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Review

The Environmental and Socio-Economic Effect of Farmland Management Right Transfer in China: A Systematic Review

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Abstract: Small and fragmented arable land is a key challenge for small-scale agricultural countries, resulting in low labor productivity, ecological damage, and inefficient land use. To cope with this challenge, the farmland transfer (FLT) policy is implemented to establish modern agriculture based on specialization and scale enlargement. Despite the rising body of literature, an overview of the effect of this policy is lacked. This paper aimed to examine the multi-dimensional effects of FLT in China. A systematic search of the Web of Science and Scopus databases revealed 26 full-text peer-reviewed articles. We found that FLT had both positive and negative effects, and its effects were mainly mediated by intermediary factors. Non-contingent FLT and post-FLT actions were responsible for the adverse effects of FLT. In the literature, the influence of FLT on the environment is the most concerning issue. The results also show that the existing evidence on the effect of FLT is insufficient; therefore, this paper proposes to further exploration of the multi-dimensional effects of FLT, institutional feedback, and trade-offs. While FLT offers the potential to address socio-economic and environmental challenges, this study suggests that an institutional framework that takes into account spatial and temporal aspects, land-use, market systems, and household conditions is needed to promote favorable development, and mitigate potential land market problems and ensure sustainable development. Despite significant limitations remain, the literature on the socio-economic and environmental effects of FLT is increasing.

Keywords: farmland transfer; farmland management right; environmental effects; socio-economic effects; systematic review

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1. Introduction

In the era of climate change coupled with a growing population and evolving demands, rivalry for the world land resource is rising. It is anticipated that the world population is projected to increase from 7.6 billion to 9.8 billion by 2050, placing additional pressure on the available land resources (UN, 2017) [1]. Land is a scarce resource and debate is ongoing on how to use this valuable resource by meeting growing demand and dwindling supply (Font et al., 2017; Scoones et al., 2019) [2,3]. As an asset, land has a property and production function (Moroni, 2018) [4]. The intricate correlation between these two functions influences the agricultural system and agrarian society (Gao et al., 2021) [5]. At present, due to the need to improve agricultural productivity by stabilizing the security of farmers' land tenure, the land policy of small agricultural countries is altering the production function of land into property function, resulting in the scale effect (Bambio and Bouayad, 2018; Li et al., 2021) [6,7]. Agriculture dominated by fragmented and scattered plots restrains farmers from scale operation, hinders the scale efficiency and intensive operation of land, and impedes fostering agricultural development (Wang et al., 2020) [8]. To withdraw from this challenge, land assembly through farmland transfer (hereafter FLT) is considered a key to realizing an agricultural scale economy, thereby improving agricultural land-use efficiency.

However, as FLT is not a stand alone issue and goes beyond land administration systems and agricultural production, it is critical to systematically overview the multidimensional effect of FLT from the various perspectives.

From the perspective of land resources, the market-based agricultural development paradigm in China faces three main obstacles: land degradation (Zhang et al., 2006) [9], land fragmentation (Liu et al., 2022) [10], and land loss (Liu et al., 2010) [11]. The accumulation of scattered, fragmented, and small plots of land are mainly due to the implementation of a household contract responsibility system, in response to distracting people communes, for the sake of distributing the land to tillers based on egalitarian principle, leading to low crop production, land degradation, economic cost and environmental damage (Chen and Brown, 2001) [12]. Recently, the amalgamation of scattered and fragmented land through FLT is regarded as a key policy for revitalizing the countryside, ensuring food security, and even driving the development of the national economy (Li et al., 2021; Zhou et al., 2020) [13,14]. FLT is the behavior of farmers to transfer (transfer-out) their farmland plots contracted by themselves to other farmers (transfer-in) in the form of lease or subcontract. In the thirteenth five-year plan (2016–2020), the government pays special to the transfer of farmland to improve agricultural labor productivity, thereby increasing household income. To transform small-scale agriculture into market-oriented, moderate-scale, and modern agriculture, the amount of FLT increased from 12.45 million hectares in 2010 to 37 million hectares in 2021, increased by three folds (NPLCD, 2005–2020). However, evidence of the comprehensive outcomes of FLT policy is scarce.

FLT is affected by various factors. For instance urban wage level and off-farm employment opportunities determine the rate of FLT (Peng et al., 2020) [15]. At the rural area level, household labor availability and proportion of total income from agricultural sources have a positive effect on FLT-in while low economic development and insufficient availability of transportation network hinder the rapid expansion of FLT-in (Jiang et al., 2020) [16]. Moreover, agricultural total investment in fixed assets, the non-agricultural population, per capita GDP and proportion of tertiary industry in GDP had significant effects on the scale of land transfer (Zhang et al., 2022) [17].

FLT study in China has three dimensions: (1) Studies on factors affecting such as early-life famine experience (Deng et al., 2019) [18], rural-urban migration (Xu et al., 2020) [19]. (2) Studies on the implementation stage of FLT including FLT-period and stability of lease period and (3) Studies on the effect induced by FLT itself which is the central focus of out study. Recently, the potential impacts of FLT have received increasing attention. For instance, FLT can liberate farmers for off-farm employment opportunities (Liu et al., 2017) [20]; enhance agricultural land use efficiency through operating scale economy (Fei et al., 2021) [21]; increase peasant income (Udimal et al., 2020) [22]; reduce the rate of land fragmentation (Zhang and Chen, 2021) [23], thereby enabling farmers to operate large scale farms (Zhou et al., 2021) [24]; induce the application of advanced agricultural input such as agricultural machinery (Liu et al., 2019 [25]; prevent idling and abandonment of land (Jiayi et al., 2022) [26]; enable farmers to adopt cost-effective production system(Li et al., 2021) [27]. Moreover, FLT encourages farmers to practice pro-environmentally agricultural production systems such as reducing chemical fertilizer application (Wu et al., 2021) [28], and adopting soil and water conservation measures (Jia and Lu, 2020) [29].

Conversely, researchers attempted to detect the adverse consequences of FLT. For instance, the current practice of transferring farmland to large-scale farm operators ignores poor farmers and exacerbates the intensity of rural poverty (Huo and Chen, 2021) [30]. Furthermore, the current form of FLT is mainly driven by the state-agricultural-business cooperative alliance, rather than the rural-based FLT market system, which often excludes the establishment of specialized smallholder farmers (Rogers et al., 2021) [31]. They also revealed that the unofficial transfer of farmland is hindering the achievement of moderate-scale operations. FLT leads to a decline in agricultural labor, resulting in a substitution effect because large-scale farmers apply more chemical fertilizers to replace the opportunity cost of transferred labor to increase production profits and cause environmental pollution

(Lu and Xie, 2018) [32]. Similarly, Wu et al. (2021) [28] found that the agricultural scale operation established by FLT tends to reduce the amount of fertilizer used for food crops while increasing for cash crops which causes ecological damage. The transfer of non-adjacent plots further exacerbates the fragmentation of the land, hinders the economies of scale in agriculture, and leads to the high cost of using organic fertilizers (Li and Shen, 2021) [33]. Moreover, Leng et al. (2021) [34] reported that the transfer of farmland inhibits food-crop production, thereby affecting food security. The transfer of cultivated land is directly related to the life of agricultural laborers who rent out their farmlands and migrate to cities and towns for non-agricultural employment, but the unfair and exclusive employment system disregard the life of the migrant agricultural labor in the city, resulting in chronic poverty and instability (Su et al., 2018) [35]. The negative outcomes of FLT are mainly associated with unclear ownership rights, random FLT regardless of the status quo, lack of a strong information system, and the rising transaction cost of farmland. Although the debate continues, an overview of the multidimensional effects of FLT is still lacking.

This study focuses on the most relevant and popular land-tenure policy in China and other small-scale agricultural countries, namely the FLT policy. Preferred reporting items for systematic reviews and meta-analyses (hereafter PRISMA) framework was employed. PRISMA offers valuable advantages such as a well-defined research question, allows the systematic review to be defined, unequivocally formulate the inclusion and exclusion criteria of literature, and offers for the assessment of immense pertinent scientific research over a specific period (Higgins et al., 2019) [36]. This study used PRIMA to identify potential studies, design coding schemes, and extract dependent variables affected by FLT. The variables were grouped into seven topical categories: agricultural systems, environment, rural revitalization, urbanization, rural household income, agricultural labor, and agricultural land.

Whilst existing reviews bring literature to examine the influencing factors, market mechanisms, and practical applications of FLT (Ou and Gong, 2022) [37], based on a literature survey, this is the first systematic study examining the potential effects of FLT on those seven domains. We aim to address the following questions: In the scientific literature focusing on agricultural land-use policies, what are the socio-economic and environmental indicators affected by FLT? How are these indicators affected by FLT? This study provides policy-makers with the knowledge to consider the multidimensional effects of FLT policy to ensure sustainable agricultural development. Furthermore, this study will identify the strengths and gaps in our understanding of FLT effects which will support future research.

Conceptualizing Farmland Transfer in China

To protect the interest of farmers in their land and build a harmonious relationship between farmland stakeholders such as farmers, the government, and land operators, the Chinese government formulated and implemented the "Three Rights System" (Yan et al., 2021) [38]. As shown in Figure 1, the three constituents of farmland rights are ownership right (belongs to collectives, immovable and non-tradable), contract right (belongs to farmers and cannot be traded), and management or use right (belongs to farmers and can be traded). Among these three rights, only the management rights can be transferable, that is, farmland transfer. Farmland transfer (FLT) refers to the behavior of farmers to transfer (transfer-out) their contracted farmland plots to other farmers (transfer-in) in the form of subcontracting, leasing, swapping, exchanging, investing in shares, and other approaches according to the land laws and regulations. Farmlands are transferred mainly to mobilizing smallholder farmers to moderate-scale operations, thereby increasing household income. However, it is prohibited to convert the land use of transferred land to other non-farm activities. This shows that farmers who have transferred-in arable land only have the right to use it without changing the original land use.

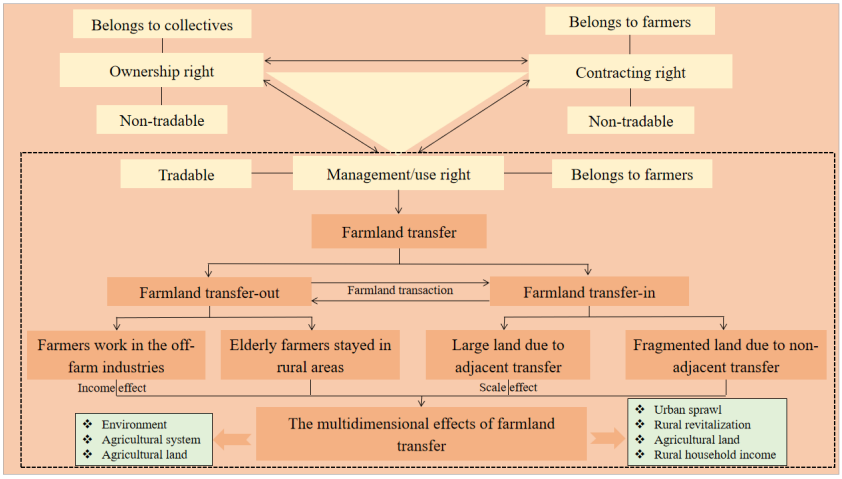


Figure 1. Conceptual framework of the systematic literature review.

The contracting right of FLT-out farmer, protected by land title certificates, build trust and confidence between the two parties, thus providing long-term stability in FLT transactions. With the consent of the government, the land is transferred from agriculture to non-agricultural sectors such as secondary and tertiary industries mainly due to industrialization and urbanization. However, our review focuses on FLT, where rural households rent farmland to or from other households.

2. Materials and Methods

This paper adopts a systematic review approach to examine the multi-dimensional effects of FLT in China and provides directions for policymakers and future studies. A systematic review is an approach to deliberately selecting relevant studies, and extracting and synthesizing findings to answer well-designed questions (Jahan et al., 2016) [39]. Systematic review produces a full range of research knowledge than is possible from single research and provides future research focuses. This section provides a brief and succinct introduction to the methodology used in the systematic review. Based on Abu et al. (2019) [40], we conducted the review by implementing the following six basic steps shown in Figure 2.

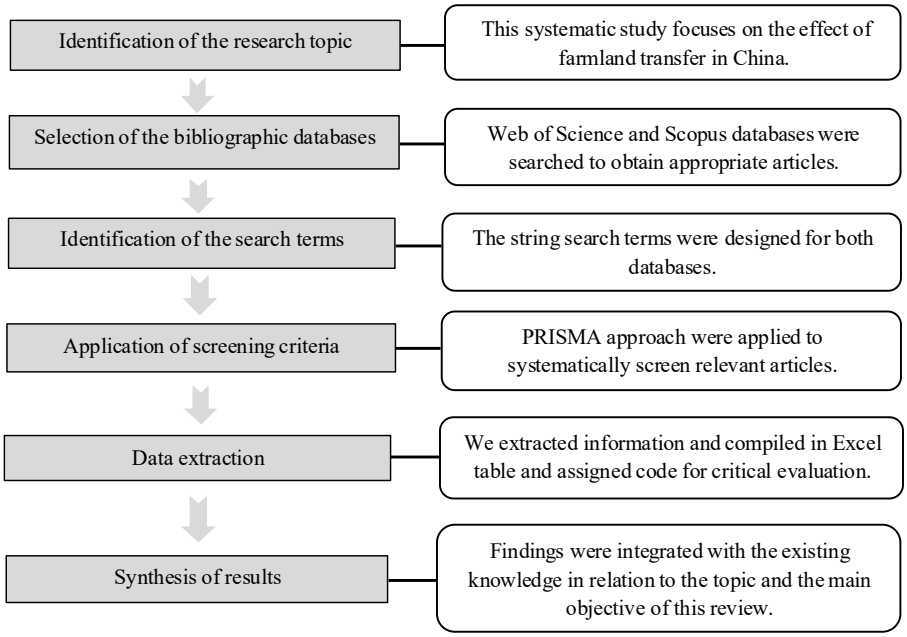


Figure 2. An essential step-by-step description of the methodology applied to the review process.

Our systematic review was guided by the PRISMA approach (Page et al., 2020) [41]. PRISMA is a framework that facilitates systematic literature review, including resources, eligibility and exclusion criteria, a systematic review process, and data extraction and analysis. The PRISMA statement was first published in 2009 to guide researchers to demonstrate transparently why a review was conducted, what the researchers did, and what they found (Moher et al., 2009) [42]. In 2020, an updated PRISMA statement form was published, which expanded the inclusion criteria of databases and registries. PRISMA offers valuable advantages such as developing well-defined research questions, allowing the systematic review to be defined, unequivocally formulating the inclusion and exclusion criteria of literature. Moreover, PRISMA offers an assessment of immense pertinent scientific research over a specific period of time. PRISMA was originally developed for health and medical-related reviews. In recent years, however, researchers have adopted PRISMA through customization and modification, as a method for systematically surveying the literature in various fields such as food security and urban sprawl (Abu et al., 2019) [40], and environmental protections (Nasir et al., 2020) [43] and other research areas. Therefore, not all components of the PRISMA statement are relevant in this review. For instance, we excluded the meta-analysis section because our review focused on the qualitative examination of the included articles. To improve the quality and credibility of this study, we added some selection criteria according to the objectives.

2.1. Determining the Scope

The scope of this study is to elucidate the multidimensional effects of FLT in China based on selective indicators including rural income, agriculture system, environment, urbanization, rural revitalization, agricultural labor supply, and agricultural land, extracted from the identified articles. This study only focuses on land transfers in rural China, excluding land transfers in urban areas. Literature on the influencing factors affecting farmland transfer and the practice of FLT were excluded unless they may have an indirect impact on the multidimensional effect of FLT. This study explores the institutions, strategies, and stakeholders involved in the implementation process of land tenure policies.

2.2. Literature Search and the Inclusion Criteria

A qualitative systematic review was adopted to elucidate the positive and negative effects of FLT in China. The review follows subsequent steps based on the PRISMA approach, including identifying appropriate databases; formulating search strings; searching studies; applying inclusion and exclusion criteria to eliminate irrelevant articles; reviewing and coding articles; extracting and synthesizing findings; analyzing and interpreting the results concerning the research objectives. The Web of Science (Clarivate Analytics) and Scopus (Elsevier) databases were searched in Autumn 2021. These two databases were found to be the hubs for high-quality articles that went through the peer-reviewed publication process. The same key terms were used in the searches of both databases (Table 1).

Table 1. The search string used for literature collection.

	Databases	Search Strings with Relevant Keywords
1.	Web of Science	TS = ((“Land transfer” OR “Farmland transfer” OR “Land circulation” OR “Farmland circulation *))
2.	Scopus	TITLE-ABS-KEY ((“Land transfer” OR “Farmland transfer” OR “Land circulation” OR “Farmland circulation *))

We conducted literature searches using criteria such as articles published only in English-language journals; focused primarily on FLT in China; published between 1990 and 2021, and went through a peer-reviewed publication process in journals with recognized impact factors. Review articles, books, book chapters, book series, and conference proceedings were excluded from this study. A paper is relevant if it discusses the positive or negative effects of FLT in the context of FLT-in and out. Articles focusing on factors affecting FLT are excluded not because they are irrelevant, but because our focus is to elucidate the impact

of FLT. The search was followed by a first screening of the articles by title, and, if necessary, by abstract. Although the results acknowledge that studies related to FLT were searched, we ensured that these fronts did not negatively impact the combined conclusions of our study. The motivation is to provide information on the multidimensional effects of FLT in China. Furthermore, this study discusses indeterminate factors that directly or indirectly influence the effect of FLT.

3. Results

3.1. Search Results

A total of 1234 articles was retrieved from the databases (Web of Science = 712 and Scopus = 522). We conducted manual searches to consider relevant articles; however, all the articles were found in the database search results. To clarify the context of this study, 23 articles were manually added, focusing on issues related to land tenure. Figure 3 shows the step-by-step inclusion and exclusion criteria of the articles searched from the databases. Most of the excluded studies fall out of the objective of this study. Finally, 26 full-text articles were eligible for this study. The selected articles were grouped into seven topical categories: rural income, agriculture system, environment, urbanization, agricultural labor supply, agricultural land, and rural revitalization (Supplementary Material). The topical category was conducted based on the dependent variables extracted from each article.

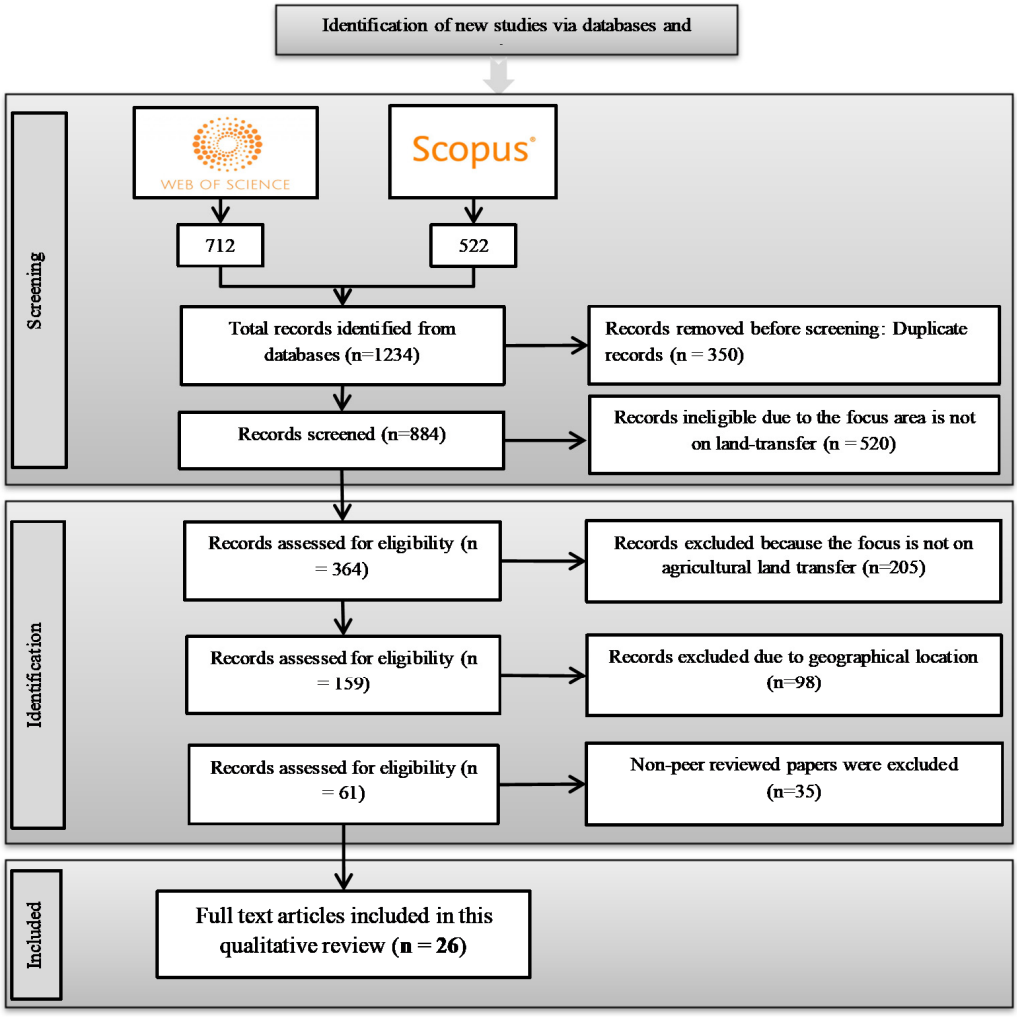


Figure 3. The flow diagram for systematic reviews included searches of databases (PRISMA diagram adapted from (Page et al., 2020) [41].

3.2. Topic Categorization

Dependent variables affected by FLT, extracted from the selected articles, were grouped into seven main topical categories (TC). The focal point of five studies is the impact of FLT on the environment (Wu et al., 2021 [28]; Lu and Xie, 2018 [32]; Li and Shen, 2021 [33]; Cao et al., 2020 [44]; Jia and Lu, 2020 [29]; Song et al., 2021 [45] and Wang. H et al., 2021 [46]). Six studies focused on how rural-household income is influenced by FLT (Liu et al., 2017 [20]; Huo and Chen, 2021 [30]; Chen et al., 2021 [47]; Udimal et al., 2020 [22]; Guo et al., 2019 [48]; Peng et al., 2020 [15]). Four studies investigate the influence of FLT on agricultural systems (Fei et al., 2021 [21]; Liu et al., 2019 [25]; Peng et al., 2021 [49]; Leng et al., 2021 [34]). A study sheds light on the impact of farmland transfers on urbanization (Dang et al., 2016) [50]. Three studies captured issues on the influence of FLT on rural revitalization (Wang. W et al., 2021 [51]; Li et al., 2021 [7]; Zheng and Li, 2019 [52]). One article examines the impact of FLT on agricultural labor (Wang et al., 2017) [53]. Four articles investigate the impact of FLT on agricultural land and related issues (Zhang and Chen, 2021 [23]; Zhou et al., 2021 [24]; Kan, 2021 [53]; Xue and Zhen, 2018 [54]). Figure 4 shows the proportion of each TC in this study. The effect of FLT on the environment (27%) was the most studied area. Rural household income affected by FLT was the second-largest TC (23%). The effect of FLT on urbanization (4%) and agricultural labor (4%) were understudied. The FLT effects on the agricultural system (15%) and agricultural land (15%) were equally evaluated.

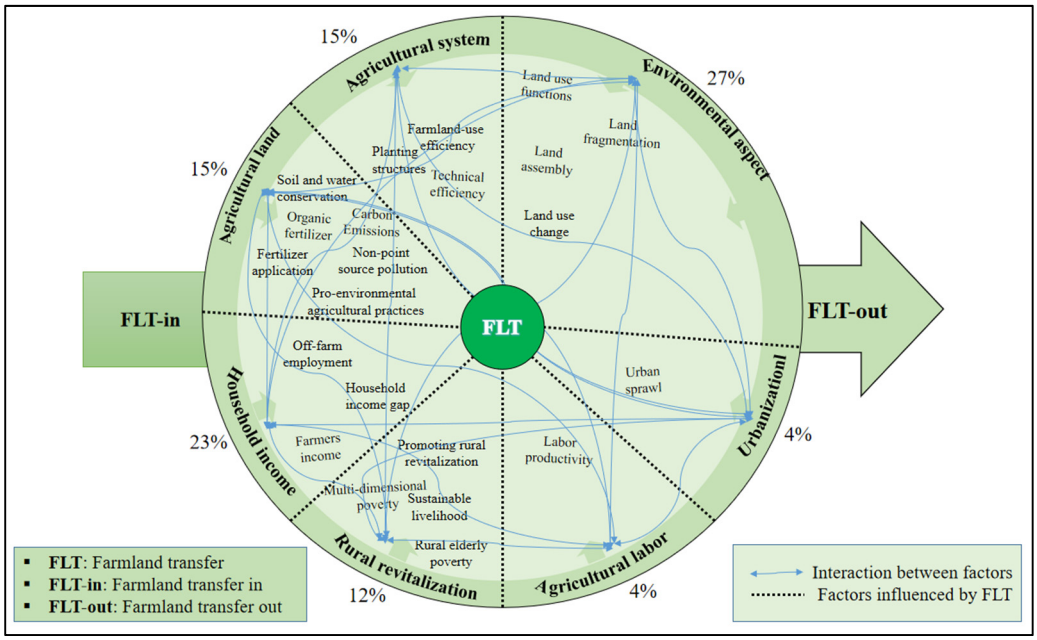


Figure 4. Distribution of the studies included in each topical category. Source: Results of literature review.

3.3. Research Trends: Temporal and Spatial Context

3.3.1. Temporal Distribution of the Studies

The findings of temporal distributions of studies in Figure 5 shows evince a flourishing focus of research on how farmland transfer affects various socio-economic and environmental indicators. In this study, a literature search was applied for the publication period between 1990 and 2021. Surprising, it has been in the spotlight since 2015. In four years (2015–2018), 24 % of the studies were conducted. The largest proportion (76%) of the articles were published between 2019 and 2021. The number of articles published in 2015 and 2016 was limited, but the number of articles published in subsequent years grew rapidly, indicating that examining the influence of farmland transfer is an emerging research field that has received much attention since the government of China introduced three farmland rights in 2014.

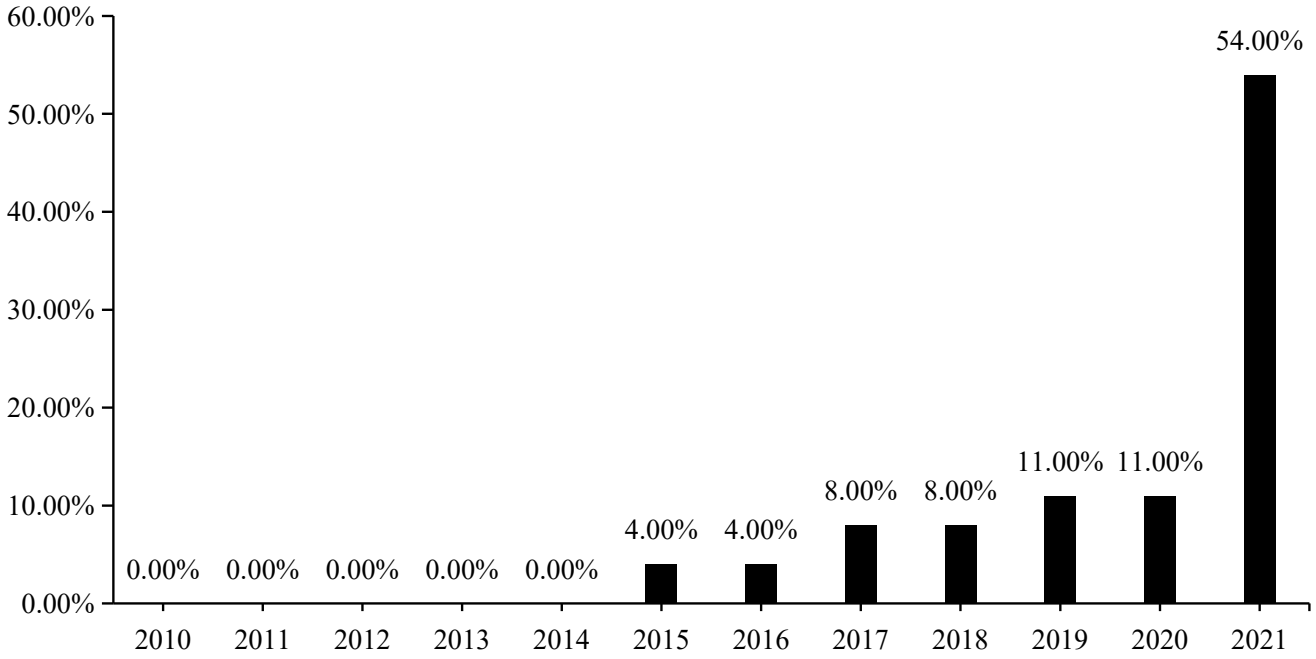


Figure 5. Temporal distribution of the studies included in this review by year. Source: Review analysis results of included studies.

3.3.2. Spatial Distribution of the Studies

Figure 6 shows the dependent variables with the spatial distribution of articles included in this review. Two articles (Fei et al., 2021 [21]; Li et al., 2021 [53] were developed in 30 provinces to illustrate the impact of farmland transfer on agricultural land-use efficiency and multidimensional poverty, suggesting that these articles can be nationally representative. Two articles (Wang et al., 2021 [53]; Peng et al., 2020) [15] examine the effect of farmland transfer on income effects and rural elderly poverty, covering 25 provinces. The five articles (Kan, 2021 [54]; Wu et al., 2021 [28]; Udimal et al., 2020 [22]; Lu and Xie, 2018 [32]; Leng et al., 2021 [34] are represented by "generalized" and are carried out based on comprehensive spatial distribution. The geography of the two studies (Zhou et al., 2021 [24]; Zheng and Li, 2019 [52] was "unspecified". Eleven articles (Liu et al., 2017 [20]; Wang et al., 2017 [51]; Liu et al., 2019 [25]; Zhang and Chen, 2021 [23]; Chen et al., 2021 [47]; Li and Shen, 2021 [33]; Peng et al., 2021 [49]; Guo et al., 2019; Song et al., 2021 [45]; Cao et al., 2020 [44]; Wang et al., 2021 [51]) in one but different provinces (Jia and Lu, 2020 [29]; Dang et al., 2016 [50]; Huo and Chen, 2021 [30]; Xue and Zhen, 2018) [55] are carried out in 7, 2, 14, and 5 provinces respectively.

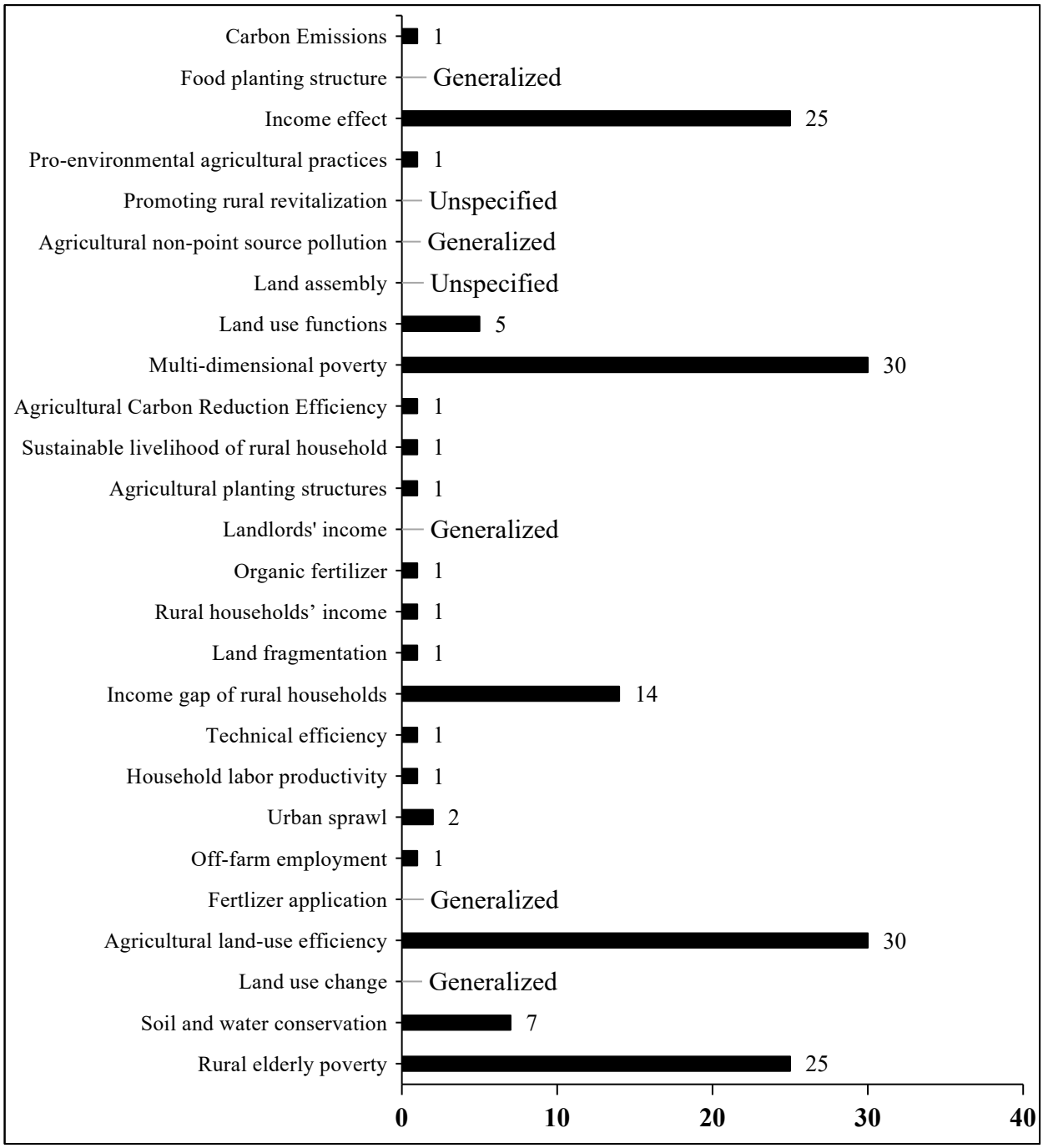


Figure 6. Distribution of each article (dependent variable affected by farmland transfer) based on regional coverage (number of provinces). Note: "Unspecified" and "Generalized" refer to spatially integrated research conducted at unspecified rural observation sites and nationwide, respectively. Source: Review analysis results of included studies.

3.3.3. Methodological Based Analysis

Most of the articles included in this review employed quantitative methods (85%), whereas only 15% of the articles employed qualitative methods. As shown in Figure 7, the data used in the articles is geospatial data (4%), household data (76%), multiple data (8%), and qualitative data (15%). The majority of articles (76%) used household-level data to elucidate the potential influence of FLT in China. The articles use primary and secondary data sources to elucidate the multidimensional effects of farmland transfer in China.

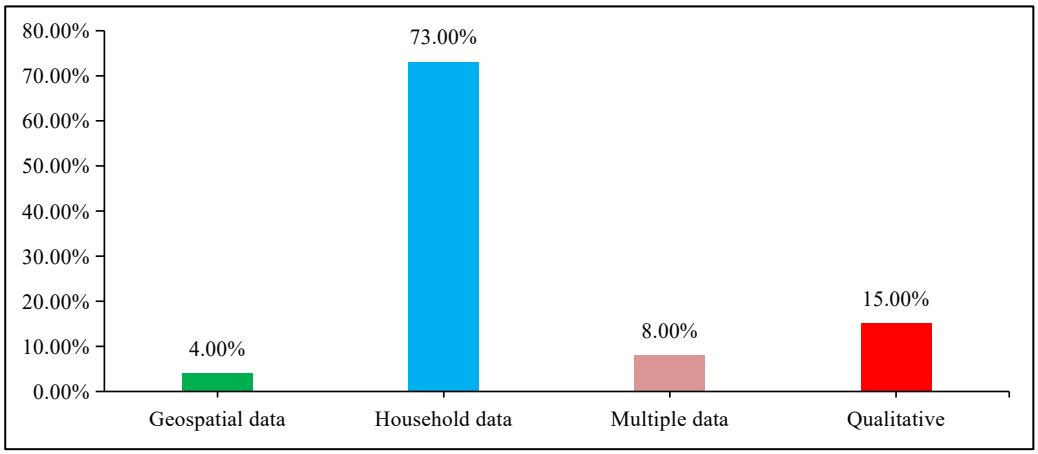


Figure 7. Distribution of articles based on the type of data used for the analysis. Source: Review analysis results of included studies.

4. Discussion

4.1. Finding-Based Analysis of the Studies

The topical category (TC) was conducted on the bases of dependent variables extracted from the included studies. This categorization approach allows each article to be included in the analysis. As shown in Table 2, the finding-based analysis is conducted based on the theoretical approaches, findings, discussions, conclusions, and policy implications of each article. This review unveiled diverse outcomes. The findings show that FLT has multi-dimensional, mixed, and intricate consequences. The transfer of farmland is mostly regarded as an end to driving the comprehensive rural development and is certain to harmonize the three rural issues (farmers, agriculture, and rural areas); however, our results indicate that FLT has both positive and negative influences, and it is necessary to further research. To develop a comprehensive framework, we integrated and conceived our results with the indicators. The following subsections present the effect of FLT on the seven topical categories in more detail. Emphasis is given to how FLT affects each indicator based on theoretical orientation. Gaps and limitations were identified and refined for further studies.

Table 2. Results of findings-based analysis.

Topical Category	Main Findings	Analysis of Results	Main Studies
TC1 Environment	• FLT has different effects (+ve and −ve) on various soil and water conservation measures. • Collective action in the form of cooperatives mediates how FLT area and FLT period influence the adoption of soil and water conservation. • FLT increases land area, significantly reduces fertilizer intensity, and encourage farmers' to use machinery. • The reduction effect of fertilizer application intensity of FLT was only significant for food crops, but not for cash crops. • The effect of FLT on fertilizer intensity was spatially dependent, higher in the west (high land fragmentation rate) than the east (developed agriculture). • Large farmers usually do not apply organic fertilizers. • The longer and more stable the land lease period, the higher the probability of large farmers using organic fertilizers. • The average circulation plot area has a significant positive impact on the probability and intensity of organic fertilizer application by large grain farmers. • Contiguous FLT and the stability of the FLT right encourage large-scale farmers to apply organic fertilizers. • FLT significantly promoted agricultural carbon reduction efficiency, thereby easing the conflict between development and land protection. • Excessive scale operation of farmland may hinder agricultural carbon reduction. • Economies of scale brought about by FLT can help to reduce agricultural non-point source pollution and the marginal cost of inputs. • Farmland rent-in had a positive effect on pro-environmental agricultural practices (PAPs) • Farmland rent-out had a negative effect on PAPs. • The interaction effect of FLT and knowledge of farmers on land protection policy (KFPP) had a positive effect on PAPs, due to the adjusting effect of KFPP.	• The central point is the effect of FLT on the environment. • The size of transferred land, length of FLT period, and the scale of the established farmland determine the behavior of farmers to implement environmentally friendly agricultural practices. • The +ve effect of FLT on ecological protection is spatiotemporally dependent. • The effect of FLT on fertilizer application is the most assessed issue in the literature after carbon emission reduction.	Jia and Lu, (2020) [29]; Wu et al. (2021) [28]; Li and Shen, (2021) [33]; Song et al. (2021) [45]; Lu and Xie, (2018) [32]; Cao et al. (2020) [44]; Wang et al. (2021) [51]
TC2 Agricultural System	• The land-use efficiency of FLT-in provinces is higher than that of FLT-out provinces. • Increasing agricultural arable land can bring economies of scale, thereby increasing the yield per unit of land. • Due to the inconsistent relationship between FLT and land-use efficiency between regions, the FLT market is difficult to judge. • Costs and prices of FLT have an impact on technical efficiency. • Both land costs and FLT prices have risen sharply in recent years. • From a land cost perspective, FLT would have a -ve impact on technical efficiency. • FLT can significantly increase farmers' decision to grow food crops • FLT has a positive effect on the "grain orientation" of the crop planting structure. • The total land transfer, paddy field transfer, and dry land transfer all have a significant positive effect on the adjustment of the planting structure to the direction of grain orientation. • Rural land transfer promotes the adjustment of grain planting structure. • FLT reduces the proportion of farmers planting grain crops, and the planting structure shifts to cash crops, with obvious structural effects. • The effect of FLT on planting structure is spatially heterogeneous and depends on crop type and size of land transferred. • FLT increases the operating income of farmers, the income of farmers in the north is higher than that in the south. • FLT among farmers is mainly a small-scale transfer and does not improve farmers' grain-growing efficiency.	• The focus is on the effect of FLT on technical efficiency and planting structure. • The price of land transfer is a restrictive factor to improve agricultural technical efficiency. • The dynamic relationship between FLT and land-use efficiency is seen as a key finding to be considered in future research. • The probability of FLT improving food security is examined in the direction of planting structure. • The scale of the transferred farmland is the decisive factor for farmers to determine the planting structure.	Fei et al. (2021) [21]; Liu et al. (2019) [25]; Peng et al. (2021) [49]; Leng et al. (2021) [34]

Table 2. *Cont.*

Topical Category	Main Findings	Analysis of Results	Main Studies
TC3 Rural household income	• The impact of FLT through cooperative members depends on the availability of agricultural labor in the household. • Families with surplus labor benefit the most from land cooperative programs. • For households with no surplus agricultural labor, off-farm work is not subject to land market access restrictions. • Households with surplus agricultural labor and access to land markets influence households' labor market decisions. • Without efficient land markets, the benefits of off-farm employment will be too small. • Land cooperatives are effective in stimulating FLT, which has a +ve impact on off-farm employment. • FLT leads farmers to seek off-farm opportunities only if efficient land markets are available. • Farmland transfer exacerbates the widening of rural household income inequality and is spatially dependent on market opportunities, labor mobility, and resource endowments. • The FLT-in increasing effect of rural household income depends on the type of household (pure household, I part-time households, and II part-time households). • Promoting farmland transfer-in to pure-agricultural and I part-time households and transfer-out from II part-time households significant +ve effect of rural household income • FLT has different effects on different types of households and drew the path for farmers to increase their income. • There are a number of factors that influence FLT decisions. • The FLT leads to a significant increase in landlord income. • Income of non-transferred landlords depends on factors such as off-farm income, credit access, skills training, and remittances, whereas out-migration has a negative impact on their income. • Landlords with alternative sources of livelihood are more likely to transfer their farmland. • The effect of FLT on the sustainable livelihoods of rural households is controlled by mediating factors that regulate the effect of FLT. • Factors affecting FLT control the effect of FLT. • FLT not only has a direct negative impact on financial capital insurance but indirectly through natural capital. • FLT has +ve and indirect effects on farmers' natural capital. • Both FLT-out and FLT-in are beneficial to rising farmers' income and have positive feedback on farmers' FLT decisions because the income sources are different between FLT-out farmers and FLT-in farmers	• Mainly emphasizes the impact of FLT on rural household income. • FLT is seen as a mechanism to expand the channels of farmers' income sources. • FLT-induced farmer income issues are closely related to off-farm employment. • The impact of FLT on farmers' income is most often assessed for farmers in and out of FLT, with mixed results.	Liu et al. (2017) [20]; Huo and Chen, (2021) [30]; Chen et al. (2021) [47]; Udimal et al. (2020) [22]; Guo et al. (2019) [48]; Peng et al. (2020) [49]; Kan, (2021) [53];

Table 2. *Cont.*

Topical Category	Main Findings	Analysis of Results	Main Studies
TC4 Agricultural land	• As most of the leased and contracted plots are not spatially adjacent, land fragmentation has been exacerbated by the transfer of farmland, suggesting that tenants are unable to combine and consolidate the two plots. • The relationship between the scale of land operations and the degree of land fragmentation is unclear. • The treatment of land fragmentation depends on the coupling effect of land transfer and consolidation. • The land fragmentation index can be effectively reduced only if the adjacent transferred plots and contracted plots have been consolidated and integrated. • FLT has a positive impact on each land use function (LUF), especially on land-based production and food security LUFs. • The FLT framework must take into account topographical and geographical conditions to successfully develop LUFs and ensure sustainable development. • FLT enabled massive land consolidation and helped to reconsider fiscal imbalances, agricultural capitalization, peasant land expropriation, and proletarianization. • The state uses the land as a tool, actively harnessing market forces to achieve land-use change and expand planning control over rural land.	• The impact of FLT policies on agricultural land is the central assessment point. • The issue of scale effects is mainly reserved for future studies. • Non-contingency nature of the transferred land leads to further fragmentation of agricultural land is the main issue in the report. • The location and landform of the transferred land are discussed as the determinant and considerable factors during the FLT.	Zhang and Chen, (2021) [23]; Xue and Zhen, (2018) [55]; Zhou et al. (2021) [24]
TC5 Urbanization	• The current FLT system leads to industrial urban expansion, and the reform package may promote population urban expansion. • The FLT reform program can effectively inhibit the use of rural land by institutions and enterprises but may promote population urban expansion.	• The contribution of FLT to urban expansion is the central point of the discussion.	Dang et al. (2016) [41]
TC6 Agricultural labor	• The impact of FLT on household labor productivity depends on the size and location of the transferred farmland. • FLT-in has a positive effect on total labor productivity (TLP) and agricultural labor productivity (ALP), which are affected by the size of the land lease and geographic location. • FLT-in from plain areas resulted in higher TLP and ALP. • High proportions of FLT-in have +ve effects on TLP and ALP. • FLT-out had a strong and positive impact on TLP and non-farm labor productivity (NALP). • TLP and NALP were also higher for households that rented out more land or were located in plains areas.	• FLT is seen as a reason to increase agricultural labor productivity, depending on the topography and location of the land being transferred. • The relationship between FLT and labor productivity remains an open question for future research.	Wang et al. (2017) [53]
TC7 Rural revitalization	• FLT has different (+ve and −ve) effects on different dimensions of poverty among rural elderly. • There is a strong linear relationship between the intensity of FLT and multidimensional poverty. • Multidimensional poverty decreases when the intensity of land transfers increases. • FLT for poor rural households can reduce multidimensional poverty by improving saving behavior. • FLT plays a significant positive role in advancing the rural revitalization development strategy.	FLT is seen as a mechanism to achieve the government's priority agenda of rural revitalization.	Wang et al. (2021) [51]; Li et al. (2021) [7]; Zheng and Li, (2019) [52]

4.1.1. Topical Category 1: The Influence of Farmland Transfer on the Environment

This TC comprises seven studies (n = 7) on the effect of FLT on the environment. This category was the most investigated area, accounting for nearly a quarter of the articles incorporated in this study. Four papers discussed the effects of FLT on fertilizer application, two articles on carbon emissions, and three articles on pro-environmental agricultural practices. Studies linking FLT with fertilizer application have mainly discussed the behavior of large-scale farmers concerning the intensity of fertilizer use. The findings revealed that FLT reduces the use of fertilizer only for food crops rather than cash crops by creating large farms Wu et al. (2021) [28]. This shows that FLT is essential for cutting off environmental pollution and ensuring food security. Large-scale farmers can deprive agricultural non-point source pollution (reduce nitrogen availability in the soil) and increase agricultural profit (Pareto optimality of inputs) by reducing costs of input Lu and Xie, (2018) [32]. They warned that FLT-in farmers tend to use more fertilizer to replace the opportunity cost of shifting labor. In particular, the substitution effect is greater for farmers who cannot provide inputs of appropriate scale, such as large agricultural machinery.

Studies focusing on the effect of FLT on pro-environmental agricultural practices discussed the behavior of large-scale farmers regarding organic fertilizer use, straw application, and soil and water conservation practices. FLT-in farmers rarely use organic fertilizers due to the practice of non-adjacent FLT, further triggering land fragmentation, which prohibits economies of scope and leads to the high cost of using organic fertilizers Li and Shen (2021) [33]. They also argued that failure to comply with the contract would prohibit large-scale farmers from using organic fertilizers. Cao et al. (2020) [44] explore the impact of FLT on straw application though integrating farmers' farmland protection policy knowledge. They found that FLT-in positively affected the pro-environmental agricultural practices, and the effect is higher when farmers understand farmland related policies.

FLT encourages farmers to practice soil and water conservation measures depending on the type of measures, the area of the transferred land, the farmland transfer period, and the coordination degree of farmers. Jia and Lu, (2020) [29] found that the size of the transferred farmland has a direct positive effect on terrace utilization, mulching, and afforestation but has a negative impact on the utilization of water-saving irrigation techniques. The FLT period has a direct impact on all measures. The longer the FLT-in period the greater the possibility of implementing the soil and water conservation measures. They also argue that farmers' collective actions (in the form of cooperatives) have a significant mediating impact on the effect of FLT-area on terrace use, afforestation, and water-saving irrigation techniques. Similarly, collective actions positively influence the effect of FLT-period on terrace utilization and water-saving irrigation. They concluded that the large FLT area and the longer FLT period encouraged farmers to use terraced fields and water-saving irrigation techniques, meditated by collective action.

Some studies in this category also examined the nexus between FLT and carbon emission reduction efficiency. Song et al. (2021) [45] found that FLT significantly aided agricultural carbon reduction efficiency. The effect varied by region (the eastern and central regions were higher than the western regions). Furthermore, they observed that the partial mediating effect of scale operations induced by FLT had a non-linear relationship with agricultural carbon reduction efficiency. They also warned that although FLT encourages farmers to involve in low-carbon agricultural management practice, it is important to protect against agricultural carbon emissions triggered by excessive expansion of farmland scale, stressing that moderate farmland scale management plays a significant role in the practice of low carbon agriculture. In addition, FLT can reduce carbon emissions by maintaining the intensity of the agricultural land (Wang et al., 2021) [51].

Several of the studies in this category show that FLT provides a significant positive role in environmental protection while improving food security. However, its effect depends on factors such as the scale of farmland resulting from farmland transfer; the quality of the transferred farmland; the stability of FLT rights; the collaborative actions of stakeholders involved in the process of farmland transfer; the transferred land-use change; the period

of FLT; and farmers knowledge level on farmland policies. Thus, this study urges policymakers to consider these mediating factors to create a harmonious relationship between agriculture and the environment through FLT. Several studies in this TC recommend policymakers incorporate the links between farmland tenure policies and pro-environmental agricultural practices by providing incentives, access to information channels, and extension services. All articles in this TC reported the exclusion of intermediary factors such as transaction costs, as a limitation that may affect the quality of FLT and operations, which in turn affect FLT outcomes.

4.1.2. Topic Category 2: The Influence of Farmland Transfer on Agricultural Systems

This topical category (TC-2) consists of four articles (n = 4) focusing on the impact of FLT on agricultural systems such as agricultural technical efficiency and agricultural planting structure. The issues addressed in this TC are the decisions made by large-scale farmers of the agricultural systems after they transfer-in farmland. The synthesis results show that FLT has both positive and negative effects on various indicators of the agricultural system. FLT had a direct influence on agricultural land use efficiency, given that the effect varied by region (Fei et al., 2021) [21]. They revealed that, in the FLT-in regions, the scale of agricultural operations expanded and labor productivity increased, thereby improving the efficiency of farmland. On the contrary, Liu et al. (2019) [25] present that due to the rise in farmland transaction prices, FLT negatively affects the technical efficiency of agriculture, further reducing the competitiveness of agriculture. They argued that future research should consider the implementation of FLT policy by considering factors such as FLT cost which affect technical efficiency, thereby prompting farmers to retract from agricultural scale operations.

Large-scale farmers tend to change the planting structure of their farms based on the scale of the land. Peng et al. (2021) [49] investigated the effect of FLT on farmers' decision to adjust agricultural planting structure. They found that farmers' who operate large areas formed by FLT-in tend to plant food crops, thereby maintaining grain orientation and food security. They further presented that FLT policy provides a guarantee for farmers' income and food security by leading farmers to produce food crops, but its effect varies between paddy farmland and dry farmland. Conversely, Leng et al. (2021) [34] explained that FLT inhibited food crop production, and farmers tend to operate large scale farmland for cash crops; however, the effect is heterogeneous among regions (higher in the south than in the north) and crop type (decrease in northern wheat cultivation and southern rice cultivation), suggesting that FLT declines the efficiency of food crop producers. Several articles in this TC argue that the initial land endowment of large-scale operators has a potential influence on the impact of FLT on the agricultural system. Furthermore, market inefficiencies are the key issue to alert policymakers. Several articles in this TC reported a lack of micro-level data as a limiting factor affecting research.

4.1.3. Topic Category 3: The Influence of Farmland Transfer on Household Income

Six articles (n = 6) in this topical category (TC-3) commonly focused on the household income effect of FLT. A quarter of the identified studies are included in this category. The literature examines the income effects of FLT on both FLT-in and FLT-out farmers. FLT in the form of household membership land cooperatives has a positive effect on off-farm employment of household heads, thereby increasing household income (Liu et al., 2017) [20]. The effect is higher for households with surplus agricultural labor without off-farm employment experience. The increase in income is due to the farmlands being transferred to the household members, and adding extra income from off-farm employment. However, FLT causes income disparities among rural households because of its positive effect on high-income households more than on low-income households and inequality of market opportunities (Huo and Chen, 2021) [30]. The income of both FLT-in and FLT-out farmers is increased due to the different sources of income (Peng et al., 2020) [7]. The income growth rate of both FLT-in farmers and out farmers is higher than non-FLT farmers.

The off-farm employment opportunities and farmland rental income are the two main income sources for FLT-out farmers. On the other hand, the source of income growth for FLT-in farmers is due to operating large-scale farmland and higher agricultural investment.

Udimal et al. (2020) [22] argue that the income effect of FLT largely depends on factors such as out-migration, off-farm income, credit access, and age, whilst income of landlords' who do not transfer farmland increases due to factors such as off-farm income, access to credit, skills training and remittances, as well as declines due to out-migration. FLT indirectly increased natural capital, and at the same time had a direct and indirect negative impact on financial capital insurance (Guo et al., 2019) [48]. They recommend that policy-makers should promote the establishment of non-agricultural industries in mountainous areas to absorb surplus rural labor, thereby improving the livelihoods of rural people and promoting sustainable development. Chen et al. (2021) [47] divided households into three categories: pure-households (no-off farm job), I part-time households (medium off-farm job), and II part-time households (high off-farm job), based on the degree of participation in off-farm employment. They noted the effects of FLT across the three household types. They conclude that promoting FLT-in to pure-agricultural households and I part-time households and transfer-out to II part-time households results in a higher income effect. They further explain that FLT can broaden the income sources channel of rural labor.

Several studies in this TC suggest that the FLT policy should not force farmers to join FLT programs. Volunteer-based FLT will have a positive impact on farmers' incomes. For farmers who are unwilling to set foot in the FLT market, measures such as subsidies, should be taken to lift them out of poverty. This study suggests that future researchers should consider multidimensional features of households, as FLT has different income effects on the different types of households. Furthermore, the literature included in this review calls for the integration of FLT with the life of farmers in the host cities. FLT-in farmers should have better access to funds to enable large-scale agricultural operations. In addition, an efficient farmland market platform should be established so that farmers can access the information service system and cooperate to increase their income using FLT. Studies in this TC commonly reported a lack of time-series data as a limitation to fully exploring the effect of FLT on rural household income.

4.1.4. Topic Category 4: The Influence of Farmland Transfer on Rural Revitalization

In China, FLT is considered a mechanism to revitalize the rural area by consolidating poverty eradication, food security, and environmental protection. Given that poverty reduction is the key to building rural revitalization. Articles in this category (n = 3) generally discussed the impact of FLT on poverty reduction. The effects of FLT on multidimensional poverty in rural elderly are different (Wang et al., 2021) [52]. They reported that FLT has a negative effect on the relative economic poverty, fuel poverty, and drinking water poverty, while it has a positive effect on the physical health poverty and mental health poverty of the rural elderly. Rural areas with more FLT have a lower incidence of poverty due to FLT can reduce multidimensional poverty by improving household savings behavior (Li et al., 2021) [7]. In addition, FLT promotes a comprehensive rural revitalization development strategy (Zheng and Li, 2019) [52]. Studies in this TC extensively discussed that FLT can reduce rural multidimensional and comprehensive poverty rates. The discussions of several articles suggest that to gain from FLT, policymakers should establish a standardized farmland market, and pay special attention to the social security system and care services for rural poverty alleviation.

4.1.5. Topic Category 5: The Influence of Farmland Transfer on Agricultural Land

Studies (n = 4 articles) in this topical category (TC-5) discuss the links between FLT with land assembly, land-use change, and land fragmentation. It is important to note that the determination of "agricultural land" is to address the impact of FLT on agricultural land itself. FLT is widely reported as a tool to merge fragmented and scattered lands to enhance

agricultural production efficiency. However, the findings of Zhang and Chen, (2021) [23] present that FLT increases the degree of farmland fragmentation as the transferred and contracted plots are non-adjacent. They urged policymakers, aiming to achieve large-scale agricultural operations, by reducing farmland fragmentation, through FLT can only be successful if the transferred and contracted plots are spatially adjacent, while the operating agricultural economies of scale depend on the particular arrangement of farmland plots. Contrary, FLT led to farmland assembly; however, the effect varied according to the topography of the farmland, and the positive effects of FLT were mainly observed in plain areas than mountainous areas (Zhou et al., 2021) [24].

Studies in this TC involve trends in FLT for land-use change and the allocation of vacant land for other off-farm activities. For instance, Kan, (2021) [54] revealed that the state has liberalized the farmland market by allowing FLT to change land use, thereby transferring farmland to potential farmers, while void land allocated for other developmental activities such as holiday guest-houses, leisure farms, and ecological parks geared towards tourist consumption. Xue and Zhen, (2018) [54] proposed the relationship between FLT and land use function and found that FLT had a positive impact on food-based land use function and regional sustainable development by improving the economic and social dimensions of the land. They provide a methodological approach to illustrate the role of a multi-level stakeholder assessment framework to integrate the assessment of FLT impacts on land-use functions with topographic and locational conditions.

Articles in this TC remind policymakers, action planners, and researchers, that, the aim to achieve large-scale agricultural operation, by reducing farmland fragmentation, through FLT can be successful only if the transferred and contracted plots are spatially adjacent. The operation of the agricultural economy of scale depends on the special arrangement of farmland plots. It is proposed that future research should consider a variety of factors to divert FLT into regional development. Moreover, agricultural capitalization, peasant land expropriation, and proletarianization resulting from the FLT and land market systems that integrate the concerns of all stakeholders in the FLT market should be implemented to ensure sustainable rural development.

4.1.6. Topic Category 6: The Influence of Farmland Transfer on Urbanization (Urban Sprawl)

This TC represents the lowest number of studies examined (n = 1 article), indicating that the effect of FLT on urban sprawl has not been adequately studied. Dang et al. (2016) [50] examine the relationship between land market mechanisms and urbanization and find that the current institutional form of FLT leads to urban expansion of the population, but non-agricultural institutions and businesses restrict the use of farmland for non-agricultural purposes. They argued that policy-makers should strengthen legal frameworks that protect displaced farmland from urban sprawl to preserve land for food production and maintain food security. There are two channels linking the FLT market and urbanization. First, FLT frees farmers to off-farm employment in urban areas as an alternative source of income. The channel is widely covered in comments in this topic category (TC-3). Second, FLT is used as a tool for land resource allocation, where agricultural land is protected for food production and inactive land is allocated for non-agricultural use as Kan, (2021) [54] reported in TC-5. This review urges future researchers to further elucidate the role of FLT in urbanization.

4.1.7. Topic Category 7: The Influence of Farmland Transfer on Agricultural Labor

FLT affects agricultural labor in two ways; labor productivity and labor supply. It is widely reported that FLT frees farmers and releases them to off-farm industries. However, the focus of these studies is to elucidate income and scale effects rather than agricultural labor distribution. Since all the farmers who moved out of the farmland did not go to the cities to work, some farmers may stay in the countryside due to the fear of urban life or other reasons, which are yet to be investigated. Therefore, this TC was established to

review articles that primarily focus on the impact of FLT on agricultural labor supply and allocation. The results of database searches indicate that the impact of FLT on agricultural labor has not been adequately studied. This topical category (TC-7) was also the lowest of the literature identified and included in this review (n = 1 article). Linking FLT to total factor productivity and agricultural labor productivity, Wang et al. (2017) [53] proposed that the impact of FLT on total factor productivity and agricultural labor productivity varies between FLT-in and out farmers, and topography. They found that FLT-in farmers who are located in plain area has higher total factor productivity and agricultural labor productivity, and FLT-out farmers gain higher total land productivity and non-agricultural labor productivity, and the effect is higher in plain area. They argued that the FLT in the plains should be encouraged, incentive measures should be taken to cultivate productive agricultural labor capable of operating moderate-scale agriculture, and productive modern agriculture should be established. However, in hilly areas, measures targeting pro-poor farmland scale expansion should be implemented.

5. Conclusions

This systematic study: (1) investigated FLT as an influencing factor on the environment, agricultural system, rural revitalization, agricultural land, agricultural labor, farmers' income, and urbanization in China; (2) unfolds diverse findings with practical policy implications, indicating significant drawbacks, and suggests areas of further research to advance awareness of the socio-economic and environmental influence of FLT in China.

First, we found that FLT had both positive and negative effects, and its effects were mainly mediated by intermediary factors. The adverse effects of FLT were mainly due to non-contingent FLT and post-FLT actions. There were evidences of the failure of transferring farmland to the adjacent farmers (contingent FLT), mainly caused by informal farmland transactions, leading to further land fragmentation, diseconomies of scale, and rising agricultural input costs. In addition, due to the unbalanced interests of the two parties, the instability of farmland use rights and the contract breach during the lease period led to uncertainty in the effects of FLT.

Second, due to the disintegration of rural-urban economic structure, it is challenging for FLT-out farmers to find non-agricultural employment opportunities in urban areas, resulting in a lack of interest in FLT or chronic poverty after they transferred-out their arable land. The disintegration of this multi-dimensional factor suggests that relatively little has been done to address the interactions of integrated systems and subsystems under FLT that can be considered for sustainable rural development. Consequently, further emphasis is placed on the comprehensive FLT system, as well as system response and back-and-forth.

Third, several articles reported that the failure to establish an efficient FLT market leads to uncertain consequences. The FLT market system has not yet established a framework to facilitate farmland transactions by providing information on farmland type, price, and quality. In addition, the current market system fails to leverage the existing local farmer cooperative institutions to establish a rural farmland trading model based on a self-reliance approach. The transaction costs of FLT are high, which weakens the FLT market. This study calls on policy-makers to build inclusive, locally-based, farmers-friendly market systems to reduce the adverse impacts of FLT.

Fourth, we found that existing research reported two major problems that are prevalent in large-scale agricultural land established by FLT and lead to low yields and environmental damage. First, large-scale land operators tend to change the land use from food crops to cash crops, adversely affecting food security. Effective measures should be conducted to improve the monitoring system to prevent large-scale operators from changing arable land use. Second, simply establishing large areas of farmland does not necessarily increase productivity. The scale of agricultural input services (appropriate mechanization services) and the scale of operation should be expanded according to the scale of arable land. Future research should develop a framework that considers incentives to mobilize FLT to farmers

by increasing the availability of agricultural input services such as farm machinery based on the size of the farmland.

Fifth, it is now well established that several studies tended to look in-depth at FLT impact on scale effect created by FLT-in farmers. However, the influence of FLT on FLT-out farmers and non-FLT farmers has remained unclear. This study urges future researchers to develop methodological frameworks to consider the triple effects, that is, the effect of FLT on FLT-in farmers, FLT-out farmers, and non-FLT farmers. Moreover, several studies pointed out that stabilizing FLT rights, practicing contingent FLT, coordinating urban and rural areas, optimizing scale operations, and incentives for large-scale operators play an important role in reversing the adverse effects of FLT.

Sixth, there has been little research into the interactions between pre and post-FLT factors. The disintegration of factors lead to isolated observations of stakeholders (government, collectives, farmers, land-operators, and cooperatives) and their actions. Thus, a further emphasis on an integrated approach to FLT pathways is suggested, along with a focus on system feedback and trade-offs.

Seventh, first-hand database searches and sequential identification of literature of this study indicate that a large body of literature focuses on the influencing factors and practical aspects of FLT, more than the perception of its potential impacts. Our review requires that, in addition to elucidating FLT effects, future research should also establish a framework to improve the established agricultural system for large farmland areas such as providing agricultural services suitable for scale operations. We argue that the findings presented in this review require policy-makers, researchers, and action planners to reconsider FLT policies regarding multiple interactions, spatial and temporal differences, and intermediate causes.

Finally, this review collected studies from two databases, excluding other supporting documents such as relevant government documents, conference papers, and studies written in languages other than English. Although these reports can make a significant contribution to a better understanding of the outcomes produced by FLT, research quality issues prevent the inclusion of those reports.

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