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Large-scale agricultural investments and contract farming in Tanzania: A systematic review on the livelihoods, food security and ecological implications

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ABSTRACT

In the past decade, contract farming has re-emerged due to the increased opposition to large-scale land acquisitions in many developing countries. During this era, contract farming has been promoted as an inclusive alternative to land grabbing that could help farmers retain their land, and an inclusive business model could help link smallholder farmers to the markets, helping alleviate poverty and promote rural development. Guided by the PRISMA protocols, this article reviews the implications of large-scale agricultural investments (LSAIs) and contract farming on Tanzania's rural livelihoods, food security, and the environment. The study found little evidence of LSAIs and contract farming's contribution to improving rural livelihoods and food security. LSAIs and contract farming exacerbate the 'dispossession from below' by accelerating land transfer from poor to rich farmers, suggesting that the schemes do not largely benefit the poor. The schemes have increased pressure on land between outsiders and indigenous farmers and declined the land size used to produce food crops, affecting local food security. The excessive use of synthetic inputs, clearing forests for LSAIs, and contract farming lead to ecological degradation. The study highlights the importance of ensuring LSAIs and contract farming schemes are more sustainable, inclusive and responsible investments.

1. Introduction

In recent decades, countries in the Global South have experienced a surge of land-based agricultural investments following the global crises, particularly the food, energy, financial, and climate change [1–4]. Under different narratives, including 'marginal, empty, and available lands' as perceived globally [5] or 'unused and underutilized land' [4] and 'idle or virgin land' [6,7] as perceived by political elites in some African countries, capitals have been increasingly capturing land for agriculture and other forms of land-based investments including energy resource extraction [8]. The process of divorcing farmers from their means of production (land) for capitalist investment is facilitated by the states, both peacefully and violently [9,10]. This is one of the critical features of Marx's 'Primitive Accumulation' [11] or 'Accumulation by Dispossession' as reconstructed and updated by David Harvey [12,13].

Land-based agricultural investments have, in many cases, received significant opposition from the local communities due to appropriation and exclusion from their land [14]. As a result, efforts have been made to ensure that agricultural investments are carried out more inclusively and responsibly, considering the local communities' land rights, livelihoods, food security, and the environment [15]. This has led to the re-emergence of contract farming or out-grower schemes in many parts of developing countries as an inclusive alternative to land grabbing [9,16,17], a narrative that has been critiqued by critical agrarian scholars and scholar-activists [18]. This institutional arrangement allows local farmers to produce and sell their produce to firms based on the pre-arranged agreement, and it has been widely used as a solution to local opposition [19,20].

Furthermore, the re-emergence of contract farming in lower and middle-income countries can be understood as a government's efforts to reduce poverty and promote rural development by linking smallholders to the market [21,22]. This view has also been supported by different international development agencies such as the World Bank and FAO, donors, and agribusiness as a 'win-win' rural development strategy for smallholders and agricultural corporations [15,21,23–25]. The 2008 World Bank World Development Report serves as a 'bring back'

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instrument of contract farming and LSAIs at the centre of international development discourse [21]. As a result, some developing countries such as India, Ghana and Tanzania have changed their land investments and agricultural policies to allow the operation of contract farming schemes and LSAIs [26].

Nevertheless, there is controversy about whether or not contract farming schemes significantly positively impact poverty alleviation and rural development [27,28]. Some literature highlights that contract farming contributes positively to rural poverty alleviation and development [25,29]. This is a view of "new institutional economics (NIE) approaches that conceptualize contract farming as an institutional solution to the 'market failures'" [21] pp.05. Others argue that contract farming is simply a mechanism of capital expansion and penetration into the countryside [30]. From an optimistic point of view, if well-arranged and implemented, contract farming has a wide potential to address issues related to market failure, increase productivity, facilitate technology transfer, and improve smallholder farmers' welfare [31]. If well restricted and controlled, contract farming can be a capital expansion mechanism while raising workers' and farmers' wages and welfare. Marx documents this phenomenon in capitalism as occurring in the English mills in the 1840s and 1850s [13]. The peculiarity of contract farming is that it allows the local smallholder farmers to maintain the ownership rights to their land [2] while engaging in a production relationship with the corporate investors who are the primary buyers of their produce. Furthermore, contract farming gives the local smallholder farmers the autonomy to choose whether or not to engage in the contract arrangements with the investors [32]. Some other studies suggest that the contribution of contract farming in rural poverty alleviation should not be generalized as the results can always be justified in single case studies [33,34]. Others argue that evidence of the benefits of contract farming in local peoples' livelihoods is still weak [35].

Tanzania was one of the African countries that were highly targeted during the post-2008 global land rush due to its strategic location, availability of arable land, and country's policies to attract foreign direct agricultural investments [36]. As in many developing countries, large-scale agricultural investments (LSAIs) in Tanzania received political acceptance as a strategy to transform agriculture through a private sector development model. In Tanzania, agriculture is still a cornerstone of the national economy and the sector employs about two-thirds of the country's population [37–40]. Most people rely on small-scale subsistence agriculture for food and income [39]. It is, therefore, stated that to reduce poverty and promote rural development, transforming smallholder agriculture into a modernized and commercialized way is paramount. In line with this, the government of Tanzania introduced the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) as a strategy to transform agriculture into a modern, commercial, highly productive, and profitable sector [41–43]. As an ambitious public-private agricultural commercialization partnership launched in 2010, SAGCOT uses contract farming to modernize and commercialize smallholder agriculture by promoting win-win rural economic and social transformation [44]. Through SAGCOT, large-scale foreign investors are invited to invest in the region under public-private partnerships (PPPs) [45]. Smallholder farmers should benefit through direct employment, and spillover effects should be achieved through contract farming schemes. SAGCOT is the continuation of the *Kilimo Kwanza* (Agriculture First) initiative, launched in 2009 by the then President of Tanzania, Jakaya Mrisho Kikwete [41,46].

Against this background, this paper reviews the implications of LSAIs and contract farming on rural livelihoods, food security and the environment. Contract farming arrangements are considered to bring the so-called 'inclusive development model' [47] by facilitating smallholders' access to market and agricultural technologies through spillover effects and, hence, promoting rural development. The paper aims to address three key questions as follows.

i. What are the implications of LSAIs and contract farming on the rural livelihoods in Tanzania?
ii. What are the implications of LSAIs and contract farming on local food security in rural Tanzania?
iii. How do LSAIs and contract farming impact the environment in Tanzania?

The paper contributes to the current debate on the impacts of LSAIs and contract farming on rural settings. It should be noted that LSAIs and contract farming have been highly promoted as proper development models for developing countries since the late 2000s. Many developing countries like Tanzania have embraced LSAIs and contract farming to improve smallholders' agriculture, promote rural development, reduce poverty and enhance rural food security. Different strategies, such as the *Kilimo Kwanza* (Agriculture First), the SAGCOT, and Big Results Now (BRN) were initiated to promote the private sector's involvement in the agricultural sector. Reviewing the current progress regarding its implications for rural livelihoods, food security, and the environment is crucial in informing the government, policymakers, and other development stakeholders.

The remainder of this paper is organized as follows: The subsequent section presents the background of the study detailing the historical dynamics of LSAIs and contract farming in Tanzania. Section 3 presents the study's methodology, detailing how the PRISMA was used to obtain the review literature. Section 4 presents the descriptive results of the reviewed literature based on year of publication, journal distribution, crop under contract, the region/s in which the study was carried out, research method, and themes on the nexus between LSAIs, contract farming, and rural welfare, food security and the environment. Section 5 discusses the nexus between LSAIs, contract farming and rural livelihoods, food security, and the environment. Section 6 presents the conclusion and policy implications.

2. Background

Large-scale agro-investments (LSAIs) and contract farming are not new practices in sub-Saharan Africa and Tanzania. Studies show that LSAIs and contract farming have existed since the colonial era [14,48]. In Tanzania, the early years of the twentieth century marked the beginning of LSAIs following the intrusion of colonialists. As Germany took over the control of Tanzania (the then Tanganyika), the introduction of plantations was necessary for the colonialists to obtain agricultural raw materials to feed their industries in Europe. However, the peasant farming system was not abandoned. In most cases, peasant farmers were integrated either as out-grower farmers or in areas where the capitalist farming system was impractical due to the nature of landscapes. The common crops produced during that time were coffee, tea, sisal, cotton, and rubber, to mention a few [49].

Germany's administration did not last long. Following the defeat of Germany during WWI, Tanganyika was handed over to the British as an overseas territory. In agriculture, the British intended to directly or indirectly make the natives producers or assist them in producing crops other than food crops. In this case, large-scale agricultural investments and peasant farming were highly encouraged and interlinked with high attention paid to the production of cash crops [50].

During the period of early independence times, LSAIs were mainly carried out by the state. By then, many state-led agricultural investments and agricultural schemes had flooded the country following the adoption of socialism. In sugarcane, for example, the government of Tanzania established estates and the Kilombero Sugar Company Limited (KSC) in the Kilombero River basin in the early 1960s [51]. The government also established the out-growers scheme to stimulate the social and economic development of the adjacent local communities [44]. Out-grower schemes were also influenced by the limited land resources allocated to the company's estate farming. It is also stated that KSC supported the out-grower farmers throughout the production process, from land preparation to harvest. KSC operated from 1962 to 1998 and, after that, was privatized [44]. After privatization, contractual terms evolved from that of company-individual farmers (which were basically oral contracts) to company-out-growers association contracts (legally written contracts) [51]. The company's role was to supply agricultural inputs, credit, extension services, and harvest assistance to the outgrowers [52].

In the tea sub-sector, the smallholder farmers were officially allowed to grow tea after independence with the government's help. Before that, the colonialists only produced tea on large-scale farms, and there was no room for smallholder production [50]. The state ownership of the major means of production aimed at increasing government revenues. In many investments, particularly in the tea industry, smallholder farmers were integrated through outgrower schemes [53]. The state further contracted the industry to the private sector; thus, the sugar industry, despite nationalization, was "publicly owned, but privately managed" [53].

The state-led land-based agricultural investments fell in the 1980s following the country's economic crisis. Economic liberalization forced a country to privatize many of its state-led estates, and thus, plantations and out-grower schemes had to be entirely managed by the private sector. Some of the notable out-grower schemes include sugar, tea, and rice out-grower schemes [54]. Nevertheless, LSAIs re-emerged in Tanzania in the post-2006 period following the global crisis [54]. This surging goes along with the introduction of new contract farming schemes or the strengthening of pre-existing ones. Furthermore, establishing the SAGCOT in 2010 has rapidly accelerated the introduction of contract farming schemes, particularly in the SAGCOT region [55]. Through SAGCOT, the government of Tanzania intends to modernize agriculture by giving the private sector a leading role [43]. Smallholder farmers are mainly expected to benefit from contract farming through access to extension services, inputs, technology, and market opportunities from large-scale agribusiness companies [49].

3. Methodology

3.1. Review protocol

The review protocol for this study was developed using PRISMA (the Preferred Reporting Items for Systematic Review and Meta-Analysis). PRISMA was used to map literature on the nexus between LSAIs, contract farming schemes and rural livelihoods in Tanzania. To effectively answer the research question, a literature search was done to identify relevant papers published between 2010 and 2024 through the Web of Science, Science Direct, Scopus and Google Scholar. Peer-reviewed articles addressing the central research question, i.e., the nexus between LSAIs, contract farming schemes and rural livelihoods in Tanzania, were considered for the review.

3.2. Search strategy

The identification of appropriate literature for review begins with setting the research objectives based on the literature gaps. The important keywords were identified after identifying the critical question to help access the relevant articles. The keywords identified include "large-scale agricultural investments (LSAIs)", "foreign direct investments (FDIs) in agriculture", "large-scale land acquisitions", "contract farming", "out-growers schemes", "rural livelihoods", "rural welfare," "poverty reduction", "food security", and "Tanzania". These keywords were utilized to create search strings based on searches conducted through search engines. Subsequently, relevant articles were identified through various search engines, such as Google Scholar, ScienceDirect, and Web of Science. Articles were chosen based on their relevance, taking into account their titles, abstracts, and whole papers.

3.3. Inclusion and exclusion criteria

Several selection criteria were set to ensure an effective review process (Table 1). First, the search process focused on peer-reviewed articles published on the topic under study. Other documents, such as books, theses, working papers, and reports, were excluded. Second, the researchers paid attention to the articles published in English. Other articles published in languages other than English were excluded. Third, articles published from 2010 to 2024 were included in the review, excluding those published before 2010.

3.4. Quality assessment

The initial search using selection criteria and search strategy yielded 790 results. After excluding other documents other than peer-reviewed articles, we ended up with 349. The next step was to exclude articles published before 2010, which resulted in 160 articles. After that, we read titles and abstracts to ensure that the information presented in the articles reflects the central research question. In this phase, we excluded 26 duplicates, 82 non-related articles, and six papers without full access, and we remained with 46 articles. The final step was reading the full article, where the researcher selected 25 articles that met all the

Table 1
Inclusion and exclusion criteria.

Criteria	The decision to select an article	Rationale
Type of Literature	Peer-reviewed journal articles and book chapters. Non-peer-reviewed articles, theses, working papers, and reports were excluded.	Original peer-reviewed articles usually provide more empirical evidence. Book chapters included in this study also provide solid empirical evidence necessary to answer the research question.
Language	English	Most academic articles are published in English, and the authors are fluent in English.
Publication date	2010 to 2024	Since the late 2000s, contract farming has been highly promoted in developing countries like Tanzania due to internal and external pressure. Besides, the country's post-2009 agricultural commercialization agenda uses contract farming as a strategic agenda to achieve smallholders' agricultural commercialization.
Geographical location	Tanzania	The review focused on the case of Tanzania, one of the countries highly targeted for LSAIs in the post-2008 global land rush. The country's policy to attract foreign investors to invest in LSAIs and contract farming was also a reason for focus.
Research methods	Both qualitative and quantitative	Studying LSAIs and contract farming involves both qualitative and quantitative methods. Reviewing literature employing both methods is crucial in obtaining rich and detailed information on the implications of LSAIs and contract farming for livelihoods, food security, and the environment.
Relevance to the research question	Reviewed literature should be relevant to the research question	Only literature that addresses the central research question was selected. Those that do not focus on all or either of the implications of LSAIs and contract farming were excluded.

selection criteria. The authors also included three book chapters that reflected the research question. The chosen book chapters were evaluated based on the methodological rigor and presentation of the results that reflected the nexus between contract farming and rural livelihoods, food security, and the environment. All three book chapters were extracted from a book on contract farming in Tanzania published as a result of a few years of extensive fieldwork on contract farming and the development of smallholder agricultural businesses in Tanzania [56]. Fig. 1 below shows the step-by-step application of the PRISMA protocol in selecting the review literature.

4. Descriptive results

This section describes the descriptive results of the reviewed literature based on year of publication, journal distribution, crop under contract, the region/s in which the study was carried out, research method, and themes on the nexus between LSAIs, contract farming, and rural welfare, food security and the environment.

4.1. Distribution of the reviewed literature based on the years of publication

It was important to analyze the reviewed literature based on the years of publication. The descriptive results show that although the review targeted literature published from 2010 to 2024, there was no peer-reviewed article or book chapter on LSAIs and contract farming from 2010 to 2014. Nevertheless, there was a significant rise in publication from 2015 to 2017, with 2017 recording the highest results (6 literature). 2018, 2019, and 2022 recorded four results each, while 2023 recorded three results, and 2020, 2021, and 2024 recorded one result each (see Fig. 2).

4.2. Distribution of the reviewed literature based on journals

Table 2 shows the distribution of the reviewed articles based on the journals. Most reviewed articles were published in international peer-reviewed journals with a high reputation. Out of 28 reviewed literature, 3 were book chapters. Three chapters of the book were reviewed from a single book focused on contract farming and smallholders in Tanzania. The analysis also shows that four journals (Food Security, Journal of Agrarian Change, Journal of Eastern African Studies, and Journal of Southern African Studies) had two publications each, and the rest had one publication. Therefore, 25 reviewed articles were published in 21 different journals across various fields of study, such as food policy, development studies, ecology, etc. This result implies that LSAIs and contract farming are relevant to different academic fields and policymakers.

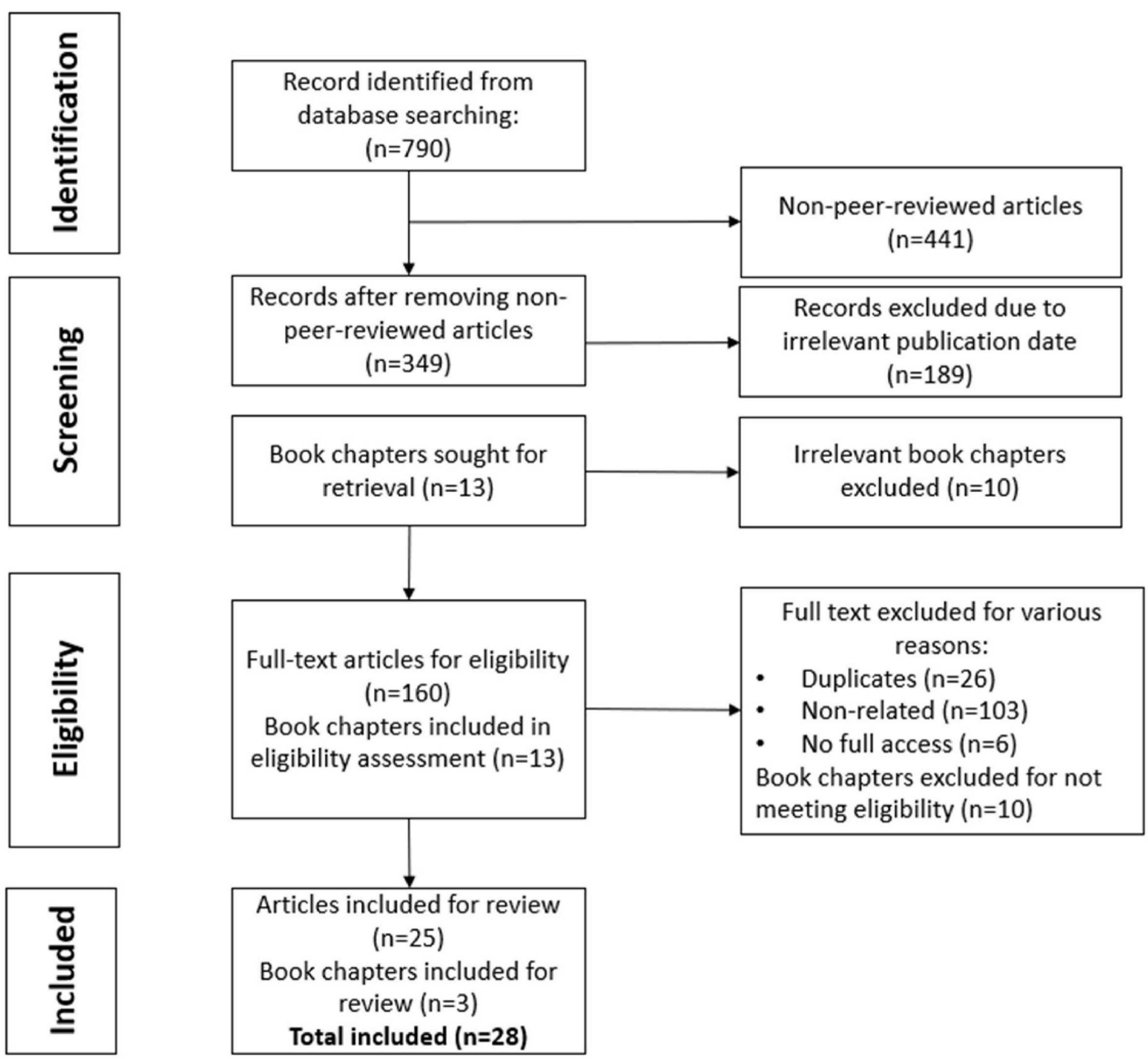

Fig. 1. Literature search process using PRISMA Protocols.

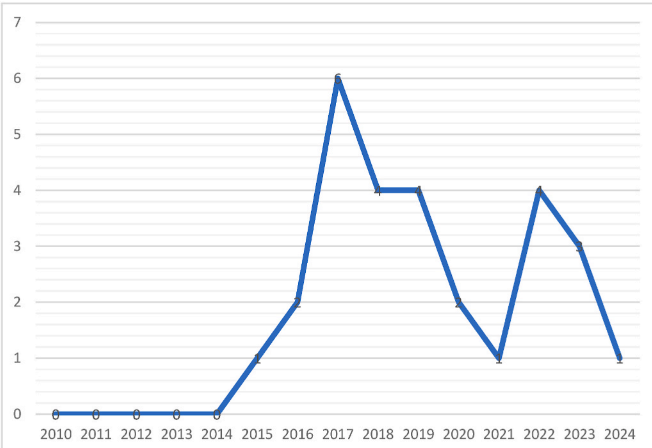

Fig. 2. Distribution of the reviewed literature based on the years of publication.

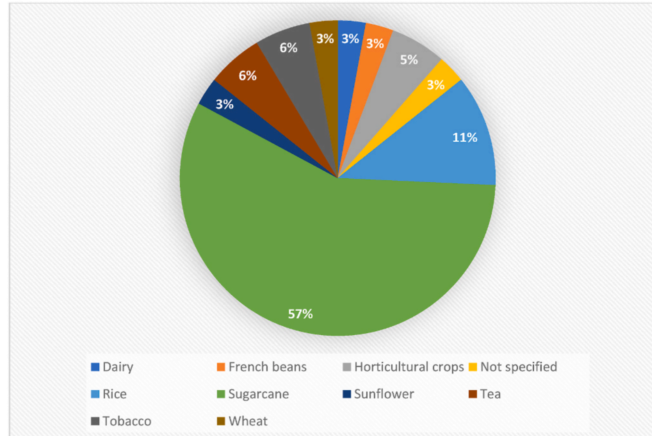

Fig. 3. Distribution of the sampled literature based on crops under contract.

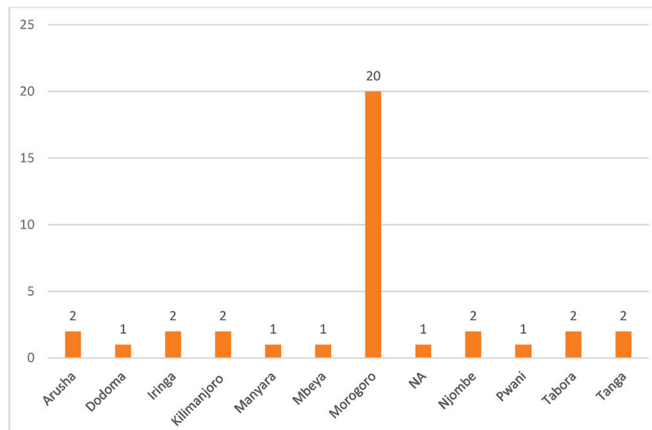

Fig. 4. Distribution of the sampled literature per region.

Table 2
Distribution of the reviewed articles per journal.

Journal/book	Frequency	Percentage
African Journal of Accounting and Social Science Studies	1	3.57
Agrarian South: Journal of Political Economy	1	3.57
Agrekon	1	3.57
Asian Journal of Agricultural Extension, Economics & Sociology	1	3.57
Contract farming and the development of smallholder agricultural business: Book Chapters	3	10.71
East African Journal of Management and Business Studies	1	3.57
East African Journal of Social and Applied Sciences	1	3.57
Environmental Research Letter	1	3.57
Food Security	2	7.14
Global Social Welfare	1	3.57
Globalizations	1	3.57
Journal of Agrarian Change	2	7.14
Journal of Co-Operative and Business Studies	1	3.57
Journal of Eastern African Studies	2	7.14
Journal of Rural Studies	1	3.57
Journal of Southern African Studies	2	7.14
Land Use Policy	1	3.57
Review of African Political Economy	1	3.57
The Journal of Korean Society International Agriculture	1	3.57
Third World Thematics: A TWQ Journal	1	3.57
World Development	1	3.57
World Development Perspectives	1	3.57

4.3. Crops under contract

The presentation of crops under contract farming is shown in Fig. 3. Surprisingly, sugarcane represents 20 studies (57 percent) either carried out in sugarcane or sugarcane with other crops, particularly rice. Contract farming of rice was the second-ranked, with four studies (11 percent) being carried out to examine it. Tea, tobacco, and horticultural crops appeared in two studies each (6 percent), while the rest appeared in only one study each. One study did not specify a crop under contract since the analysis was based on the 2012–13 nationally representative National Panel Survey (NPS 2012–13) collected by the National Bureau of Statistics (NBS) [57].

4.4. Distribution of studies per region

The mapping of the regions where the studies were carried out in the present study is presented in Fig. 4. It should be noted that some studies were carried out across regions researching single or multiple crops [55, 58–60]. In this case, the total frequencies reflected in Fig. 4 are not equivalent to the total number of literature reviewed for this study. The reviewed studies appeared to be carried out in 11 regions of Mainland Tanzania. Out of 11 regions, most studies appeared to be carried out in the Morogoro region, one of the strategic areas for SAGCOT implementation. Two sampled pieces of literature appeared in each region: Arusha, Iringa, Kilimanjaro, Njombe, Tabora, and Tanga. The rest of the regions were each the source of only one article in the sample. Additionally, one sample article did not show a specific region where the study was carried out since the study used the 2012–13 nationally representative National Panel Survey (NPS 2012–13) collected by the National Bureau of Statistics (NBS) [57].

4.5. Research methods employed

Fig. 5 presents the research methods used in the reviewed literature. The researchers examined the content of the reviewed articles in detail to discover the methods applied. Three categories of methods were found: qualitative, quantitative, and mixed. It was observed that most of the reviewed literature (50 percent) employed a qualitative research approach, while 39 percent of the reviewed literature employed a quantitative approach. The remaining 11 percent of the reviewed literature employed mixed methods.

4.6. Themes in LSAIs, contract farming, and rural welfare

Three main themes guiding this study included the nexus between LSAIs and contract farming with rural livelihoods, food security, and the

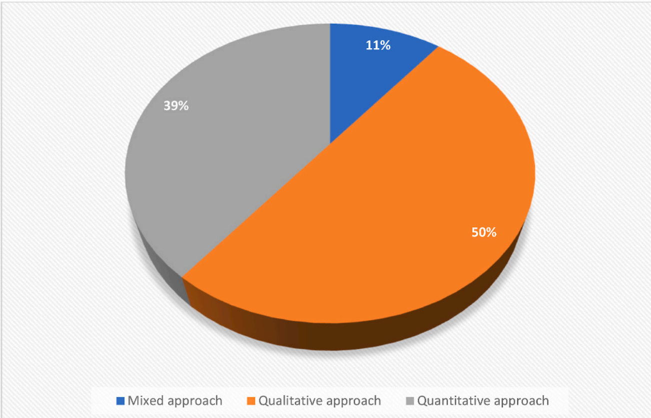

Fig. 5. Representation of the research approach.

environment (Table 3). Out of the 28 reviewed studies, 7 (25 percent) highlighted that LSAIs and contract farming positively impact rural livelihoods, while 10 (35.7 percent) highlighted that LSAIs and contract farming negatively impact rural livelihoods. Besides, 11 studies (39.3 percent) reported mixed findings suggesting that LSAIs and contract farming negatively and positively impact rural livelihoods. For instance, most studies that reported mixed findings highlight that contract farming benefits the most affluent farmers while deteriorating the livelihoods of the poor farmers. LSAIs and contract farming are, therefore, regarded to have little impact on poverty reduction and catalyze social differentiation and labor exploitation [14,54,58,59,61].

Regarding food security, none of the reviewed literature indicated that LSAIs positively impact rural food security. 8 (28.6 percent) out of 28 reviewed literature highlighted that LSAIs and contract farming negatively impact rural food security due to limited land for producing food crops [14,54,57,58,60–62] and that the income obtained from contract farming is not sufficient to cover household food deficit [63]. One study (3.6 percent) presented a mixed finding that LSAIs and contract farming positively and negatively impact rural food security [55]. The rest of the studies did not report anything related to food security.

The last theme reviewed in this study was related to the implications of LSAIs and contract farming on the environment. It was observed that only 6 out of the 28 reviewed highlighted the ecological implications of LSAIs and contract farming. These studies were carried out in two main sub-sectors, namely sugarcane [14,61,62,64] and tobacco subsectors [65,66].

Table 3
LSAIs, contract farming, and rural implications.

Variable	Impact	Frequency	Percentage
LSAIs, contract farming, and rural livelihood improvement	Positive impact	7	25.0
	Negative impact	10	35.7
	Mixed Impact	11	39.3
	NA	0	0
LSAIs, contract farming, and food security	Positive findings	0	0
	Negative findings	8	28.6
	Mixed findings	1	3.6
	NA	19	67.8
LSAIs, contract farming, and the environment	Negative	6	21.4
	Positive	0	0
	Mixed	0	0
	NA	22	78.6
Total		**28**	**100**

5. Discussion

5.1. LSAIs, contract farming, and rural livelihood improvement

The findings from this study show that there are still competing narratives on whether or not LSAIs and contract farming have potentially positive impacts on local peoples' livelihoods [60,67]. The discussion always centers on one side, the government, industry, donors and international development agencies, with the other group of so-called 'social activists' or 'academic activists'. The former focuses on the developmental gains associated with contract farming schemes as contract farming is branded as a 'win-win' business model that equally benefits smallholder farmers and agribusiness firms, while the latter builds its arguments on the political economy perspective of such engagement, seeing contract farming "as another means for global agribusiness to exploit peasants and labour" [25] pp.05. For the investors, different discourses, including that of 'empowerment', 'partnership', and 'social responsibility', is widely used to legalize and operationalize contract farming [53]. For governments and international development agencies such as the World Bank and FAO, different narratives, including "helping the poor" or "putting peasants first," are widely used to legitimize and operationalize contract farming in the developing world [68]. Contract farming is therefore branded as a mechanism to improve farmers' access to inputs, credit, technology, and market, and ultimately improve smallholders' farm productivity, increase incomes, and promote rural development [69].

Based on the reviewed literature, LSAIs and contract farming schemes reportedly play positive and negative roles in transforming rural livelihoods [34,70]. This study's findings show that 25 % of the reviewed literature highlights that LSAIs and contract farming positively contribute to rural livelihoods in Tanzania. Sugarcane production is one of the aspects of contract farming that has been highly researched in Tanzania concerning its implications for rural livelihoods, and studies report mixed findings. For instance, in Kilombero Valley, one of the critical SAGCOT zones, the smallholder farmers get employed in the sub-sector and generate incomes enough to sustain their lives [54,55]. While some surrounding local farmers are employed by the company as wage labourers, others are incorporated as out-growers producing sugarcane in their plots of land and selling it to the sugarcane processing companies [33]. Kilombero Sugar Company Limited, for example, has employed more than 8000 outgrowers, the majority of them being small-scale outgrowers [52]. West and Haug assert that "despite its low profitability, sugarcane offers an important income security, and, to some extent, helps households to mitigate climatic and market uncertainty related to cultivating food crops" pp. 680. Outgrowers prefer to engage more in sugarcane production as it requires low labor as compared to other kinds of crops like rice, which is also one of the crops grown under contract farming in Tanzania, particularly in Kilombero Valley [33]. Low labor requirement in sugarcane helps to increase income mainly for labor-constrained or single-headed households, sick or the elderly with limited resources to hire labor for rice production, which is more labor-intensive and more vulnerable to drought and floods compared to sugarcane [47].

Some studies highlight that LSAIs and contract farming increase agricultural productivity and income, enabling some smallholder farmers to diversify their incomes by combining crop production with wage labor and petty trade [34,44]. A study in the Arusha region investigated the contribution of contract farming to youth's livelihoods and revealed that contract farming leads to a gain of 17 percent, 34 percent and 37.5 percent in the yield, crop income and household income, respectively [34]. Contract farming gains could be considered opportunity costs for not participating in contract farming. The reviewed literature also indicates that LSAIs and contract farming schemes in Tanzania are also reported to play a significant role in supporting local charitable initiatives in the health and education sector by raising buildings and giving other necessary support [44]. These social infrastructures are constructed as part of the project's corporate social responsibility (CSR) for the local communities by 'giving back' to the community some of the benefits generated from the investments [55,65,66,71].

On the contrary, LSAIs and contract farming schemes have also been reported to impact rural livelihoods in Tanzania's rural areas negatively. Eleven studies (35.7 percent) of 28 support that LSAIs and contract farming negatively impact rural livelihood. While the political intentions for establishing these schemes are to improve agriculture and lift rural people out of poverty, it is reported that many incorporated smallholder farmers' livelihoods are deteriorated as instead of getting rich, they get poorer and poorer, suggesting that contract farming does not guarantee livelihoods or better lives [45]. Instead of empowering smallholder farmers, contract farming serves as a tool for disempowering them [72]. A study of a tea outgrowing scheme in the Iringa region found the scheme to have a negative but insignificant impact on small-scale farmers' income and livelihoods. The negligible impact showed that both members and non-members have relatively no change in income due to the scheme [73]. Due to labor intensiveness, engaging in tea outgrowing schemes makes farmers spend much time in tea production while neglecting other income-generating activities. Low income from tea makes farmers vulnerable to poverty and livelihood insecurity [45].

Another negative consequence of LSAIs and contract farming in Tanzania is that of spearheading the dispossession of land [33,54,62,64] or as others call it 'dispossession from below' or intimate land grabbing [74]. In most contract farming schemes, particularly in sugarcane outgrowing schemes, 'big growers' have captured the most lucrative opportunity, dispossessing land from the poor farmers who cannot invest in tea outgrowing schemes due to structural or institutional challenges [54]. As a result, poor farmers are either squeezed out of the sugar frontiers or hired as cheap labor in both firm's or big growers' farms [44]. Competition between small growers and big growers makes small growers game losers. The situation also makes contract farming contribute little to poverty alleviation and catalyze social differentiation and labor exploitation [59]. Land dispossession in contract farming schemes has also been reported elsewhere in developing countries, highlighting that the schemes accelerate land concentration for affluent groups [18,75–77]. Land dispossession from below creates a group of land-rich farmers who mainly benefit from contract farming by accumulating more wealth than landless farmers [33].

While contract farming schemes enable smallholder farmers to access agricultural inputs, extension services, and harvest assistance from investors on credit [52] due to smallholder farmers' limited access to those resources [46], some studies raise questions on whether these services favor smallholder farmers. In the Kilombero Plantation Limited (KPL) rice contract farming, for example, "farmers complained that the production loan arrangements with KPL are exploitative and risky when crops fail due to unforeseen flooding, as was widely reported to have occurred in 2014. Farmers also indicated that they found the SRI [System of Rice Intensification] methods to be too 'expensive' in relation to the low price offered in the market for the early maturing, short, semi-aromatic variety (SARO5) that KPL had promoted, relative to the tall and aromatic 'Supa' varieties that farmers traditionally broadcast in their fields" [47] pp.680. These exploitative and unfavorable arrangements made some rice farmers terminate their contracts. Some studies also report that contract farming limits smallholder farmers from engaging in other livelihood opportunities, particularly off-farm activities that could help farmers earn more income. Contracted farmers must work strictly on contracted farms, hence losing other livelihood opportunities such as livestock keeping or petty businesses [78].

To summarize this section, the livelihood outcomes of LSAIs and contract farming are contested and cannot be generalized. As reported in this study, most studies (35.7 %) highlight that LSAIs and contract farming schemes do not positively contribute to rural livelihood improvements, while only 25 % highlight that LSAIs and contract farming positively impact rural livelihood improvement. The remaining 39.3 % of the literature highlights both positive and negative impacts of LSAIs and contract farming on rural livelihood improvement. On the one hand, contract farming can contribute to improved farmers' income for some crops or specific contexts, but it cannot produce the same results in another context or other specific crop. Besides, while contract farming can benefit some specific groups of farmers, particularly rich farmers, it can also deteriorate the livelihoods of poor farmers who surrender their land and labor to rich farmers [79]. This situation exacerbates social and economic inequality within the rural context.

5.2. LSAIs, contract farming and households' food security

The second theme examined in this study was the nexus between LSAIs, contract farming, and food security. The descriptive results based on the sampled literature show mixed findings on the contribution of LSAIs and contract farming to food security, with many studies highlighting that LSAIs and contract farming schemes negatively contribute to food security. On the positive side, contract farming schemes in Tanzania are believed to enhance households' food security by increasing productivity and purchasing power due to increased incomes from contract farming. In most cases, out-growers grow food crops and the contracted cash crops for subsistence and local markets [55]. The situation contradicts some other areas where contract farming schemes are used. Some studies report that while the emphasis is put on the production of export cash crops, farmers neglect the production of food crops, which results in the rise of local food demand. This is very common in areas where contract farming schemes involve non-food crops like sugarcane, coffee, and grapes, to mention a few. Food security may not threaten the outgrowers or those working in the agro-industry, but the poorest of the poor have no chance of working in the agro-industry or working as outgrowers. As warned by Isager et al. [44], contract farming schemes extend monoculture out of estates, and as monoculture gradually takes over land use, prevent local food crop production and push resource-poor households into "commuter farming" if not outright dispossession and migration.

The study by Sullivan et al. [33] shows that positive spillovers of large-scale agricultural investments in terms of contract farming and technological spillovers translate into increased farm productivity. However, the increased productivity does not translate into household income and food security. Increased food expenditure is a notable issue for contracted households [60]. Another study in a sugarcane out-growers scheme in Tanzania shows that "income from sugarcane cultivation does not improve food security among smallholder sugarcane out-growers in the study area. Similarly, household food insecurity was at 18.3 % prevalence among sugarcane out-growers, while 20.43 % of the entire sugarcane out-growers experienced severe food insecurity" [63] pp.263. Besides, food insecurity in some areas with LSAIs and contract farming happens due to the exclusion of some households into the schemes, the lack of land ownership, exclusion from employment opportunities, and limited income-generating activities, with women bearing more adverse effects [80]. In combination with other factors such as climate change, LSAIs and contract farming exacerbate the existing and create new vulnerabilities to food and livelihoods in the surrounding local communities [81]. Besides, in some cases, the rigidity of the contracts prevents households from growing other crops to improve their food security and from engaging in different livelihood strategies (off-farm activities) to diversify their income [78]. All these incidents affect households' food security and income.

Generally, a large portion of the literature suggests that LSAIs and contract farming do not positively influence rural households' food security. Since, in most cases, contract farming involves the production of non-staple food crops, the decline in land size for food crop production combined with unstable or low prices of contracted crops make farmers vulnerable to food insecurity [14,54,58,61]. Food insecurity claims in contract farming schemes are also a case in many developing countries where smallholder farmers either face food insecurity or are threatened to fall under the trap of food insecurity due to their decision to participate in contract farming or the introduction of contract farming schemes in their surroundings [82]. Overemphasis on export-oriented cash crops makes farmers neglect or reduce the production of food crops, resulting in the rise of household food demand. In the vanilla CF scheme in the northeastern SAVA region of Madagascar, households engaging in CF are reported to be highly food insecure compared to households not engaging in vanilla CF [83]. Local and household food insecurity also grows as contract farmers fail to divide labor provision between the production of contracted cash crops and staple food crops [82]. This is simply because most contracted farmers rely on family labor, and their ability to rely on hired labor is limited due to poverty. The limited income from CF is insufficient to pay for the hired laborers [45].

5.3. LSAIs, contract farming and the environment

The last theme explored in this study was the nexus between LSAIs, contract farming, and the environment. The study found that contract farming schemes have their own ecological implications. Political ecology is a useful framework for analyzing this human-environment relationship in agriculture in general and out-grower schemes in particular since it combines both aspects of cultural ecology and political economy. Political ecology highlights that understanding human-environment linkages at local, regional, and global levels requires looking at how resource use patterns relate to political-economic dynamics. Political ecology in agrarian studies aims to comprehend how state policy, regional trading blocs, transnational capital investment, market penetration, and the social relations of production—that is, patterns of control over labor, land, and surplus—affect agriculture and environmental change [84].

The political ecology perspective is relevant in understanding the impacts of LSAIs and contract farming on rural welfare since capital penetration into agriculture and the countryside links people and the environment. The intensive use of agrochemicals in contract farming schemes and the often inadequately and misunderstood explained problem of 'pesticide misuse' negatively affect the ecosystem. In Tanzania, the widespread application of synthetic inputs by outgrowers exerts higher concentrations of ammonia in the soil resulting in undesired effects, particularly that of retarding the natural fertility of the soil [61]. Degradation of the available resources, estrangement from the local ecosystem (even if the land is retained), and, ultimately, the unsustainability of the overall agrarian setting are possible outcomes [85]. The expansion of capitalist farming into the countryside in Tanzania has severe negative ecological implications [14,62].

For sugarcane, one of the most debated out-growers schemes in Tanzania, many ecological implications are associated with it. Martiniello [61] describes some of the associated ecological implications, stating that sugarcane production greatly facilitates climate change due to the sugar industry's high water and energy-intensive character. Besides, sugar production requires huge amounts of water for irrigation and sucrose extraction. In Kilombero Valley, intensive sugar production has resulted in the fall of water level in the Great Ruaha River from which the company draws its water, jeopardizing local peoples' agricultural livelihoods. In addition to that, "the sugar agro-industry generates air pollution, mainly from pre-harvest burning and effluent from sugar mills, which have elevated levels of carbon monoxide and ozone in the atmosphere. Burning itself has been found to be a major cause of the decline in the soil's microbial activity and the deterioration of its physical and chemical properties, which in part explain persistent low sucrose content in outgrowers' cane" [61] pp.13.

One of the most recent studies on sugarcane outgrowing schemes in Tanzania and Uganda highlights that:

Large-scale sugarcane schemes are premised upon widespread deforestation. Establishing these commercialization initiatives requires enclosing the space, homogenizing production, and standardizing monocropping, generating a huge loss of biodiversity. Though at different scales, deforestation is also driven by outgrowers [contract farmers] themselves, who, under a set of simultaneous pressures, dedicate rising portions of their land endowments towards sugarcane cultivation, clearing the space from undesired species of trees [64]. pp.16.

In the tobacco sub-sector, environmental concerns have been widely reported in Tanzania. Tobacco production on a large-scale and through contract farming has been associated with the depletion of soil quality [66]. Furthermore, tobacco production is associated with pervasive deforestation as a large land size is cleared for tobacco production. In addition, the demand for fuelwood to cure tobacco accelerates the clearing of forests, impacting the natural ecosystems [65]. Tobacco production and consumption have also been associated with some adverse health risks [71]. Nevertheless, tobacco production companies have introduced strategies such as 'good agricultural practices' that require farmers to adhere to some production standards in response to environmental concerns. For instance, the contracts specify that each contracted farmer must grow at least 50 trees for each bag of fertilizer supplied on credit, representing 500 trees per hectare of flue-cured tobacco. Furthermore, the curing farmers must use only wood from planted forests or supplied by the government to preserve the native forest [65] pp.222. The company also has to 'give back to society' in terms of corporate social responsibility [65,66]. Nevertheless, in most cases, social and environmental profiles on paper do not materialize in reality.

To summarize this section, the ecological implications of LSAIs and contract farming are multi-faced. LSAIs and contract farming mainly rely on conventional agricultural practices that reinforce the excessive use of synthetic inputs such as chemical fertilizers and herbicides, negatively impacting the ecosystem's health. Clearing forests for large-scale agricultural investments also negatively affects the local ecosystem, resulting in the loss of plants. Conversely, contract farming extends monoculture beyond the plantation boundaries, losing forest and plant species preserved in the rural communities. Despite the efforts to combat the environmental concerns of LSAIs and contract farming, these negative impacts are still increasing day after day and have adverse effects on the present and future generations.

6. The implications of the study

The present study has both theoretical, practical, and policy implications for understanding LSAIs and contract farming in Tanzania and more broadly. The findings of this study contradict the dominant narrative that LSAIs and contract farming are among the powerful tools to empower the rural poor and enhance smallholders' food security, as the arrangements bring less positive outcomes. The economic gains of contract farming are reported to be concentrated in the hands of a few affluent classes, marginalizing the poor. This widens the existing social inequality and promotes social and economic differentiation. Facilitation of 'dispossession from below' is another concern related to contract farming. In most cases, rich farmers capture the land from poor farmers to establish outgrowers' farms while leaving the Indigenous farmers landless or having limited land. This situation will have more adverse effects on future generations as the land is increasingly concentrated in a few groups of the rich. The findings can, therefore, help policymakers rethink contract farming to ensure that it benefits poor people while assisting them to retain their land.

7. Conclusion

This paper has described the interrelationship between transnational capital penetration into the countryside through LSAIs and contract farming and the well-being of local communities, food security, and the environment. The study systematically reviewed 28 literature on LSAIs and contract farming in Tanzania to achieve the stated objective.

Tanzania was selected since it is one of the African countries that were highly targeted for LSAIs due to its strategic geographical location, availability of abundant fertile land, and country's policies aimed at attracting private sector participation in agriculture. The study found that 39.3 % of the reviewed literature presented mixed results on the implications of LSAIs and contract farming on rural livelihoods. In comparison, 35.7 % and 25 % highlighted the negative and positive implications of LSAIs and contract farming on rural livelihoods.

Although LSAIs and contract farming schemes help to improve rural livelihoods by creating employment opportunities, increasing farm productivity, and improving farmers' incomes, some reported potential downsides remain. As it has been reported in the case of the Kilombero sugarcane out-growers scheme in Morogoro region Tanzania and other areas in Tanzania where contract farming schemes operate, some large-scale outgrowers have rapidly captured the most lucrative business opportunities and the land they require, marginalizing smaller out-growers [54]. Besides, resource-rich farmers benefit more from contract farming than resource-poor households since they are highly market-oriented [59]. The findings suggest that LSAIs and contract farming widen the existing social inequality and accelerate the poor farmers' land dispossession by the rich farmers. This dispossession may have no observable negative impact on the present generation, but the generation to come, with more focus on children and women would be the ones to suffer the consequences.

Food insecurity has been reported to be one of the dominant cases in LSAIs and contract farming schemes in Tanzania. None of the reviewed literature highlighted the positive impacts of LSAIs and contract farming on food security. One article highlighted the mixed results of LSAIs and contract farming, which positively and negatively impact food security. In contrast, eight articles highlighted the negative impacts of LSAIs and contract farming on rural food security. The study found that in most cases, contract farming schemes involve non-food crops. The land for growing food crops is directed to growing contracted cash crops, sometimes giving farmers limited income to supplement the food deficit. Contracted farmers are also obligated to work on contracted crops with limited chances to grow other crops or engage in off-farm-related activities. The situation affects the participating households' food security since farmers earn low from contract farming.

The study also revealed that contract farming schemes are not exceptional regarding environmental costs. The intensive use of synthetic inputs like chemical fertilizers and pesticides is one of the key features of conventional farming systems accelerated through contract farming. Besides, clearing forests by the contracted farmers to establish new farms highly impacts the local ecosystem. The study highlights the importance of defending local communities' rights to better livelihoods, food security, and the environment to ensure that the LSAIs and contract farming schemes benefit the local people without compromising the needs of the present and future generations. The important focus should also be paid to the indigenous community's land rights as the schemes accelerate both outright land dispossession and dispossession from below.

CRediT authorship contribution statement

Gabriel Kanuti Ndimbo: Writing – original draft, Methodology, Conceptualization. **Evaristo Haulle:** Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix I. List of the reviewed literature

SN	Author(s)	Year	Title	Journal	Crops under contract	The region/s in the study was carried out	Research method	Results		
								CF and rural welfare	CF and food security	CF and ecology
1	Chongela	2015	Economic Analysis of Outgrowers' Sugarcane and Paddy Production Scheme at Ruembe Sugarcane Basin in Kilosa District, Morogoro, Tanzania: A Comparative Approach	Asian Journal of Agricultural Extension, Economics & Sociology	Sugarcane and rice	Morogoro	Quantitative	Mixed findings	NA	NA
2	Martiniello	2016	'Don't stop the mill': South African capital and agrarian change in Tanzania.	Third World Thematics: A TWQ Journal	Sugarcane	Morogoro	Qualitative	Negative	Negative	Negative
2	Isager et al.	2016	The Post-Privatization Role of Out-growers' Associations in Rural Capital Accumulation: Contract Farming of Sugar Cane in Kilombero, Tanzania	Journal of Agrarian Change	Sugarcane	Morogoro	Qualitative	Mixed	NA	NA
4	Herrmann	2017	Large-Scale Agricultural Investments and Smallholder Welfare: A Comparison of Wage Labor and Outgrower Channels in Tanzania	World Development	Sugarcane	Morogoro	Mixed Methods	Mixed findings	NA	NA
5	Sulle, E	2017	Social Differentiation and the Politics of Land: Sugar Cane Outgrowing in Kilombero, Tanzania	Journal of Southern African Studies	Sugarcane	Morogoro	Qualitative	Mixed	Negative	NA
6	West & Haug	2017	The vulnerability and resilience of smallholder inclusive agricultural investments in Tanzania	Journal of Eastern African Studies	Sugarcane and rice	Morogoro	Qualitative	Mixed findings	NA	Negative
7	Larsen & Gillett	2017	Embedding the tobacco value chain in social and	Book Chapter	Tobacco	Tabora	Qualitative	Positive	NA	Negative

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SN	Author(s)	Year	Title	Journal	Crops under contract	The region/s in the study was carried out	Research method	Results		
								CF and rural welfare	CF and food security	CF and ecology
			environmental concerns: contract farming							
8	Nsindagi et al.	2017	Income diversification of small-scale sugarcane contract farmers in Kilombero and Turiani, Tanzania	Book Chapter	Sugarcane	Morogoro	Quantitative	Positive	NA	NA
9	Kuzilwa & Mpeta	2017	Does contract farming empower smallholder agricultural producers? Lessons from sunflower contract farming in Tanzania	Book Chapter	Sunflower	Dodoma	Quantitative	Negative	NA	NA
10	Martiniello	2018	Contract farming in Uganda and Tanzania: inclusive development or adverse incorporation?	Review of African Political Economy	Sugarcane	Morogoro	Qualitative	Negative	Negative	Negative
11	Brüntrup et al.	2018	Nucleus-outgrower schemes as an alternative to traditional smallholder agriculture in Tanzania– strengths, weaknesses and policy requirements	Food Security	Rice, sugarcane, and tea	Iringa, Mbeya, Morogoro, Njombe & Pwani	Qualitative	Mixed findings	Mixed findings	NA
12	Gramzow et al.	2018	Linking smallholder vegetable producers to markets-A comparison of a vegetable producer group and a contract-farming arrangement in the Lushoto District of Tanzania	Journal of Rural Studies	Vegetables	Tanga	Qualitative	Positive	NA	NA
13	Herrmann et al.	2018	Food value chain linkages and household food security in Tanzania	Food Security	NA	NA	Quantitative	Positive	Negative	NA
14	Martiniello and Azambuja	2019	Contracting Sugarcane Farming in Global Agricultural Value Chains in Eastern Africa: Debates, Dynamics, and Struggles	Agrarian South: Journal of Political Economy	Sugarcane	Morogoro	Qualitative	Negative	Negative	Negative
15	Machimu & Kayunze	2019	Impact of Sugarcane Contract Farming Arrangements on Smallholder Farmers' Livelihood Outcomes in Kilombero Valley, Tanzania	East African Journal of Social and Applied Sciences	Sugarcane	Morogoro	Quantitative	Negative	NA	NA
16	Akyoo et al.	2019	Socio-Economic Determinants of Household Participation in Out-growers Scheme and Investor Farm- Employment in Kilombero Valley, Tanzania	African Journal of Accounting and Social Science Studies	Sugarcane	Morogoro	Mixed approach	Positive	NA	NA
17	Osabuohien et al.	2019	Female labor outcomes and large-scale agricultural land investments: Macro-micro evidence from Tanzania	Land Use Policy	Sugarcane and rice	Morogoro	Quantitative	Mixed findings	NA	NA
18	Sulle, E	2020	Bureaucrats, investors and smallholders: contesting land rights and agro-commercialization in the Southern agricultural growth corridor of Tanzania	Journal of Eastern African Studies	Sugarcane and dairy	Morogoro and Njombe	Qualitative	Mixed findings	Negative	NA
19	De Blasis	2020	Global horticultural value chains, labour and poverty in Tanzania	World Development Perspectives	Horticultural crops	Arusha, Kilimanjoro & Tanga	Qualitative	Negative	NA	NA
20	Isager et al.	2021	Land and contract farming: Changes in the distribution and meanings of land in Kilombero, Tanzania	Journal of Agrarian Change	Sugarcane	Morogoro	Qualitative	Mixed findings	NA	NA
21	Marwa & Manda	2022	Do youth farmers benefit from participating in contract farming? Evidence from French beans youth farmers in Arusha, Tanzania	Agrekon	French beans	Arusha	Quantitative	Positive	NA	NA
22	Kimaro & Lee	2022	Assessing the Impact of Outgrower Scheme on Smallholder Farmers' Income in Tanzania: The Case of	The Journal of Korean Society International Agriculture	Tea	Iringa	Quantitative	Negative	NA	NA

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SN	Author(s)	Year	Title	Journal	Crops under contract	The region/s in the study was carried out	Research method	Results		
								CF and rural welfare	CF and food security	CF and ecology
			Small-scale Tea Producers in Mufindi District							
23	Makoye et al.	2022	Tobacco Farming and the Reconfiguration of Co-operatives in Tanzania	Journal of Southern African Studies	Tobacco	Tabora	Qualitative	Mixed findings	NA	Negative
24	Sullivan et al.	2022	Impacts of large-scale land acquisitions on smallholder agriculture and livelihoods in Tanzania	Environmental Research Letter	Sugarcane and Wheat	Morogoro, Kilimanjaro & Manyara	Quantitative	Negative	Negative	NA
25	Nsindagi	2023	Does Contract Farming in Cash Crops Guarantee Food Security Among Smallholder Sugarcane (*Saccharum officinarum* L.) Out-Growers? An Instrumental Variable Approach	Global Social Welfare	Sugarcane	Morogoro	Quantitative	Negative	Negative	NA
26	Koshuma et al.	2023	Socio-Economic Determinants of Smallholder Sugarcane Farmers' Participation in Contract Farming through Agricultural Marketing Co-Operative Societies in Kilombero Valley, Tanzania	Journal of Co-operative and Business Studies	Sugarcane	Morogoro	Mixed	Positive	NA	NA
27	Mwakibete & Sesabo	2023	Wage Employment in Sugarcane Outgrower Schemes in Kilombero Tanzania: A Gender Perspective	East African Journal of Management and Business Studies	Sugarcane	Morogoro	Quantitative	Mixed findings	NA	NA
28	Martiniello	2024	The politics of the anti-politics machine of agricultural commercialization: Uganda and Tanzania in the Longue Durée	Globalizations	Sugarcane	Morogoro	Qualitative	Negative	NA	NA

Data availability

No data was used for the research described in the article.

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