

REFERENCES

- [1] A. Urfels *et al.*, “Farm size limits agriculture’s poverty reduction potential in Eastern India even with irrigation-led intensification,” *Agric Syst*, vol. 207, Apr. 2023, doi: 10.1016/j.agsy.2023.103618.
- [2] Z. Yi, Y. Wang, and Y. J. Chen, “Financing an Agricultural Supply Chain with a Capital-Constrained Smallholder Farmer in Developing Economies,” *Prod Oper Manag*, vol. 30, no. 7, pp. 2102–2121, Jul. 2021, doi: 10.1111/poms.13357.
- [3] N. Clavijo-Buritica, L. Triana-Sanchez, and J. W. Escobar, “A hybrid modeling approach for resilient agri-supply network design in emerging countries: Colombian coffee supply chain,” *Socioecon Plann Sci*, vol. 85, Feb. 2023, doi: 10.1016/j.seps.2022.101431.
- [4] I. Hashmiu, F. Adams, S. Etuah, and J. Quaye, “Food-cash crop diversification and farm household welfare in the Forest-Savannah Transition Zone of Ghana,” *Food Secur*, vol. 16, no. 2, pp. 487–509, Apr. 2024, doi: 10.1007/s12571-024-01434-3.
- [5] L. Mampitiya, H. S. Sumanasekara, N. Rathnayake, Y. Hoshino, and U. Rathnayake, “Explainable artificial intelligence to estimate the Sri Lankan (Ceylon) Tea crop yield,” *Smart Agricultural Technology*, vol. 11, Aug. 2025, doi: 10.1016/j.atech.2025.100999.
- [6] M. Munasinghe, Y. Deraniyagala, N. Dassanayake, and H. Karunarathna, “Economic, social and environmental impacts and overall sustainability of the tea sector in Sri Lanka,” *Sustain Prod Consum*, vol. 12, pp. 155–169, Oct. 2017, doi: 10.1016/j.spc.2017.07.003.
- [7] S. Bermúdez, V. Voora, C. Larrea, and E. Luna, “Tea prices and sustainability SUSTAINABLE COMMODITIES MARKETPLACE SERIES Market Overview,” 2024.
- [8] Asian Development Bank, “Value Chain Development for Tea Sector: Technical Assistance Report,” 2020.
- [9] International Labour Organization, “Future of work for Tea SmallholderS in Sri lanka,” 2018.
- [10] C. Perelli, L. Cacchiarelli, V. Peveri, and G. Branca, “Gender equality and sustainable development: A cross-country study on women’s contribution to the adoption of the climate-smart agriculture in Sub-Saharan Africa,” *Ecological Economics*, vol. 219, May 2024, doi: 10.1016/j.ecolecon.2024.108145.
- [11] W. Li and W. He, “Revenue-increasing effect of rural e-commerce: A perspective of farmers’ market integration and employment growth,” *Econ Anal Policy*, vol. 81, pp. 482–493, Mar. 2024, doi: 10.1016/j.eap.2023.12.015.

- [12] M. M. Jayalath and H. N. Perera, "Mapping post-harvest waste in perishable supply chains through system dynamics: A Sri Lankan case study," *Journal of Agricultural Sciences - Sri Lanka*, vol. 16, no. 3, pp. 526–543, Sep. 2021, doi: 10.4038/jas.v16i03.9477.
- [13] L. M. Bastidas-Orrego, N. Jaramillo, J. A. Castillo-Grisales, and Y. F. Ceballos, "A systematic review of the evaluation of agricultural policies: Using prisma," Oct. 01, 2023, *Elsevier Ltd.* doi: 10.1016/j.heliyon.2023.e20292.
- [14] R. Ishangulyyev, S. Kim, and S. H. Lee, "Understanding food loss and waste-why are we losing and wasting food?," *Foods*, vol. 8, no. 8, 2019, doi: 10.3390/foods8080297.
- [15] L. Schilling and S. Seuring, "The Role of Information and Communication Technology in Managing Supply Chains in Base-of-the-Pyramid Markets," *IEEE Trans Eng Manag*, Mar. 2022, doi: 10.1109/TEM.2022.3156527.
- [16] M. Addison *et al.*, "Exploring the impact of agricultural digitalization on smallholder farmers' livelihoods in Ghana," *Heliyon*, p. e27541, Mar. 2024, doi: 10.1016/j.heliyon.2024.e27541.
- [17] Food and Agriculture Organization of the United Nations, "International tea market: market situation, prospects and emerging issues 2," 2022.
- [18] L. Schilling and S. Seuring, "Sustainable value creation through information technology-enabled supply chains in emerging markets," *International Journal of Logistics Management*, vol. 33, no. 3, pp. 1001–1016, Aug. 2022, doi: 10.1108/IJLM-04-2021-0206.
- [19] D. Agrawal, A. Dwivedi, A. Patil, and S. K. Paul, "Impediments of product recovery in circular supply chains: Implications for sustainable development," *Sustainable Development*, vol. 31, no. 3, pp. 1618–1637, Jun. 2023, doi: 10.1002/sd.2472.
- [20] C. K. Prahalad, A. Di Benedetto, and C. Nakata, "Bottom of the pyramid as a source of breakthrough innovations," *Journal of Product Innovation Management*, vol. 29, no. 1, pp. 6–12, Jan. 2012, doi: 10.1111/j.1540-5885.2011.00874.x.
- [21] E. Njuguna, T. Daum, R. Birner, and J. Mburu, "Silicon Savannah and smallholder farming: How can digitalization contribute to sustainable agricultural transformation in Africa?," Jan. 01, 2025, *Elsevier Ltd.* doi: 10.1016/j.agry.2024.104180.
- [22] M. N. K. SAUNDERS, P. LEWIS, and A. THORNHILL, *Research Methods for Business Students*. Pearson, 1997.
- [23] S. Seuring, T. Stella, and M. Stella, "Developing and Publishing Strong Empirical Research in Sustainability Management—Addressing the Intersection of Theory, Method, and Empirical Field," *Frontiers in Sustainability*, vol. 1, Feb. 2021, doi: 10.3389/frsus.2020.617870.

- [24] K. Braa and R. Vidgen, "Interpretation, intervention, and reduction in the organizational laboratory: a framework for in-context information system research," 1999.
- [25] R. K. Yin, "Case Study Research and Applications: Design and Methods," 2018.
- [26] R. Kaplinsky, M. Morris, S. Barrientos, J. Smith, and J. Barnes, "A HANDBOOK FOR VALUE CHAIN RESEARCH Prepared for the IDRC by An Important Health Warning or A Guide for Using this Handbook," 2000.
- [27] John. Sterman, *Business dynamics : systems thinking and modeling for a complex world*. Irwin/McGraw-Hill, 2000.
- [28] Jr. Joe H. Ward, "Hierarchical Grouping to Optimize an Objective Function," *J Am Stat Assoc*, vol. 58, no. 301, 1963.
- [29] T. L. Saaty, "DECISION MAKING-THE ANALYTIC HIERARCHY AND NETWORK PROCESSES (AHP/ANP)," 2004.
- [30] G.-H. Tzeng and J.-J. Huang, *Multiple Attribute Decision Making: Methods and Applications*. Taylor & Francis, 2011.
- [31] Inc. The MathWorks, "Fuzzy Logic Toolbox User's Guide," 2024. [Online]. Available: www.mathworks.com
- [32] International Organization for Standardization, *ISO 31000: 2018, Risk Management - Guidelines*. ISO, Geneva, Switzerland, 2018.
- [33] J. Hammond *et al.*, "Poverty dynamics and the determining factors among East African smallholder farmers," *Agric Syst*, vol. 206, Mar. 2023, doi: 10.1016/j.agry.2023.103611.
- [34] J. Mössinger, C. Troost, and T. Berger, "Bridging the gap between models and users: A lightweight mobile interface for optimized farming decisions in interactive modeling sessions," *Agric Syst*, vol. 195, Jan. 2022, doi: 10.1016/j.agry.2021.103315.
- [35] I. Ali, I. Golgeci, and A. Arslan, "Achieving resilience through knowledge management practices and risk management culture in agri-food supply chains," *Supply Chain Management*, vol. 28, no. 2, pp. 284–299, Mar. 2023, doi: 10.1108/SCM-02-2021-0059.
- [36] Md. F. Bin Alam, S. R. Tushar, S. Md. Zaman, E. D. R. S. Gonzalez, A. B. M. M. Bari, and C. L. Karmaker, "Analysis of the drivers of Agriculture 4.0 implementation in the emerging economies: Implications towards sustainability and food security," *Green Technologies and Sustainability*, vol. 1, no. 2, p. 100021, May 2023, doi: 10.1016/j.grets.2023.100021.
- [37] T. Hoang, J. Bell, P. H. Hiep, and C. W. Autry, "The sustainable development of rural-to-urban food supply chains in developing nations," *International Journal of Logistics Management*, 2023, doi: 10.1108/IJLM-02-2022-0072.

- [38] R. Fabregas, M. Kremer, and F. Schilbach, "Realizing the potential of digital development: The case of agricultural advice," Dec. 13, 2019, *American Association for the Advancement of Science*. doi: 10.1126/science.aay3038.
- [39] A. Quandt *et al.*, "Mobile phone use is associated with higher smallholder agricultural productivity in Tanzania, East Africa," *PLoS One*, vol. 15, no. 8 August, Aug. 2020, doi: 10.1371/journal.pone.0237337.
- [40] M. Kabirigi, H. Sekabira, Z. Sun, and F. Hermans, "The use of mobile phones and the heterogeneity of banana farmers in Rwanda," *Environ Dev Sustain*, 2022, doi: 10.1007/s10668-022-02268-9.
- [41] E. Simelton and M. McCampbell, "Do digital climate services for farmers encourage resilient farming practices? Pinpointing gaps through the responsible research and innovation framework," *Agriculture (Switzerland)*, vol. 11, no. 10, Oct. 2021, doi: 10.3390/agriculture11100953.
- [42] W. M. Fernando, H. N. Perera, R. M. C. Ratnayake, and A. Thibbotuwawa, "Storm in a teacup: implications of mobile phone literacy on sustainable smallholder agri-food supply chains in developing economies," *International Journal of Logistics Management*, 2024, doi: 10.1108/IJLM-09-2023-0413.
- [43] A. R. Abdulai, R. Gibson, and E. D. G. Fraser, "Beyond transformations: Zooming in on agricultural digitalization and the changing social practices of rural farming in Northern Ghana, West Africa," *J Rural Stud*, vol. 100, May 2023, doi: 10.1016/j.jrurstud.2023.103019.
- [44] G. E. Mushi, G. D. M. Serugendo, and P. Y. Burgi, "Digital Technology and Services for Sustainable Agriculture in Tanzania: A Literature Review," Feb. 01, 2022, *MDPI*. doi: 10.3390/su14042415.
- [45] M. Lezoche, H. Panetto, J. Kacprzyk, J. E. Hernandez, and M. M. E. Alemany Díaz, "Agri-food 4.0: A survey of the Supply Chains and Technologies for the Future Agriculture," May 01, 2020, *Elsevier B.V.* doi: 10.1016/j.compind.2020.103187.
- [46] A. Piancharoenwong and Y. F. Badir, "IoT smart farming adoption intention under climate change: The gain and loss perspective," *Technol Forecast Soc Change*, vol. 200, Mar. 2024, doi: 10.1016/j.techfore.2023.123192.
- [47] W. M. Fernando, H. N. Perera, R. M. Chandima Ratnayake, and A. Thibbotuwawa, "Assessing the Digital Transformation Maturity of SMEs: A Systematic Literature Review," *Institute of Electrical and Electronics Engineers (IEEE)*, Apr. 2024, pp. 427–432. doi: 10.1109/ectidamtncon60518.2024.10480063.
- [48] W. M. Fernando, A. Thibbotuwawa, R. M. C. Ratnayake, and H. N. Perera, "Digitalizing Smallholder Farmer Agri-Food Supply Chains: A Case Study from a Developing Economy," 2024, pp. 164–176. doi: 10.1007/978-3-031-71633-1_12.

- [49] F. Dad, F. Dibari, A. Kebede, E. Lefu, T. Ndumiyana, and B. Butaumocho, “Digitalisation in the WFP fresh food voucher programme: a pilot study from rural Amhara region, Ethiopia,” *Front Nutr*, vol. 10, 2023, doi: 10.3389/fnut.2023.1217794.
- [50] Bobbi Gray *et al.*, “DIGITAL FARMER PROFILES: Reimagining Smallholder Agriculture,” 2018.
- [51] P. Kumar, T. Hendriks, H. Panoutsopoulos, and C. Brewster, “Investigating FAIR data principles compliance in horizon 2020 funded Agri-food and rural development multi-actor projects,” *Agric Syst*, vol. 214, Feb. 2024, doi: 10.1016/j.agsy.2023.103822.
- [52] W. J. Burke, T. S. Jayne, and S. S. Snapp, “Nitrogen efficiency by soil quality and management regimes on Malawi farms: Can fertilizer use remain profitable?,” *World Dev*, vol. 152, Apr. 2022, doi: 10.1016/j.worlddev.2021.105792.
- [53] J. G. A. Barbedo, “A review on the combination of deep learning techniques with proximal hyperspectral images in agriculture,” Jul. 01, 2023, *Elsevier B.V.* doi: 10.1016/j.compag.2023.107920.
- [54] Food and Agriculture Organization (FAO), “Digital Agriculture Profile • Rwanda,” 2020.
- [55] T. Dietz and J. Grabs, “Additionality and Implementation Gaps in Voluntary Sustainability Standards,” *New Political Economy*, vol. 27, no. 2, pp. 203–224, 2022, doi: 10.1080/13563467.2021.1881473.
- [56] P. Glasbergen, “Smallholders do not Eat Certificates,” *Ecological Economics*, vol. 147, pp. 243–252, May 2018, doi: 10.1016/j.ecolecon.2018.01.023.
- [57] J. Bemelmans, D. Curzi, A. Olper, and M. Maertens, “Trade effects of voluntary sustainability standards in tropical commodity sectors,” *Food Policy*, vol. 118, Jul. 2023, doi: 10.1016/j.foodpol.2023.102440.
- [58] T. Chever, A. Gonçalves, and C. Lepeule, “Research for AGRI Committee – Farm certification schemes for sustainable agriculture, state of play and overview in the EU and in key global producing countries, concepts and methods,” Brussels, 2022.
- [59] W. M. Fernando, H. N. Perera, A. Thibbotuwawa, and R. M. C. Ratnayake, “Optimizing Market Access for Tea Smallholder Farmers: The Role of Voluntary Sustainable Standards in Developing Economies,” *IFAC-PapersOnLine*, vol. 59, no. 10, pp. 655–660, 2025, doi: 10.1016/j.ifacol.2025.09.112.
- [60] A. Elyasi and E. Teimoury, “Applying Critical Systems Practice meta-methodology to improve sustainability in the rice supply chain of Iran,” *Sustain Prod Consum*, vol. 35, pp. 453–468, Jan. 2023, doi: 10.1016/j.spc.2022.11.024.

- [61] M. Githinji, M. van Noordwijk, C. Muthuri, E. N. Speelman, J. Kampen, and G. J. Hofstede, “‘You never farm alone’: Farmer land-use decisions influenced by social relations,” *J Rural Stud*, vol. 108, May 2024, doi: 10.1016/j.jrurstud.2024.103284.
- [62] W. M. Fernando, A. Thibbotuwawa, H. N. Perera, P. Nielsen, and D. K. Kilic, “An integrated vehicle routing model to optimize agricultural products distribution in retail chains,” *Cleaner Logistics and Supply Chain*, vol. 10, Mar. 2024, doi: 10.1016/j.clscn.2023.100137.
- [63] R. M. C. Ratnayake and K. Antosz, “Risk-Based Maintenance Assessment in the Manufacturing Industry: Minimisation of Suboptimal Prioritisation,” *Management and Production Engineering Review*, vol. 8, no. 1, pp. 38–45, Mar. 2017, doi: 10.1515/mper-2017-0005.
- [64] I. Medvediev, D. Muzylyov, and J. Montewka, “A model for agribusiness supply chain risk management using fuzzy logic. Case study: Grain route from Ukraine to Poland,” *Transp Res E Logist Transp Rev*, vol. 190, Oct. 2024, doi: 10.1016/j.tre.2024.103691.
- [65] M. Güler and G. Büyüközkan, “Analysis of digital transformation strategies with an integrated fuzzy AHP-axiomatic design methodology,” in *IFAC-PapersOnLine*, Elsevier B.V., Sep. 2019, pp. 1186–1191. doi: 10.1016/j.ifacol.2019.11.359.
- [66] R. M. C. Ratnayake, “Knowledge based engineering approach for subsea pipeline systems’ FFR assessment,” *TQM Journal*, vol. 28, no. 1, pp. 40–61, Jan. 2016, doi: 10.1108/TQM-12-2013-0148.
- [67] F. Nilsson, N. Silva, and J. Schelin, “Single-use versus reusable packaging for perishable liquid foods - Exploring evidence from research on climate impact and food safety,” Aug. 01, 2024, *Elsevier B.V.* doi: 10.1016/j.resconrec.2024.107655.
- [68] A. Zhang and S. Seuring, “Digital product passport for sustainable and circular supply chain management: a structured review of use cases,” *International Journal of Logistics Research and Applications*, 2024, doi: 10.1080/13675567.2024.2374256.
- [69] M. H. Lubinga, A. A. Ogundeji, H. Jordaan, and A. J. Verschoor, “Impact of European Union generalized system of preferences scheme on fruit and vegetable exports from East Africa: A preference margin approach,” *Outlook Agric*, vol. 46, no. 3, pp. 213–222, Sep. 2017, doi: 10.1177/0030727017728590.
- [70] H. C. Jalotjot and H. Tokuda, “Exploring smallholder farmers’ open innovation capability: A structural equation modeling approach,” *Journal of Open Innovation: Technology, Market, and Complexity*, vol. 10, no. 2, Jun. 2024, doi: 10.1016/j.joitmc.2024.100305.
- [71] J. P. Spellmeier, C. B. Rosa, P. D. Rigo, M. F. Mello, and M. Hoss, “Design of a business model for competitive end-of-life performance of photovoltaic

systems in Brazil,” *Renew Energy*, vol. 245, Jun. 2025, doi: 10.1016/j.renene.2025.122755.

- [72] M. Niero, “Implementation of the European Union’s packaging and packaging waste regulation: A decision support framework combining quantitative environmental sustainability assessment methods and socio-technical approaches,” *Cleaner Waste Systems*, vol. 6, Dec. 2023, doi: 10.1016/j.clwas.2023.100112.