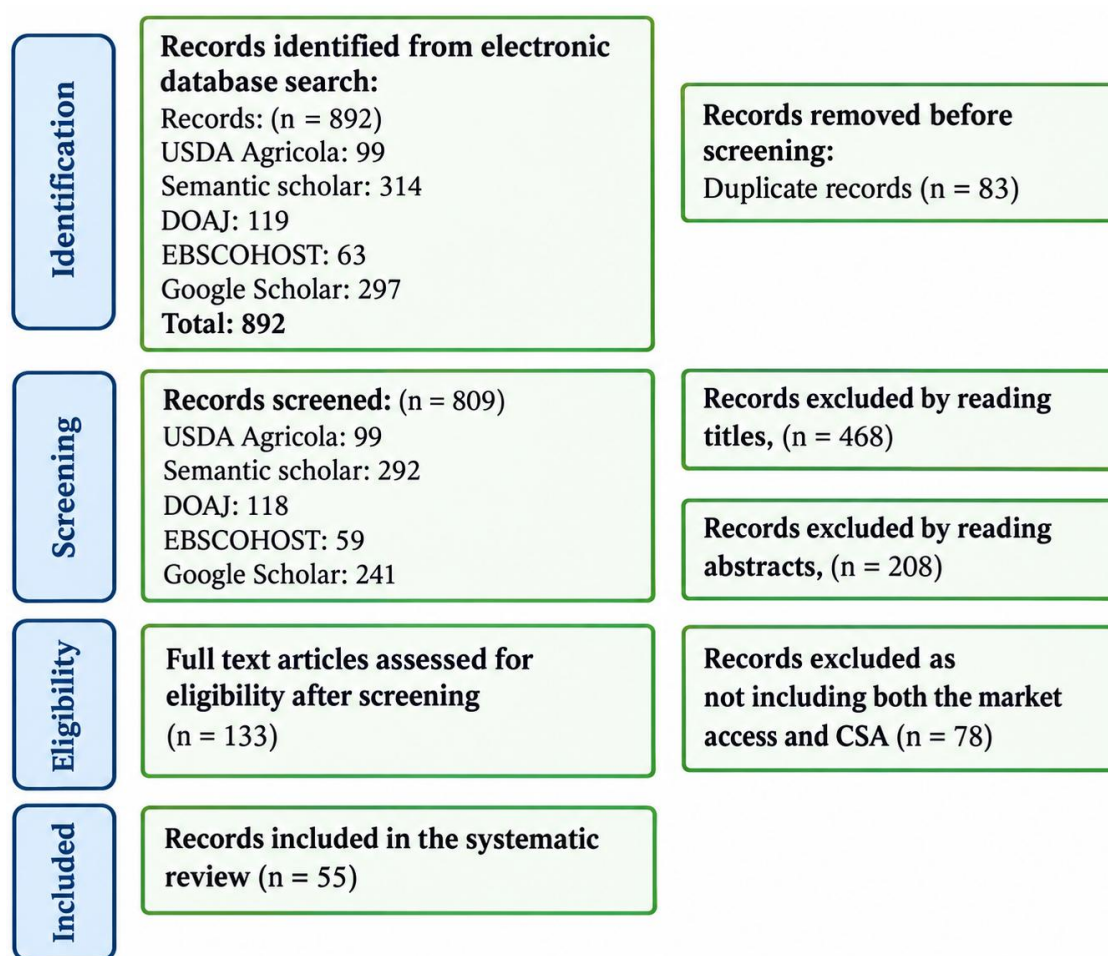


Fig. 1: PRISMA flowchart showing the selection procedures of the studies

The initial search generated a total of 892 records, including 99 from Agricola, 314 from Semantic Scholar, 63 from EBSCOhost, 119 from DOAJ, and 298 records from Google Scholar. After removing duplicates, 809 unique records remained. The articles were then exported into Excel to be screened in different steps. The flow of this process is demonstrated in Figure 1.

First, the titles were screened by checking the criteria of the presence of at least two keywords. Since a few studies were mentioning about market access effect on adoption of CSA, words such as determinants, factors, indicators, drivers, barriers were prioritized as they can have market access or distance to market as a proxy indicator. Moreover, some articles were also kept by

considering their relevance with market demand and value chain systems.

In addition, the review article considered both quantitative and qualitative studies. Among these, (63.8%) employed mixed method, 18.2% used quantitative methods and rest of the studies used qualitative methods. Following these criteria resulted in the exclusion of 468 articles. The second stage of screening of the remaining articles was done based on the abstract of each article. After going through all abstracts, 208 articles were excluded which had lack of information about factors influencing the adoption of CSA and market access. Following that, important information from each article was gathered by assessing the full text of 133 articles. After detailed review, finally 55 articles were kept for final inclusion. These articles were selected for their relevance, methodological rigor, and the depth of information they

provided regarding CSA adoption and market access and for each article the following information was gathered: author names, title, publication year, abstract, where the research was conducted, focus, theme, used statistical model and analytical methods, and significant variables.

Bibliometric analysis

Among the selected 55 articles (Figure 2), the highest number ($n = 14$) of articles were related to Ethiopia, followed by Kenya ($n = 7$), Nigeria ($n = 4$) and Zimbabwe ($n = 4$). Rest of the countries had two articles each and eleven articles were published having locations in Belize, Botswana, Brazil, Mali, Taiwan, Tanzania, Togo and the United States. It is noticeable that the developing countries were more concerned with agricultural development regarding market access and CSA.

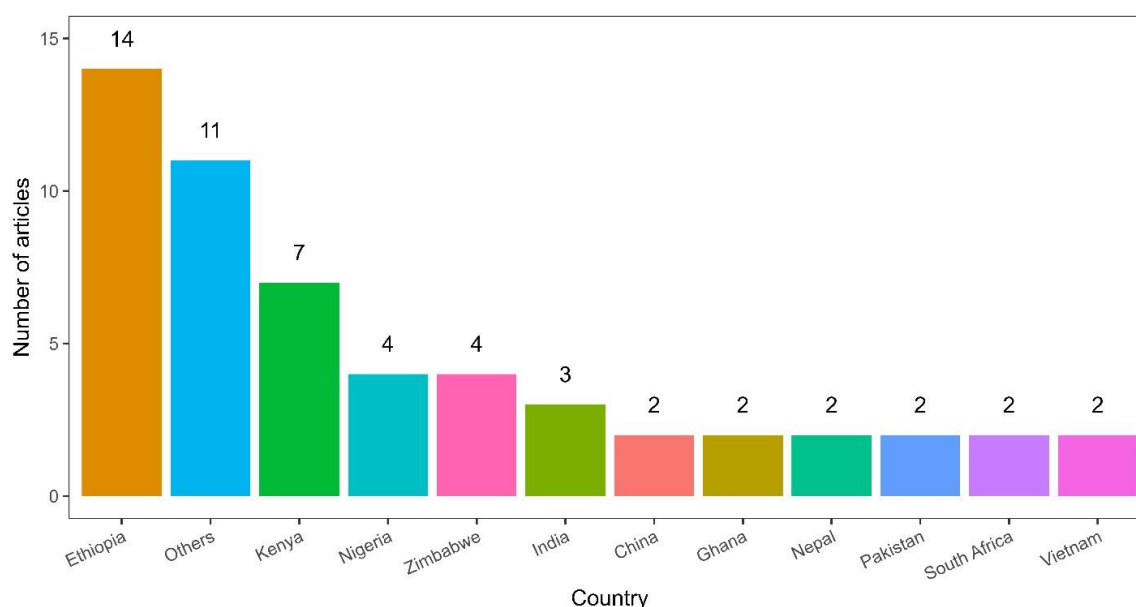


Fig. 2: Country-wise selected articles

We have used five databases to source the articles related to market access and CSA. After eliminating based on the exclusion criteria, 55 articles were selected for review. Among them, equal proportion (32.3%) came from Semantic scholar and Google scholar, while 29% were found in DOAJ and the remaining 6.5% were from EBSCOhost. Primarily we found 99 articles in the USDA Agricola database (Figure 3). However, after screening and removal of duplicate entries in multiple databases, we have not kept any articles of the Agricola because those were also included in other databases.

Research themes

A wide range of focuses to climate-smart agriculture practices and market access were highlighted in the

reviewed articles (around 80%). In particular, the major areas of focus included different CSA practices, their adoption and impact on livelihoods, sustainable crop production and profitability along with exploring the determinants and constraints affecting the level of adoption. Several studies (around 15%) also focused on the influence of market on adoption of different technologies as well as policy for future implication. The remaining studies discussed about the role of institutional support, policy, social networks, and financial mechanisms such as e-credit, climate change adaptation strategies, sustainable agricultural techniques, market dynamics, and supply chain in facilitating CSA adoption.

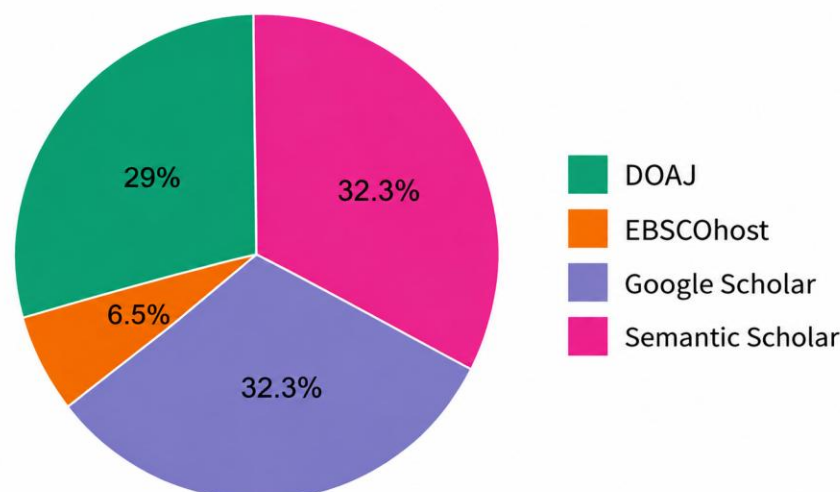


Fig. 3: Distribution of articles by databases

Methodological diversity

Most (69.1%) of the articles had used quantitative, while only 7.3% had employed qualitative research methods (Figure 4). It is good sign that a growing number (16.4) of research works had combined both qualitative and quantitative research methods to generate more demand-driven policy formulation by

combining statistical rigor with contextual insights. Participatory videos and case studies enhanced qualitative insights in research on community-based and institutional approaches. To measure the causal influences, both experimental and quasi-experimental designs were employed, including difference-in-difference techniques.

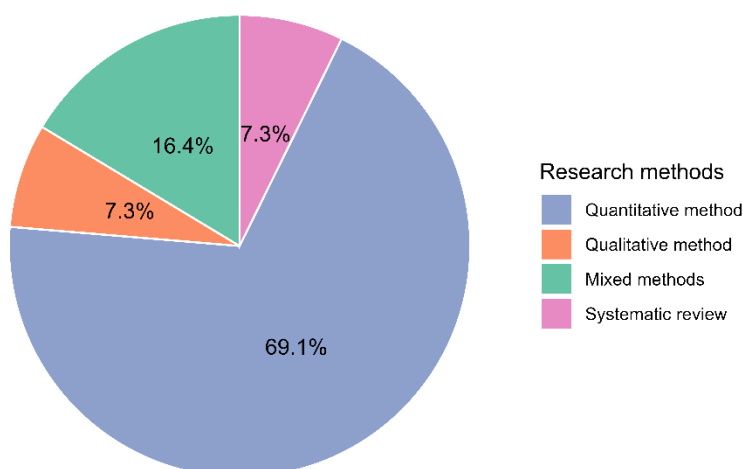


Fig. 4: Distribution of articles by research methods

Variables used

A wide range of the reviewed studies mentioned market access as an indicator along with other institutional, financial, agricultural, and demographic factors. Generally, the included variables covered market access indicators such as market participation,

availability of infrastructure, average distance to markets, supply chain type, sociodemographic factors (household size, age, gender, education, family size), farm characteristics (land size, livestock and asset ownership, labor size), institutional factors (access to training and extension services), and technological elements (agroecosystem type, use of inputs, adoption

of particular CSA technologies, cropping intensity, and cropping practices). Access to climate information, and financial indicators such as access to credit, off-farm income, income levels are examples of additional variables. A few articles also included behavioral and attitudinal factors such as social capital, expertise, and risk perception.

Statistical analysis

A variety of statistical techniques were used in the reviewed paper to analyze the intensity of CSA adoption. Majority of the studies used descriptive statistics to show the frequency and average of independent and dependent variables, followed by inferential models such as binary logistic regression (13%), multinomial logistic regression and multivariate probit model (15%) to identify the key determinants, indicators and barriers. Selection bias was addressed and the effects on income and yields were assessed using endogenous switching regression models (around 7%). Additionally, some studies applied ordered probit (7%) and Poisson regressions, some focused on causal effects, including quasi-experimental designs (2%), agent-based models (2%) and outcomes. While, thematic coding and participative scoring were used in qualitative studies to clarify enablers and barriers, principal component analysis and cluster analysis were applied to analyze adoption trends (about 2%).

Results

Adoption of CSA and factors

The widely adopted CSA techniques are soil and water conservation, manure application, residue cover, fertility management, crop diversification, small-scale irrigation, crop–livestock integration (Feyisa, 2022; Legesse et al., 2024).

Crop yields, gross margins, and benefit-cost ratios have all significantly improved as a result of the acceptance of CSA methods as well as the utilization of agricultural subsidies (Chaulagai, 2025). Subsidies, for instance, have been demonstrated to boost yields by 37%, gross margins by 85%, and benefit-cost ratios by 72%, however, the advantages typically favour larger farmers than resource poor smallholder farmers.

A wide range of socio-economic, socio-demographic, institutional and financial factors can significantly affect the CSA adoption level such as the farmer's age, income, education of household head, labour size, off-farm employment, access to irrigation equipment and reliable water sources, awareness of water conservation practices, such as rainwater harvesting, access to sanitation, and arable land size (Ali, 2021;

Aryal et al., 2018; Bojago and Abrham, 2023; Legesse et al., 2024; Umer et al., 2024; Zeleke et al., 2024).

One particular study showed that adopting CSA practices such as crop insurance increased the household income for cocoa farmers in Ghana (Agbenyo et al., 2022). Moreover, the adoption of CSA has benefitted families by increasing their income and food security (Legesse et al., 2024).

Financial constraints, a lack of technical experts, less availability to high-quality inputs such as, seeds, fertilizer, and equipment, and a lack of awareness among farmers are some of the frequently mentioned barriers to adoption (Dossou-Yovo et al., 2024; Njogu et al., 2024). Adoption rate can be improved by addressing the issues with institutional support and access to extension services (Feyisa, 2022; Legesse et al., 2024)

According to several studies, the adoption of CSAs will vary from farmer to farmer; either the process may be gradual or partial participation occurs when farmers practice specific CSA techniques, such as crop diversification or soil and water conservation. But they may not perform some of the more technical applications, such as small-scale irrigation and advanced fertility management (Ali, 2021; Bojago and Abrham, 2023). Before committing to full-scale implementation, this gradual turn of events gives farmers to evaluate the success of individual practices that helps to mitigate the risk associated new techniques (Chaulagai, 2025).

Policy interventions that combine financial incentives, infrastructure improvements, extension and training services, and inclusive scaling strategies have been identified as vital for widespread and sustained CSA adoption. The adoption of multiple CSA technologies can maximize the benefits than (Aryal et al., 2018; Asante et al., 2024; Gikonyo et al., 2022; Luu, 2020). But these adoption trends are not the same for all households or agroecological zones. Knowledge and skill building is important for pushing the efforts to promote CSA practices. Community-based training, microfinance support, and empowering women can increase the number of adoptions and the volume of those adoptions. But challenges such as, uncertain land ownership, cultural differences, weather risks, and poor market infrastructure still make adoption hard in some places.

Market access and their role in promoting CSA

The conclusions from the articles emphasized the importance of market access to enhance the adoption of Climate-Smart Agriculture techniques and the impact of the CSA practices on improving livelihood. The

proximity to district market significantly affected the adoption of small-scale irrigation techniques, since, households that are nearer to markets centres are more likely to adopt the practice (Bojago and Abrham, 2023; Tadesse and Ahmed, 2023). Along with that, convenient market access can have positive impact on the adoption of CSA techniques as well as increase the need to access to market information (Ali, 2021; Asante et al., 2024; Gikonyo et al., 2022; Kopper and Jayne, 2019; Xie et al., 2024). However, market-related problems are often mentioned, including production support, longer distance to travel to district market, restricted transport facilities (Chaulagai, 2025; Debela et al., 2024; Geda et al., 2024; Legesse et al., 2024; Mango et al., 2018; Mujeyi et al., 2021).

Adoption of CSA is further supported by integration into sustainable supply chains, a key component of market access, which enhances market accessibility and promotes socially and environmentally conscious farming methods (Chaulagai, 2025; Swain et al., 2022; Prosperi et al., 2024). Farmers can earn money if they are better equipped to overcome the challenges to enter the market and learn to have access of digital platforms for supply and marketing of their products. Adoption of CSA is found to have a strong association with access conditions like better transport and storage facilities, condition of the road, proximity to roads, markets and traders, reliable buyers and price information, access to extension and training, and higher farm income with lesser climate exposure (Aryal et al., 2018; Mahmood et al., 2024; Mburu et al., 2024; Mujeyi et al., 2020). The high transaction costs, poor infrastructure and lack of coordination within the supply chain, restrict access to quality inputs and limit the participation of smallholder farmers in profitable output markets, thereby reducing incentives to use profitable technologies like CSA (Kumar and Doan, 2025). Another important mechanism is risk tolerance, which has been found to be a driver of better farmers' risk-taking behavior in turn leading to better market access and increased uptake of climate smart agricultural technology (Kumar and Doan, 2025).

Some other studies focused on market access and related factors influencing the participation in or adoption of any new technology. Farmer's method of linking with markets include (cell phone calls, social media, informal market, farming co-operatives, retail markets, domestics traders-local traders) strongly influence the adoption of sustainable agricultural practices (Agholor et al., 2023). Additionally, the dietary diversity of both men and women can be improved (Kihui and Amuakwa-Mensah, 2021) and households are more responsive to land price changes with better market access (Kopper and Jayne, 2019). However, close personal network can act as a

gatekeeper in having a proper market linkage whereas, farmer groups and other social networks can increase the market opportunity for smallholder farmers (Mwema et al., 2021).

Results of Thematic Analysis

Based on the data, the 55 studies can be categorized into three thematic areas based on their title and abstract, namely market access, CSA, and linkage between market access and CSA. Figure 5 shows the relative occurrence of different thematic phrases found the abstracts of the selected articles. Approximately 18 studies discussed the relationship between market access and Climate-Smart Agriculture. It is therefore important to understand these interactions in order to find ways to increase the adoption of CSA and its smallholder farmer livelihood impacts. The articles included the factors such as understanding of the market accessibility of supply chains, infrastructure, market proximity, and digital marketing platforms on the adoption, intensity, and economic consequences of CSA activities.

Approximately 33 studies investigate the link between Climate-Smart Agriculture and climate change where CSA is analyzed as a strategic response to environmental challenges and climatic variability. These studies focused on the identification and evaluation of CSA practices and the role of CSA in increasing agricultural productivity. The correlation between Climate-Smart Agriculture and climate change is explored by assuming CSA as a potential adaptation technique for climate change and environmental variability. The remaining 4 studies concentrate on linking climate change with market access and explicitly discussed about the significance of market information, supply chain sustainability of the agricultural market.



Research coverage

Research coverage

2024; Perosa et al., 2024; Prosperi et al., 2024). However, despite its importance, taking up CSA remains tricky for many smallholder farmers, in particular those who live in areas short of resources. Farmers often encounter significant barriers. High transportation costs, poor infrastructure, limited access to extension services, and insufficient financial support are the most significant barriers often encountered by the smallholder farmers in rural settings (Njogu et al., 2024).

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The emphasis on gathering data through quantitative methods indicates the importance of primary data, which is crucial for identifying the factors, indicators, barriers affecting the adoption as well as the impacts of CSA practices on livelihood. It allows the researchers to evaluate the patterns in bigger groups and check the hypotheses regarding adoption levels and market access. On the other hand, qualitative and review-based studies revealed the existing knowledge gaps, policy implications and some institutional frameworks.

The adoption of CSA has gained attention due to its promising nature that help a smallholder farmer to adapt and cope in different agroecological regions. However, the current socioeconomic and institutional contexts, such as the difficulties in accessing markets, could limit the diffusion and long-term maintenance of CSA practices. Lack of market knowledge, alternate market access, fixed product price, poor infrastructure, distance to markets, poor transportation and storage systems, and difficulties in providing formal market requirements can impact farmers' share of returns from CSA investments. In some regions, agricultural subsidies, and contract farming with buyers can increase the production rate, but market saturation often reduces the price if the market demand is not considered. The best CSA practices are identified by evaluating their productivity, resilience and reduced greenhouse gas emissions, as well as by evaluating in different agro-ecological regions. The constraint affects resource-poor and subsistence farmers with more transaction costs and increased risk for perishable products.

Identified research gaps

From the synthesis, it is now evident that existing research has mostly focused on determining the challenging factors, potentials and the level of adoption related to CSA. While market access is a crucial determinant, there is a lack of empirical research on the conditional marginal effect of market access on CSA adoption and climate change. Moreover, coastal regions such as Bangladesh are highly vulnerable to climate change and natural disasters, with a growing population dependent on agriculture. Fundamental research is needed to design, particularly in coastal areas, on how the market indicators are driving the adoption of CSA practices among smallholder farmers. The research can provide valuable insights to close the knowledge gap and help to formulate effective policy interventions.

Policy synthesis

In order to promote greater market access and higher adoption of CSA, especially in fragile areas, it may be

prudent to prioritize several policy recommendations. Governments and non-government agencies should focus on building the transport network, obtaining market access, and building storage facilities. Reducing the transaction costs farmers face in moving their goods to markets will make it easier for more uptake CSA practices and improve their productivity (Feyisa, 2022). Expansion of training programs is essential if farmers are to acquire the knowledge and expertise needed to implement CSA practices properly. This will help them to adopt sustainable farming methods, and make special arrangements to follow market trends (Ali, 2021; Lamichhane et al., 2022).

Strengthening market information systems through digital platforms, mobile apps, and local co-operatives, farmers can obtain real-time data on market prices, demand trends, and consumer preferences. This means farmers can make more timely and better-informed decisions about which sorts of crops to grow when they are going to sell them (Perosa et al., 2024). In addition, as a complementary step, policymakers should allow microfinance options for them in the form of subsidies and interest-free loans that could make it easier for them to take on those initial costs associated with implementing CSA technologies, especially for the resource-poor farmers (Chaulagai, 2025). Inclusive policy frameworks for small farmers, female-headed households and other disadvantaged groups can ensure that CSA will become something they can adopt to keep pace with the changing climate (Feyisa, 2022; Aryal et al., 2018).

Conclusion

This systematic review discusses the adoption of CSA practices and the influence of market access with highlighting the distance to markets and infrastructure quality. CSA and other technologies can be significantly affected by market access, by either facilitating adoption or improving farmers' access to inputs, information, and output markets.

The evidence shows that transition from technology oriented to integrated market-oriented promotion of adoption of CSA is required. Policy makers, development actors, and agricultural service providers should take market access into account when developing the roadmap for CSA through strengthening market information systems, and facilitating inclusive value-chain participation. There is a need for location specific establishment of financial institutions, capacity building, and government programs to create easy-to-access credit and incentive packages to overcome investment challenges of resource-poor smallholder

farmers. The smallholder farmers can be empowered by adopting CSA technologies as it ensures effective adaptation to climate change and achieve sustainable livelihoods.

However, significant research gaps remain, particularly on the individual effect of market access on CSA adoption and climate change adaptation in vulnerable coastal regions such as Bangladesh. Future research needs to go beyond the use of market access as a stand-alone variable, and explore the interplay between various elements of market access (market connectivity, information access, infrastructure, value-chain integration), and their impact on adoption decisions. This review recommends integrated approaches by combining infrastructure, financial and policy incentives, capacity building, with market access variables that can fit well in specific agroecological and socioeconomic contexts.

Disclosure of interest

The authors declare that there are no relevant financial or non-financial competing interests to report.

Contribution

Methodology: Mahmuda Khanom; Writing original draft preparation: Mahmuda Khanom; Writing review and editing: Mahmuda Khanom, Md Kamrul Hasan, Md Ektear Uddin, Md Mamun-ur Rashid; Resources & Supervision: Md Kamrul Hasan

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