



Systematic Literature Review (SLR) Seed System Development supports The Development of Seed Social Entrepreneurship

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Abstract. The purpose of the research is to map the recent developments of the seed system concept. The seed system has developed the concept of a formal and informal seed system towards an integrated, interrelated seed system. This mapping was used for triggering further research and guiding the application of the concept in practice. Using the Publish or Perish application and obtaining 360 journals in the period 1988-2021, found various online reference sources on websites (such as www.sciencedirect.com, ProQuest, Web of Science, and www.google.scholar.com). Important information is obtained. The results of this article review explain the development of 3 (three) seed system concepts, namely formal seed systems, informal seed systems, and intermediate/integrated seed systems. The results of this study show that the commercialization of seeds dominated by the private sector is still high when they use poor quality seeds, loss of local knowledge of farmers in seed storage, reduced biodiversity, and problems between private / seed companies and farmers and NGOs in the formal and informal seed sector. It is necessary to increase the participation of local stakeholders (farmer groups/ cooperatives and local entrepreneurs). There is a need for k cooperation and synergy of actors in the seed system so that there is a division of roles, collective action, and technical regulations in integrated seed sector development policies. In addition, this study also describes the distribution of the research area. The novelty of this paper is to raise several research questions that can be researched for the future regarding the framework of stakeholder collaboration through the concept of common/shared property with the role of local stakeholders such as local entrepreneurship, cooperatives, and farmer groups, which are strengthened through integrated seed policy regulations mainly in the developing country.

Keywords: Collaboration, Entrepreneurship, Industry, Seed, Stakeholder.

1 Introduction

Seeds must provide good results for the farmers who grow them, so innovation and creativity in producing quality seeds are needed so that the seeds produced can provide benefits to seed users [1]. Seed and food sovereignty are integral components of a sustainable and resilient society in a sustainable seed governance system [2]. Seed quality is the most important basic input in agriculture. The cheapest, easiest, and most effective way to increase agricultural production, productivity, and quality is to use quality seeds from high-yielding varieties. Good seed quality is the basis for better agricultural productivity [3].

The growth of the seed industry seeks to improve the delivery of modern science to farmers, aiming to increase agricultural productivity. The healthy development of the seed industry is essential to ensure food security [4]. The development of private research/breeding industry developed after liberalization and responded to users' needs by improving the quality of seed varieties, so it is important to create incentives for farmers to adopt these high-yielding varieties [5]. Seed Policy and Intellectual Property Rights in various countries, especially developing countries, will increase crop productivity and improve food security [6].

A productive agricultural system is based on an effective seed system. The seed system has a subsystem: (a) research, breeding, and release of plant varieties, (b). seed production and distribution, (c) quality control and certification, (d). education and training, (e). plant extension and seeding, and (f). seed use [7]. The seed system is complex, with various subsystems, each having a very large risk opportunity. To hold a seed industry, it must be supported by funding, human resources, cultivation technology, seed harvesting and processing technology, storage, packaging, transportation, and legalization (seed certification) [3].

The seed system is divided into 2 (two) systems, namely formal and informal seed systems [8]. The informal seed system includes methods of seed selection, production, and diffusion by the farmer and his family members. Farmers get seeds and varieties through informal networks based on exchanges with relatives and neighbors or buying them from other farmers and local markets [9][8][10][11][12][13][14]. The formal seed system includes seed production and supply mechanisms operated by the public or private sector through scientific methodologies for plant breeding. Formal systems have little interaction with informal systems, especially those relating to subsistence farmers [8] [10] [11][13], and the commercialization of the formal seed sector marks the development of a seed system dominated by international development actors [12].

Research on the development of seed systems leads to intermediate seed systems [15][16][12], a seed system that integrates formal and informal seed systems. This integrated seed system connects formal and informal seed systems so that it becomes a more effective strategy to increase national and local seed supply while improving infrastructure and investment climate for formal (private and public) [17][18]. Such a seed system which has been developed in Ethiopia consists of three seed systems: a formal, informal, and intermediate seed system [15][19], as well as the development of an integrated seed sector

policy that includes the release of varieties, seed quality management, and the rights of plant breeders in Ethiopia, Mali, and Zambia [16].

Subsequent studies found that public, private, and civil society actors involved in shaping policy design and developing innovations to build innovative and sustainable seed systems had different goals, values, and levels of influence (David et al., 2016). The emergence of multinational seed companies changed regulations in some countries because it affected intellectual property rights, transforming the public and private sectors, property rights of seed resources, and access to farmers (Venkatesh, 2017), (Clapp, 2021) (Morris, 1998). Policymakers need to be adequately informed in drafting regulations that enable effective governance of the seed industry, resulting in the public policies of the seed industry in many developing countries contrary to the interests of small-scale and resource-poor farmers (David et al., 2015). Due to the limitations of research related to the development of the concept of seed system integration/intermediate, it raises questions in this study about the concept of an intermediate/integration seed system evolving as well as the extent to which studies that result in a framework for collaboration, allow actors and organizations to take collective responsibility while maintaining distributed decision-making at the local level. This collaboration can potentially strengthen and advance the governance of varieties and seeds, as happened in the development of cereal crops in Mali (Rattunde, 2020).

The purpose of this study is to map the latest developments of the seed system concept and fill gaps in the study or framework of stakeholder collaboration in the intermediate seed system/integration so that it becomes the material for further research at the same time, guides the application of the seed system concept to build a seed ecosystem in Indonesia. The seed system is undergoing the development of concepts from formal and informal seed systems towards interrelated integration seed systems that exist in developed or developing countries. This systematic literature review research on seed systems is taken from various sources or references relevant to this study's purpose.

2 Method

This research was qualitative with the Systematic Literature Review (SLR) method. SLR is a research method related to certain research questions, certain topics, or phenomena of concern through the process of identifying, evaluating, and interpreting all relevant research results (Kitchenham, 2011); (Brereton, 2013); (Hafiza, 2019) (Grandiose, 2021). A qualitative approach with the SLR method was used to synthesize (summarize) research results that are descriptive qualitative, namely collecting articles about the concept of the seed system from various literature from 2 (two) stages, namely: (a) searching through the Publish or Perish application and obtaining 360 journals in the 1988-2021 period found 17 (seventeen) journals, (b) on various online reference sources on websites (such as www.sciencedirect.com, Proquest, web of science and also www.google.scholar.com). Found as many as 43 journals. The next step was identifying the journal by classifying the research year, methods used, journal quality, results, and research coverage (local, national, or international).

This method would later provide an overview of seed system development as a form of review results by posing research questions for future research. A systematic Literature

Review (SLR) is conducted based on literature sources on the focus of research, namely about the seed system; on the year of publication, namely from 1988 to 2021; based on methodology, namely qualitative research methods, quantitative methods, literature studies, and others. Articles that meet those criteria total 60 articles.

From the results of the classification of the reviewed journals, the following results were obtained: The context of the study was more in developing countries such as Ethiopia and India, while few were located in developed countries such as the United States and the United Kingdom. Most studies were on the African and Asian continents, in Africa 51 % while in Asia 14 %.

Meanwhile, from the year analysis from the results of the systematic literature review, data was obtained that 82% came from 2011-2021, while only 18% came from publication in the period of 1988 to 2010, as presented as follows: For the validity of journals carried out by SLR, data was obtained that the journals that existed 55% or 33 journals were journals that were in the Q1 category according to the SCImago Journal Rank Indicator while for Q2 it was 24% or 14 journals. Meanwhile, regarding the categorization of research methods in journals carried out by SLR, qualitative and quantitative research methods are quite balanced, namely 53% quantitative and 45% qualitative.

The results of the literature review can be done to group the study context as follows:

3 Results and Discussion

3.1 Seed system development

There are 9 (nine) articles related to formal seed systems or 34.6%, 8 (eight) informal seed systems (30.8 %), and 9 (Nine) (34,6 %) intermediate seed systems/integration that are discussed. This means there is a balance in the number of articles and studies on the entire seed system, including informal and intermediate seed systems/integrations. Trends show that 44.5 % of studies were published in the period (2009-2015) while 55.5 % of publications in the following years, i.e., the period (2016-2020) for the formal seed system. There was an increase in studies on the informal seed system, namely in the period (2016-2020), which was 62.5% compared to 37.5% of publications (2009-2015). The intermediate seed system/integration tends to decrease from 66.6% in 2009-2015 to 33.3% of publications in 2016-2020 (see Table 1). This indicates a tendency to increase the publication of articles on the seed system compared to formal seed systems and intermediate seed systems/integration.

Meanwhile, regionally, in the formal seed system, there are 6 (six) articles studied in African countries. In contrast, 3 (three) articles are studied in Asia, and none are studied in the Americas or Europe. Therefore, based on the mapping of the location of this study, the development of formal seed concepts is still popular in Africa, with the number of studies 7 (seven) (66.6 %) studies each compared to 3 (three) studies (33.3%) in Asia. Meanwhile, in the informal seed system, article publications from Africa are still the majority, with 57.1% or 4 (four) publications, compared to 28.6% or 2 (two) articles in Asia and 14.3% or 1 (one) publication related to informal seed systems in America. As for the publication of publications related to the intermediate seed system/integration, 77.7 % or 7 (seven) articles

are from Africa, while only 22.3 % or 2 (two) articles are from Asia. From the entire seed system article reviewed, most of the research was conducted in Africa compared to Asia and America. This indicates the need for more research in Asia. (see Figure 7).

There is no single and dominant methodology used in developing the study of the concept of the seed system. However, there is still an opportunity for the various methods used in exploring this method, as evidenced by the 77.7 % of studies conducted by (Smale, 2014) (Qiu aXiao, 2016) (Deng, 2019), (2016) (Popa, 2019); (Kalianda, 2014) and (Nyoka, 2014) with quantitative methods and methods qualitatively performed by (Amanor, 2016); (Howard, 2009) or 22.3% formal seed system research. This is inversely proportional to the informal seed system research of 62.5% with qualitative methods carried out by (Peschard, 202a) (Peschard, 2020b) (De Boef, 2010) (Sievers, 2020); whereas (Lundukaa, 2012); [9]; (McGuire, 2016) or 37.5 % conducted research using quantitative methods. Meanwhile, in the integration seed system research, relatively balanced research was carried out with qualitative methods as much as [15] (Louwaars, 2012) [16] (Bentley, 2018); (Almekinders, 2008) or 55.5 % and quantitative research as much as 45.5 % conducted by (Abay, 2008); (Croft, 2017); [19] (Winters, 2005). Overall, the research methods conducted in the reviewed seed system article are relatively balanced between quantitative research methods and qualitative research (50% versus 50%) (see Figure 8).

3.2 Formal seed system

The subsequent analysis is associated with the concepts selected for this study, which consisted of various related discussion attributes (see Table 4). In developing the formal seed concept, liberalization through large inputs to produce seed supply, especially in Africa (Smale, 2014), resulted in the commercialization of seeds that would affect agricultural development, especially in Zambia (Amanor, 2016). The commercialization of such seeds encourages farmers in Asia, Africa, and Latin America to adopt new varieties with the expectation of higher yield potential (Huan-Guang et al., 2016), (Kalinda, 2014). On the other hand, seed companies are making innovations, such as in China (Deng, 2019), to improve their business by predicting future market developments (Popa, 2019).

But in its development, transnational corporations monopolized the agricultural sector, particularly seeds (Howard, 2009). There has been a delay in increasing the contribution of the modern seed industry to the growth of agricultural products, such as the high use of unqualified Nutfah plasma in Asia, Africa, and Latin America (Nyoka, Betserai. et al., 2014). The public, private, and civil society actors (stakeholders) involved have sought to formulate policies and develop innovations to build innovative and sustainable seed systems. Such efforts require the latest data and analysis in collaborative efforts among stakeholders in formulating such policies (David et al., 2016).

3.3 Informal Seed System

The development of informal seed systems is characterized by the use and development of varieties, seed production and storage, and seed exchange by local farmers as the three main components of a dynamic system of crop seeds for smallholder farmers in developing

countries [17] examples such as local varieties are popular among farming households in Malawi (Lundukaa, 2012). The informal seed system remains a mainstay in acquiring seed exchange, especially in Africa. So, farmers can access 90.2% of their seeds from informal systems, with 50.9% coming from local markets. This suggests that smallholder farmers are already investing in informal seed systems [14]. In subsequent developments, the informal seed system also experienced obstacles such as patent and royalty legal disputes involving NGOs and peasant movements with transnational corporations in Brazil and India (Karine et al., (a), 2020). This confirms the paradigm shift from farmers' right to seed sovereignty due to developments in Intellectual property laws, the monopoly on seed companies, and the loss of agrobiodiversity and seed protection (Karine et al. (b), 2020).

The loss of agrobiodiversity and the concentration of economic and political power in agricultural and food systems are faced with the concept of common property to study, conceptualize, and transform the governance of seeds and plant varieties (Stefanie et al., 2021). The concept of the common property provides seed security, livelihoods of farming communities, and conservation of plant and varietal diversity (De Boef, 2010). So, efforts are needed to increase the participation of local stakeholders, technical regulations, and commercialization to improve the local seed market in increasing large-scale seed production (Schmidt, I.B et al., 2019). Another supporting idea is the role of the public sector in increasing the number and geography of the distribution of local seed outlets and the research of public extension systems that support informal seed systems, as happened in Syria (Hassan, Aden AW, et al., 2008).

3.4 Intermediate Seed System / Integration

Linking formal and farmer seed systems becomes a more effective strategy for increasing national and local seed supply (Conny et al. P. Louwaars, 2008). The role of the formal and informal sectors in providing support to create an integrated seed system meets the needs of various farmer groups [19]. Various forms of public-private or public and civil partnerships at the local level within the seed sector encourage the proper management and appropriate varieties among local seed companies to maintain their business in specific local or regional markets in Africa, including variety release, seed quality management, and plant breeder rights [16].

Organizing diversity in seed supply, from public and private organizations to NGOs, farmer cooperatives, and informal farmer groups, makes seed programs and policies more practical and effective in achieving food security (Niels P. Louwaars and Walter Simon de Boef, 2012). SPC (Seed et al.) in Ethiopia is categorized as an intermediate/integration seed system because it has system characteristics formal and informal seeding plays a key role in meeting seed demand and contributes greatly to increased seed supply through the production of high volumes of seeds, crops, and diversification of varieties, and seed delivery to farmers (Dawit et al., et al., 2017). The formal seed sector comprises public and private organizations, including research institutions, universities, seed companies, some businesses, and NGOs [19]. As in Indonesia, partnerships between transnational companies and smallholders through a contract system (Paul Winters et al., 2005).

3.5 The role of Stakeholders in the seed system

The seed system has a network of stakeholders involved in providing, managing, replacing, and distributing seeds of certain crops in a specific place in the region (Jeffery et al. et al., 2018). In the formal seeding system, seed standards are set by the government, while in the informal seed system, the farmers set the standards. Official seeds have "certification" to ensure they are healthy, defects-free, and recognized and approved varieties. Despite evolving knowledge, informal seeding systems are more dominant, diverse, and poorly documented (Oliver T. Coomes et al., 2015). Each seed system has its stakeholders, but the list of representatives with key roles (Jeffery et al. et al., 2018) is as follows :

The integration of breeding in Kenya's formal and informal seed systems could increase access to diverse Nutfah plasma and strengthen food security, with more companies entering the market in formal seed systems. On the other hand, informal seeds have greater potential if supplemented with more specific data [10]. When combined with scientists' knowledge, analysis of case studies of varieties developed by farmers can lead to the identification and development of varieties (Fetien Abay et al., 2008).

The proposed multistakeholder framework is a tool for documenting seed systems, diagnosing coordination disorders, and recommending solutions, guiding the design of more integrated seed systems and sustainable interventions for superior seeds in the Americas and Africa (Jeffery et al., 2018). Local entrepreneurs can connect effectively and for the long term in the development of farmer groups as a liaison for companies and smallholders (Sally Walkerman et al., 2015) supported by the Integrated Seed Sector policy (*Integrated Seed Sector Development*) can facilitate the evolution of groups of farmers involved in informal or community-based seed systems into formal seed entrepreneurs (Niels P. Louwaars and Walter Simon de Boef, 2012)

4 Conclusion:

The literature review of the development of 3 (three) seed systems produces conclusions in facing the constraints of seed development in formal and informal systems, so it is necessary: (a) a multistakeholder framework in collaborative efforts, (b) efforts to increase local stakeholder participation and commercialization to improve the local seed market, (c) integrated seed policy regulations governing the implementation of the multistakeholder collaboration framework.

The novelty resulting from the Systematic Literature Review / SLR carried out resulted in the next research question, namely how to compile a framework for stakeholder collaboration to build a cooperative of seed social entrepreneurship through the concept of common/common property through increasing the role of local stakeholders (farmer groups/cooperatives / local entrepreneurs) supported by integrated seed policy regulations.

Reference

1. Sadjad, S. (1993). *Dari benih kepada benih*. Jakarta: Gramedia Widiasarana Indonesia.

2. Nishikawa, Y. (2022). Integration of Endogenous Development Integration of Endogenous Development. In Y. N. Pimbert, *Seeds for Diversity and Inclusion*, (pp. 41-55. https://link.springer.com/chapter/10.1007/978-3-030-89405-4_3). Japan: Palgrave Macmillan.
3. Sudjindro. (2009). Permasalahan dalam Implementasi Sistem Perbenihan. *Buletin Tanaman Tembakau, Serat & Minyak Industri*, <http://balittas.litbang.pertanian.go.id/images/pdf/vol1292.pdf>.
4. Zhang, C. (2020). Reconstruction of Seed Industry's Value Chain in the Context. *2020 6th International Conference on Energy, Environment and Materials Science* (pp. doi:10.1088/1755-1315/585/1/012080). IOP Publishing.
5. Larissa Flister and Viktoriya Galushko. (2016). The impact of wheat market liberalization on the seed industry's innovative capacity: an assessment of Brazil's experience. *Agricultural and Food Economics*, DOI 10.1186/s40100-016-0055-8.
6. Kolady, e. a. (2012). The Impact of Seed Policy Reforms and Intellectual Property Rights on Crop Productivity in India. *Journal of Agricultural Economics Vol. 63, No. 2*, 361–384 doi: 10.1111/j.1477-9552.2012.00335.x.
7. Mugnisjah, W. Q. (1994). *Pengantar Produksi Benih*. Jakarta: Raja Grafindo Persada.
8. Boef, e. A. (2010). Integrating Genetic Resource Conservation and Sustainable Development into Strategies to Increase the Robustness of Seed Systems. *Journal of Sustainable Agriculture*, 504–531. DOI: 10.1080/10440046.2010.484689.
9. Hassan, e. A. (2008). The Role Of Informal Farmer-To-Farmer Seed Distribution In Diffusion Of New Barley in Varieties in Syria. *Experimental Agriculture*, 413-431.doi:10.1017/S001447970800642X.
10. Croft, e. a. (2017). Formal and Informal Seed Systems in Kenya: Supporting Indigenous Vegetable Seed Quality. *The Journal of Development Studies*, Pages 758–775. <https://doi.org/10.1080/00220388.2017.1308487>.
11. Niels P. Louwaars and Walter Simon de Boef . (2012). Integrated Seed Sector Development in Africa: A Conceptual Framework for Creating Coherence Between Practices, Programs, and Policies. *Journal of Crop Improvement*, 39- 59.<https://doi.org/10.1080/15427528.2011.611277>.
12. Westengen, e. a. (2019). Governing Seeds in East Africa in the Face of Climate Change: Assessing Political and Social Outcomes. *Frontiers in Sustainable Food Systems 3*, DOI:10.3389/fsufs.2019.00053.
13. Thijssen, e. M. (2008). *Farmers, seeds, and varieties Supporting informal seed supply in Ethiopia*. Wageningen: Wageningen University and Research Centre.
14. Shawn McGuire and Louise Sperling. (2016). Seed systems smallholder farmers use. *Food Security*, 179-195. DOI 10.1007/s12571-015-0528-8.
15. Sisay, e. a. (2017). Seed producer cooperatives in the Ethiopian seed sector and their role in seed supply improvement: A review . *Journal of Crop Improvement*, 323–355. <https://doi.org/10.1080/15427528.2017.1303800>.
16. Louwaars, e. N. (2013). Integrated Seed Sector Development in Africa: A Basis for Seed Policy and Law. *Journal of Crop Improvement*, 186–214.DOI: 10.1080/15427528.2012.751472.
17. Almekinders, C. M. (1994). Local Seed Systems and Their Importance for an Improved Seed Supply in Developing Countries. *Euphytica 78*, 207–216.<https://link.springer.com/article/10.1007/BF00027519>.
18. Louwaars, C. J. (2002). The Importance of the Farmers'Seed Systems in a Functional National Seed Sector. *Journal of New Seeds*, 15-33. DOI: 10.1300/J153v04n01_02.
19. Bishaw, Zewdie et al. (2012). Farmers' Seed Sources and Seed Quality: 1. Physical and Physiological Quality. *Journal of Crop Improvement*, 655-692.<https://doi.org/10.1080/15427528.2012.670695>.

20. Amanor, K. S. (2016). South–South Cooperation, Agribusiness, and African Agricultural Development: Brazil and China in Ghana and Mozambique. *World Development*, 13-23. <https://doi.org/10.1016/j.worlddev.2015.11.021>.
21. Brereton, K. a. (2013). A systematic review of systematic review process research in software engineering. *Information and Software Technology*, 2049-2075. <https://doi.org/10.1016/j.infsof.2013.07.010>.
22. Clapp, J. (2021). The problem with growing corporate concentration and power in the global food system. *Nature Food | VOL 2 |*, 404–408. <https://doi.org/10.1038/s43016-021- 00297-7>.
23. Conny J. M. Almekinders and Niels P. Louwaars. (2008). The Importance of the Farmers' Seed Systems in a Functional National Seed Sector. *Journal of New Seeds*, 15-33. https://doi.org/10.1300/J153v04n01_02.
24. David J. Spielman and Adam Kennedy . (2016). Towards better metrics and policymaking for seed system development: Insights from Asia's seed industry. *Agricultural Systems*, 111-122. <https://doi.org/10.1016/j.agsy.2016.05.015>.
25. David J. Spielman and Adam Kennedy. (2015). Innovation, competition, and productivity growth: Evidence on the impact of growth in Asia’s maize seed sector. *International Conference of Agricultural Economist* (pp. 1-30.10.22004/ag.econ.211561). Milan: Università Degri Studi de Milano Agriculture in an Interconnected world.
26. De Boef, W. S. (2010). Integrating Genetic Resource Conservation and Sustainable Development into Strategies to Increase the Robustness of Seed Systems. *Journal of Sustainable Agriculture* , 504-531. <https://doi.org/10.1080/10440046.2010.484689>.
27. Deng, H. e. (2019). Perception and Attitude toward GM Technology among Agribusiness Managers in China as Producers and as Consumers. *Sustainability*, 1342. <https://doi.org/10.3390/su11051342>.
28. Hassan, Aden AW, et al. (2008). The role of informal farmer-to-farmer seed distribution in diffusion of new barley varieties in Syria. *Experimental Agriculture* , 413-431. DOI:10.1017/S001447970800642X.
29. Howard, P. H. (2009). Visualizing Consolidation in the Global Seed Industry:1996–2008. *Sustainability*, 1266-1287; doi:10.3390/su1041266.
30. Huan-guang et.al, Q. (2016). Farmers’ seed choice behaviors under asymmetrical information: Evidence from maize farming in China. *Journal of Integrative Agriculture*, 1915-1923.
31. Kalinda, T. (2014). Adoption of Improved Maize Seed Varieties in Southern Zambia. *Asian Journal of Agricultural Sciences* , 33-39. DOI:10.19026/ajas.6.4851.
32. Karine Peschard & Shalini Randeria (b). (2020). Keeping seeds in our hands’: the rise of seed activism. *The Journal of Peasant Studies*, 613-647. <https://doi.org/10.1080/03066150.2020.1753705>.
33. Karine Peschard and Shalini Randeria,(a). (2020). Taking Monsanto to court: legal activism around intellectual property in Brazil and India. *The Journal of Peasant Studies*, 792-819. <https://doi.org/10.1080/03066150.2020.1753184>.
34. Kitchenham, e. B. (2011). Repeatability of systematic literature reviews. *Proceedings of EASE 2011*, (p. DOI:10.1049/ic.2011.0006).
35. Lundukaa, R. e. (2012). Could farmer interest in diverse seed attributes explain adoption plateaus for modern maize varieties in Malawi? *Food Policy*, 504-510. <https://doi.org/10.1016/j.foodpol.2012.05.001>.
36. Morris, e. a. (1998). India’s maize seed industry in transition: changing roles for the public and private. *Food Policy, Vol. 23, No. 1*, 55-71. [https://doi.org/10.1016/S0306-9192\(98\)00014-1](https://doi.org/10.1016/S0306-9192(98)00014-1).
37. 9192(98)00014-1.
38. Muluk, m. r. (2021). Tinjauan Pustaka Sistematis Tentang Desentralisasi Asimetris. *Jurnal Ilmu Administrasi dan Organisasi*, pasal 4 DOI: 10.20476/jbb.v28i2.1036.

39. Nyoka, Betserai. et al. (2014). Tree Seed and Seedling Supply Systems: A Review of the Asia, Africa and Latin America Models. *Small-scale Forestry*, 171-191. DOI 10.1007/s11842- 014-9280-8.
40. Popa, A. e. (2019). A New Method for Agricultural Market Share Assessment. *Sustainability* , 1- 13. DOI:10.3390/SU11010088.
41. Rattunde, e. .. (2020). Transforming a traditional commons-based seed system through collaborative networks of farmer seed-cooperatives the case of sorghum in Mali. *Agriculture and Human Values*, 561-578. <https://doi.org/10.1007/s10460-020-10170-1>.
42. Schmidt, I.B et.al. (2019). Community-based native seed production for restoration in Brazil – the role of science and policy. *Plant Biology*, 389-397. doi: 10.1111/plb.12842.
43. Sisay, e. a. (2017). Seed producer cooperatives in the Ethiopian seed sector and their role in seed supply improvement: A review . *Journal of Crop Improvement*, 323–355. <https://doi.org/10.1080/15427528.2017.1303800>.
44. Smale, M. a. (2014). Demand for maize hybrids and hybrid change on smallholder farms in Kenya. *Agricultural Economics*, 409–420. <https://doi.org/10.1111/agec.12095>.
45. Stefanie Sievers-Glotzbach and Anja Christinck. (2021). Introduction to the symposium: seed as a commons—exploring innovative concepts and practices governing seed and varieties. *Agriculture and Human Values*, 499– 507. <https://link.springer.com/article/10.1007/s10460-020-10166-x>.
46. Venkatesh, P. (2017). Indian seed industry in the era of intellectual property rights. In N. M. P. Venkatesh, *Indian seed industry in the era of intellectual property rights* (pp. 73-100. https://www.researchgate.net/publication/320609607_Indian_Seed_Industry_in_the_Era_of_Intellectual_Property_Rights). ICAR – National Institute Of Agricultural Economics And Policy.

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