



- Abd Aziz, N.N., & Samad, S. 2016. Innovation and competitive advantage: Moderating effects of firm age in foods manufacturing SMEs in Malaysia. *Procedia Economics and Finance* 35: 256–266. [http://doi.org/10.1016/S2212-5671\(16\)00032-0](http://doi.org/10.1016/S2212-5671(16)00032-0)
- Akis, E. 2015. Innovation and competitive power. *Procedia-Social and Behavioral Sciences* 195: 1311–1320.
- Alarcón, L.V., Allepuz, A., & Mateu, E. 2021. Biosecurity in pig farms: a review. *Porcine Health Management* 7(1): 5. <http://doi.org/10.1186/s40813-020-00181-z>
- Altman. 1985. *Organizational behavior: Theory and practice*. Orlando, Florida: Academic Press, Inc.
- Anang, B. T., & Apedo, C. K. 2023. The influence of off-farm work on farm income among smallholder farm households in northern Ghana. *Cogent Economics & Finance* 11(1): 2196861. <https://doi.org/10.1080/23322039.2023.2196861>
- Aziz, N. N. A., & Samad, S. 2016. Innovation and competitive advantage: Moderating effects of firm age in foods manufacturing SMEs in Malaysia. *Procedia Economics and Finance* 35: 256–266. [https://doi.org/10.1016/S2212-5671\(16\)00032-0](https://doi.org/10.1016/S2212-5671(16)00032-0)
- Bachev, H. 2010. *Management of farm contracts and competitiveness*. Germany: VDM Verlag Dr. Muller.
- Bachev, H. L. 2021. Unpacking competitiveness of agricultural farms in Bulgaria. *Journal of Economics Bibliography* 8(1): 56–81. <https://doi.org/10.1453/jeb.v8i1.2180>
- Bai, Z., Zhao, J., Wei, Z., Jin, X., & Ma, L. 2019. Socio-economic drivers of pig production and their effects on achieving sustainable development goals in China. *Journal of Integrative Environmental Sciences* 16(1): 141–155. <http://doi.org/10.1080/1943815X.2019.1671463>
- Bianchi, M., Bava, L., Sandrucci, A., Tangorra, F., Tamburini, A., Gislón, G., & Zucali, M. 2022. Diffusion of precision livestock farming technologies in dairy cattle farms. *Animal* 16(11): 100650. <http://doi.org/10.1016/j.animal.2022.100650>
- Biru, H.S., & Korgitet, H.S. 2019. The effect of farmers education on farm productivity: Evidence from small-scale maize producing farmers in North Bench District, Bench Maji Zone. *Research on Humanities and Social Sciences* 9(17): 26–34. <http://doi.org/10.7176/RHSS/9-17-04>
- Bosma, R. H., Udo, H. M., Verreth, J. A., Visser, L. E., & Nam, C. Q. 2005. Agriculture diversification in the Mekong Delta: farmers' motives and contributions to livelihoods. *Asian Journal of Agriculture and Development* 2: 49–66.
- Carayannis, E., & Grigoroudis, E. 2016. Quadruple innovation helix and smart specialization: Knowledge production and national competitiveness. *Foresight and STI Governance* 10(1): 31–42.

Cesaro, J. D., Bonnet, P., Hostiou, N., Cournut, S., & Quang, H. V. 2016. Statistics on livestock production in Vietnam.

Chams, N., & García-Blandón, J. 2019. On the importance of sustainable human resource management for the adoption of sustainable development goals. *Resources, Conservation and Recycling* 141: 109–122. <http://doi.org/10.1016/j.resconrec.2018.10.006>

Chursin, A., Vlasov, Y., & Makarov, Y. 2017. Innovation as a basis for competitiveness: Theory and practice. 1st ed. Springer Cham, Switzerland.

Cook. 1994. A structural equation model of dyadic relationship within the family system. *Journal of Consulting and Clinical Psychology* 62: 500–509.

Corbett, C., & Van Wassenhove, L. 1993. Trade-offs? What trade-offs? Competence and competitiveness in manufacturing strategy. *California Management Review* 35(4): 107–122.

Dang-Nguyen, T.Q., Tich, N.K., Nguyen, B.X., Ozawa, M., Kikuchi, K., Manabe, N., Ratky, J., Kanai, Y., & Nagai, T. 2010. Introduction of various Vietnamese indigenous pig breeds and their conservation by using assisted reproductive techniques. *Journal of Reproduction and Development* 56(1): 31–35. <http://doi.org/10.1262/jrd.09-165k>

Dhillon, R., & Moncur, Q. 2023. Small-scale farming: A review of challenges and potential opportunities offered by technological advancements. *Sustainability* 15(21): 15478. <http://doi.org/10.3390/su152115478>

Dhraief, M. Z., Bedhief, S., Dhehibi, B., Oueslati-Zlaoui, M., Jebali, O., & Ben-Youssef, S. 2019. Factors affecting innovative technologies adoption by livestock holders in arid area of Tunisia. *Journal of New Medit* 4: 3–18. <https://doi.org/10.30682/nm1904a>

Di Falco, S. 2018. Adaptation to climate change in sub-Saharan agriculture: Assessing the evidence and rethinking the drivers, pp. 83–106. In: Berck, C. S., Berck, P., & Falco, S. D. (Ed). *Agricultural adaptation to climate change in Africa*. Routledge, Abingdon, UK.

Diaz, A.C., Sasaki, N., Tsusaka, T.W., & Szabo, S. 2021. Factors affecting farmers' willingness to adopt a mobile app in the marketing of bamboo products. *Resources, Conservation and Recycling Advances* 11: 200056. <http://doi.org/10.1016/j.rcradv.2021.200056>

Dinh, D.-T., Do, T.-N., Trinh, A.-D., Pham, N.-B., & Le, T.-T. 2021. Utilization of biogas as an untapped renewable energy source in Vietnam. *Economia delle Fonti di Energia e dell'Ambiente* 2021(1): 105–120. <http://doi.org/10.3280/EFE2021-001006>

Dinh, Tung Xuan. 2017. An overview of agricultural pollution in Vietnam: The livestock sector. Prepared for the World Bank, Washington, DC.

Dione, M. M., Dohoo, I., Ndiwa, N., Poole, J., Ouma, E., Amia, W. C., & Wieland, B. 2020. Impact of participatory training of smallholder pig farmers on knowledge, attitudes and practices regarding biosecurity for the control of African swine fever in Uganda. *Transboundary and*

- Distanont, A., & Khongmalai, O. 2018. The role of innovation in creating a competitive advantage. *Kasetsart Journal of Social Sciences* 41: 1–7. <https://doi.org/10.1016/j.kjss.2018.07.009>
- Distanont, A., & Orapan, K. 2020. The role of innovation in creating a competitive advantage. *Kasetsart Journal of Social Sciences* 41(1): 15–21. <https://doi.org/10.1016/j.kjss.2018.07.009>
- Doğan, E. 2016. The effect of innovation on competitiveness. *Istanbul University Econometrics and Statistics e-Journal* 24: 60–81.
- FAO. 2022. Pig production in Vietnam from 2005 to 2021 (in million heads). Statista. Retrieved March 15, 2023 from <https://www.statista.com/statistics/661016/vietnam-pig-production/>
- FAO. 2020. Africa swine fever (ASF) situation in Asia update, 20 September 2019. http://www.fao.org/ag/againfo/programmes/en/empres/ASF/situation_update.html. Accessed June 20, 2020.
- FAO. 2023. Pig production in Vietnam from 2005 to 2021 (in million heads). <https://www.statista.com/statistics/661016/vietnam-pig-production/>. Accessed December 22, 2022.
- Fowowe, B. 2020. The effects of financial inclusion on agricultural productivity in Nigeria. *Journal of Economic Development* 22(1): 61–79. <http://doi.org/10.1108/JED-11-2019-0059>
- Frederick, H., O'connor, A., & Kuratko, D.F. 2016. *Entrepreneurship: Theory, process, and practice*. 9th ed. Cengage Learning, US.
- Fuetsch, E. 2022. Innovation in family farms: the roles of the market, the family, and farm performance. *Journal of Small Business Strategy* 32(2): 83–103. <http://doi.org/10.53703/001c.31714>
- Geels, F.W., & Schot, J. 2007. Typology of sociotechnical transition pathways. *Research Policy* 36: 399–417.
- General Statistics Office. 2023. *Statistical year book of 2023*. Statistical Publishing House. <https://www.nso.gov.vn/en/default/2024/07/statistical-yearbook-of-2023/>
- Glover, D., Sumberg, J., Ton, G., Andersson, J., & Badstue, L. 2019. Rethinking technological change in smallholder agriculture. *Outlook on Agriculture* 48(3): 169–180. <http://doi.org/10.1177/0030727019864978>
- Gottschall, R.L., & Woods, J.A. 2020. Family human capital and the championing of innovation in small firms. *Journal of Small Business Strategy* 30: 1–15.
- General Statistics Office (GSO). 2014. *Statistical yearbook*. Hanoi: Statistical Publishing House.

General Statistics Office (GSO). 2024. Socio-economic situation report in the first quarter of 2024. <https://www.gso.gov.vn/en/data-and-statistics/2024/04/socio-economic-situation-report-in-the-first-quarter-of-2024/>. Accessed Aug 5, 2024.

General Statistics Office (GSO). 2015. Vietnam household living standard survey report. Hanoi, Vietnam: Statistical Publishing House.

General Statistics Office (GSO). 2016. Statistical year book of Vietnam 2015. Hanoi, Vietnam: Statistical Publishing House.

General Statistics Office (GSO). 2023. Statistical year book of 2023. Statistical Publishing House, Hanoi.

Guntoro, B., Triatmojo, A., Ariyadi, B., & Qui, N. 2023. Risk analysis in cattle farmers' prevention practices of anthrax and foot and mouth disease in Yogyakarta province, Indonesia. *Advances in Animal and Veterinary Sciences* 11(6): 987–997. <https://doi.org/10.17582/journal.aavs/2023/11.6.987.997>

Gupta, S., Malhotra, N.K., Czinkota, M., & Foroudi, P. 2016. Marketing innovation: A consequence of competitiveness. *Journal of Business Research* 69: 5671–5681.

Hansen, A. 2018. Meat consumption and capitalist development: The meatification of food provision and practice in Vietnam. *Geoforum* 93: 57–68.

Hendayana, Y., Ahman, E., & Mulyadi, H. 2019. The effect of innovation on business competitiveness of small and medium enterprise in Indonesia, pp. 116–120. *International Conference on Organizational Innovation (ICOI 2019)*. 20–22 July 2019. University of Ulsan, South Korea.

Hoang, G. H. 2020a. Adoption of good agricultural practices by cattle farmers in the Binh Dinh Province of Vietnam. *Journal of Agricultural Extension* 24(4): 151–160. <https://doi.org/10.4314/jae.v24i4.15>

Hoang, G. H. 2020b. Exploring farmers' adoption of VietGAP from systemic perspective: implication for developing agri-food systems. *British Food Journal* 122(12): 3641–3661. <https://doi.org/10.1108/BFJ-09-2019-0724>

Huong, L.T.T., Takahashi, Y., Duy, L.V., Chung, D.K., & Yabe, M. 2023. Development of livestock farming system and technical efficiency: A case study on pig production in Vietnam. *Journal of the Faculty of Agriculture, Kyushu University* 68(1): 79. <http://doi.org/10.5109/6770291>

Huyen, L. T. T., Duteurtre, G., Cournut, S., Messad, S., & Hostiou, N. 2019. Diversity and sustainability of pig farm types in the northern mountains of Vietnam. *Tropical Animal Health and Production* 51: 2583–2593.

Huyen, N. T. T., Nga, N. T. D., Hung, P. V., Lapar, L. A., Trung, N. X., Unger, F., & Pho, N. V. 2018. Farming practices in smallholder pig production

in Vietnam: implications for food safety. *Journal of Economics, Management and Agricultural Development* 4: 1–14.

- Jerop, R., Dannenberg, P., Owuor, G., Mshenga, P., Kimurto, P., Willkomm, M., & Hartmann, G. 2018. Factors affecting the adoption of agricultural innovations on underutilized cereals: The case of finger millet among smallholder farmers in Kenya. *African Journal of Agricultural Research* 13: 1888–1900.
- Jiang, H. 2009. Review of Vietnamese agricultural policy. *Transnational Corporations Review* 1(3): 17–29. <https://doi.org/10.1080/19186444.2009.11658201>
- Jouzi, Z., Azadi, H., Taheri, F., Zarafshani, K., Gebrehiwot, K., Van Passel, S., & Lebailly, P. 2017. Organic farming and small-scale farmers: Main opportunities and challenges. *Ecological Economics* 132: 144–154. <http://doi.org/10.1016/j.ecolecon.2016.10.016>
- Judith, K., Gathungu, E., Ayuya, O.I., & Kimurto, P. 2021. Effects of production and market innovations on the level of competitiveness of sorghum small scale agrienterprises. *Modern Economy* 12: 1137–1159.
- Khan, F.U., Nouman, M., Negrut, L., Abban, J., Cismas, L.M., & Siddiqi, M.F. 2024. Constraints to agricultural finance in underdeveloped and developing countries: A systematic literature review. *International Journal of Sustainable Agricultural Research* 22(1): 2329388. <http://doi.org/10.1080/14735903.2024.2329388>
- Khuu, T. P. D., Saito, Y., Tojo, N., Nguyen, P. D., Nguyen, T. N. H., & Matsuishi, T. F. 2019. Are consumers willing to pay more for traceability? Evidence from an auction experiment of Vietnamese pork. *International Journal of Food and Agricultural Economics* 7: 127–140.
- Kinh, L.V., Hai, L.T., Quang, D.V., & Duc, N.V. 2010. Pig production in Vietnam. *ACIAR Working Paper - Priorities for Pig Research in Southeast Asia and the Pacific to 2010* 53: 65–71.
- Krampe, C., Ingenbleek, P.T.M., Niemi, J.K., & Serratos, J. 2024. Designing precision livestock farming system innovations: A farmer perspective. *Journal of Rural Studies* 111: 103397. <http://doi.org/10.1016/j.jrurstud.2024.103397>
- Kumari, A., & Garg, V. 2023. Impact of credit on sustainable agricultural development in India. *Journal of Sustainable Finance and Investment* 13(1): 560–571. <https://doi.org/10.1080/20430795.2021.1964811>
- Lapar, L.A. 2014. Review of the pig sector in Vietnam. *The REVALTER Project, Multi-Scale Assessment of Livestock Development Pathways in Vietnam*. 51 p.
- Lapar, M., & Tiongco, M. 2011. Private standards in pork value chains: Role, impact and potential for local innovation to improve food safety and enhance smallholder competitiveness. *Farm Policy Journal* 8: 39–53.

- Läpple, D., & Thorne, F. 2019. The role of innovation in farm economic sustainability: Generalised propensity score evidence from Irish dairy farms. *Journal of Agricultural Economics* 70: 178–197.
- Läpple, D., & Kelley, H. 2015. Spatial dependence in the adoption of organic drystock farming in Ireland. *European Review of Agricultural Economics* 42: 315–337.
- Lencucha, R., Pal, N. E., Appau, A., Thow, A. M., & Drope, J. 2020. Government policy and agricultural production: A scoping review to inform research and policy on healthy agricultural commodities. *Globalization and Health* 16: 1–15.
- Levine, D.M., & Stephan, D.F. 2010. *Even you can learn statistics: A guide for everyone who has ever been afraid of statistics*. 2nd ed. FT Press, New Jersey.
- Linh, N.T., Dong, N.T.K., & Thu, N.V. 2022. A survey of Muscovy duck production in rural areas of Tra Vinh Province, Vietnam. *Journal of the Indonesian Tropical Animal Agriculture* 47(2): 138–145. <http://doi.org/10.14710/jitaa.47.2.138-145>
- Liu, J., Fang, Y., Wang, G., Liu, B., & Wang, R. 2023. The aging of farmers and its challenges for labor-intensive agriculture in China: A perspective on farmland transfer plans for farmers' retirement. *Journal of Rural Studies* 100: 103013. <http://doi.org/10.1016/j.jrurstud.2023.103013>
- Ly, N.T., Nanseki, T., & Chomei, Y. 2016. Technical efficiency and its determinants in household pig production in Vietnam: A DEA approach. *The Japanese Journal of Rural Economics* 18: 56–61.
- Maes, D. G. D., Dewulf, J., Piñeiro, C., Edwards, S., & Kyriazakis, I. 2020. A critical reflection on intensive pork production with an emphasis on animal health and welfare. *Journal of Animal Science* 98(Suppl 1): S15–S26. <https://doi.org/10.1093/jas/skz362>
- Malak-Rawlikowska, A., Gębska, M., Hoste, R., Leeb, C., Montanari, C., Wallace, M., & Roest, K. 2021. Developing a methodology for aggregated assessment of the economic sustainability of pig farms. *Energies* 14(6): 1760. <https://doi.org/10.3390/en14061760>
- Minh, D. N., Huy, D. T. N., & Dat, P. M. 2021. Vietnam's meat import market under impacts of the European-Vietnam Free Trade Agreement and quality management demand. *Management* 25(1): 99–117.
- Ndwandwe, S.B., & Weng, R.-C. 2018. Competitive analyses of the pig industry in Swaziland. *Sustainability* 10(12): 4402.
- Neethirajan, S. 2021. Is seeing still believing? Leveraging deepfake technology for livestock farming. *Frontiers in Veterinary Science* 8: 740253. <http://doi.org/10.3389/fvets.2021.740253>
- Negassi, S., Lhuillery, S., Sattin, J.F., Hung, T.Y., & Pratloug, F. 2019. Does the relationship between innovation and competition vary across industries? Comparison of public and private research enterprises. *Economics of Innovation and New Technology* 28: 465–482.

- Nga, N.T.D., Ho, N.N., Pham, V.H., & Lapar, M.L. 2013. The pig value chain in Vietnam: A situational analysis report. ILRI Research Report. Nairobi, Kenya: ILRI.
- Nga, N.T.D., Van Hung, P., Vy, L.T.L., Huyen, N.T.T., Ha, D.N., & Huong, G. 2021. Swine production and challenges in Vietnam after African swine fever: A case study in peri-urban Hanoi, Vietnam. *Vietnam Journal of Agricultural Sciences* 4(1): 965–977. <http://doi.org/10.31817/vjas.2021.4.1.07>
- Nguyen Thi Thuy, M., Dorny, P., Lebailly, P., Le Thi Minh, C., Nguyen Thi Thu, H., & Dermauw, V. 2020. Mapping the pork value chain in Vietnam: A systematic review. *Tropical Animal Health and Production* 52(6): 2799–2808. <http://doi.org/10.1007/s11250-020-02338-y>
- Nguyen-Thi, T., Pham-Thi-Ngoc, L., Nguyen-Ngoc, Q., Dang-Xuan, S., Lee Nguyen-Thi, T., Pham-Thi-Ngoc, L., Nguyen-Ngoc, Q., Dang-Xuan, S., Lee, H.S., Nguyen-Viet, H., Padungtod, P., Nguyen-Thu, T., Nguyen-Thi, T., & Tran-Cong, T. 2021. An assessment of the economic impacts of the 2019 African swine fever outbreaks in Vietnam. *Frontiers in Veterinary Science* 8: 686038. <http://doi.org/10.3389/fvets.2021.686038>
- Nguyen, T.-T., Nguyen, T.T., & Grote, U. 2023. Credit, shocks and production efficiency of rice farmers in Vietnam. *Economic Analysis and Policy* 77: 780–791. <http://doi.org/10.1016/j.eap.2022.12.018>
- Norton, T., Chen, C., Larsen, M.L.V., & Berckmans, D. 2019. Precision livestock farming: Building ‘digital representations’ to bring the animals closer to the farmer. *Animal* 13(12): 3009–3017. <http://doi.org/10.1017/S175173111900199X>
- Nybom, J., Hunter, E., Micheels, E., & Melin, M. 2021. Farmers’ strategic responses to competitive intensity and the impact on perceived performance. *SN Business and Economics* 1(6): 74. <https://doi.org/10.1007/s43546-021-00078-1>
- OECD. 2022. Agricultural policy: Indicator group. https://www.oecd-ilibrary.org/agriculture-and-food/agricultural-policy/indicator-group/english_22d89f8c-en
- OECD. 2023. Meat consumption (indicator). <http://doi.org/10.1787/fa290fd0-en>
- OECD. 2016. Meat consumption (indicator). <http://doi.org/10.1787/fa290fd0-en>
- Oladapo, M.O., Abualqumboz, M., Ngog, L.M., Oyetunji, A.K., Amaechi, C.V., Bello, R., & Amaechi, E.C. 2023. Sustainable technology adoption as a source of competitive advantage for pineapple production in Ejigbo, Nigeria. *Economies* 11(9): 222. <http://doi.org/10.3390/economies11090222>
- Phung, Q. A., & Dao, N. 2024. Farmers’ perceptions of sustainable agriculture in the Red River Delta, Vietnam. *Heliyon* 10(7): e28576.



- Piñeiro, V., Arias, J., Dürr, J., Elverdin, P., Ibáñez, A.M., Kinengyere, A., Opazo, C.M., Owoo, N., Page, J.R., & Prager, S.D. 2020. A scoping review on incentives for adoption of sustainable agricultural practices and their outcomes. *Nature Sustainability* 3(10): 809–820. <http://doi.org/10.1038/s41893-020-00617-y>
- Priya, & Singh, S. 2024. Factors influencing the adoption of sustainable agricultural practices: A systematic literature review and lesson learned for India. *Forum for Social Economics* 53(1): 1–17. <https://doi.org/10.1080/07360932.2022.2057566>
- Quddus, M.A. 2022. Dissemination of technological innovations of livestock in Bangladesh: Adoption levels and behavioral precision. *Proceedings of the National Academy of Sciences India Section B: Biological Sciences* 92: 461–472.
- Qui, N. H., Guntoro, B., Putra, A. R. S., Thu, N. T. A., Liangco, N. C., & Linh, N. T. 2025. Analysis of pig farming productivity and the perceptions of farmers towards government support policies in the Mekong delta, Vietnam. *Advances in Animal and Veterinary Sciences* 13(2): 279–288. <https://dx.doi.org/10.17582/journal.aavs/2025/13.2.279.288>
- Qui, N. H., Guntoro, B., & Syahlani, S. P. 2020. The social profile, constraints, and its impact on swine herd size in Tra Vinh Province, Vietnam. *Tropical Animal Science Journal* 43(4): 385–390. <https://doi.org/10.5398/tasj.2020.43.4.385>
- Qui, N. H., Guntoro, B., Syahlani, S. P., & Linh, N. T. 2021. Factor affecting the information sources and communication channels toward pig farmer's perception of African swine fever in Tra Vinh province, Vietnam. *Tropical Animal Science Journal* 44(2): 248–254. <https://doi.org/10.5398/tasj.2021.44.2.248>
- Qui, N. H., Guntoro, B., Putra, A. R. S., Thu, N. T. A., Liangco, N. C., & Linh, N. T. 2025. Analysis of pig farming productivity and the perceptions of farmers towards government support policies in the Mekong delta, Vietnam. *Advances in Animal and Veterinary Sciences* 13(2): 279–288. <http://doi.org/10.17582/journal.aavs/2025/13.2.279.288>
- Qui, N. H., Guntoro, B., Syahlani, S., & Linh, N. 2020. Value chain analysis and benefit distribution of pig industry in Vietnam. *Uncertain Supply Chain Management* 8(4): 685–692.
- Qui, N. H., Thu, N. T. A., & Linh, N. T. 2024b. Factors affecting highly pathogenic avian influenza vaccination practices at poultry farms in Tra Vinh, Vietnam. *Open Veterinary Journal* 14(3): 794–804. <http://doi.org/10.5455/OVJ.2024.v14.i3.6>
- Qui, N. H., Thu, N. T. A., & Linh, N. T. 2024a. The awareness and behaviour of farmers towards highly pathogenic avian influenza prevention in Tra Vinh, Vietnam. *Journal of the Indonesian Tropical Animal Agriculture* 49(2): 169–180. <http://doi.org/10.14710/jitaa.49.2.169-180>

- Qui, M. D., & Ha, D. T. 2023. Pig farmers' preferences for the adoption of good animal husbandry practices in Vietnam: A choice experiment. *Sustainability* 15(13): 10545. <https://doi.org/10.3390/su151310545>
- Quyen, N. T. K., Yen, T. T. B., & Riple, A. K. L. 2022. Adoption of Vietnamese good agricultural practices (VietGAP) in aquaculture: Evidence from small-scale shrimp farming. *Asian Fisheries Science* 34: 393–403. <https://doi.org/10.33997/j.afs.2021.34.4.012>
- Ransom, E., Bain, C., & Halimatusa'Diyah, I. 2017. Livestock-livelihood linkages in Uganda: The benefits for women and rural households? *Journal of Rural Social Sciences* 32: 3.
- Rigg, J., Salamanca, A., & Thompson, E.C. 2016. The puzzle of East and Southeast Asia's persistent smallholder. *Journal of Rural Studies* 43: 118–133.
- Ritter, C., Jansen, J., Roche, S., Kelton, D.F., Adams, C.L., Orsel, K., Erskine, R.J., Benedictus, G., Lam, T.J., & Barkema, H.W. 2017. Invited review: Determinants of farmers' adoption of management-based strategies for infectious disease prevention and control. *Journal of Dairy Science* 100: 3329–3347.
- Roessler, R., Mpouam, S.E., Muchemwa, T., & Schlecht, E. 2016. Emerging development pathways of urban livestock production in rapidly growing West Africa cities. *Sustainability* 8(11): 1199. <http://doi.org/10.3390/su8111199>
- Rogers, E.M. 2003. *Diffusion of innovations*. 5th ed. Free Press, New York.
- Rosanowski, S. M., Magouras, I., Ho, W.-C., Yiu, W. C. J., Pfeiffer, D. U., & Zeeh, F. 2023. The challenges of pig farming in Hong Kong: A study of farmers' perceptions and attitudes towards a pig health and production management service. *BMC Veterinary Research* 19(1): 30. <https://doi.org/10.1186/s12917-023-03591-7>
- Savagar, A., Aguda, O., Galanakis, Y., & Wu, J.W. 2024. Market concentration and productivity: Evidence from the UK. *Fiscal Studies* 45(4): 459–482. <http://doi.org/10.1111/1475-5890.12381>
- Sharifuzzaman, M., Mun, H.-S., Ampode, K.M.B., Lagua, E.B., Park, H.-R., Kim, Y.-H., Hasan, M.K., & Yang, C.-J. 2024. Smart pig farming - A journey ahead of Vietnam. *Agriculture* 14(4): 555. <http://doi.org/10.3390/agriculture14040555>
- Shirinyan, L., Arych, M., & Rohanova, H. 2021. Influence of insurance on competitiveness of food enterprises in Ukraine. *Management Theory and Studies for Rural Business and Infrastructure Development* 43: 5–12.
- Siphesihle, Q., & Lelethu, M. 2020. Factors affecting subsistence farming in rural areas of Nyandeni local municipality in the Eastern Cape Province. *South African Journal of Agricultural Extension* 48(2): 92–105. <http://doi.org/10.17159/2413-3221/2020/v48n2a540>
- Smith, A.M., Duncan, P., Edgar, D., & McColl, J. 2021a. Responsible and sustainable farm business: Contextual duality as the moderating

influence on entrepreneurial orientation. *International Journal of Entrepreneurial Innovation* 22(2): 88–99.
<http://doi.org/10.1177/1465750320944702>

Smith, H. E., Sallu, S. M., Whitfield, S., Gaworek-Michalczenia, M. F., Recha, J. W., Sayula, G. J., & Mziray, S. 2021. Innovation systems and affordances in climate smart agriculture. *Journal of Rural Studies* 87: 199–212. <https://doi.org/10.1016/j.jrurstud.2021.09.001>

Sullivan, G.M., & Artino, A.R., Jr. 2013. Analyzing and interpreting data from likert-type scales. *Journal of Graduate Medical Education* 5(4): 541–542. <http://doi.org/10.4300/jgme-5-4-18>

Takahashi, Y., Nomura, H., Van Duy, L., Son, C.T., & Yabe, M. 2020. Water-use efficiency of alternative pig farming systems in Vietnam. *Resources, Conservation and Recycling* 161: 104926. <http://doi.org/10.1016/j.resconrec.2020.104926>

Tavakol, M., & Dennick, R. 2011. Making sense of Cronbach's alpha. *International Journal of Medical Education* 2: 53–55. <http://doi.org/10.5116/ijme.4dfb.8dfd>

Thien. 2020. <https://www.cabidigitallibrary.org/doi/10.1079/cabicompendum.60224>

Thompson, N.M., Bir, C., Widmar, D.A., & Mintert, J.R. 2019. Farmer perceptions of precision agriculture technology benefits. *Journal of Agricultural and Applied Economics* 51: 142–163.

Tisdell, C. 2009. Trends in Vietnam's pork supply and structural features of its pig sector. *The Open Area Studies Journal* 2: 52–71.

Tran, T. Q. 2015. Nonfarm employment and household income among ethnic minorities in Vietnam. *Economic Research* 28(1): 703–716. <https://doi.org/10.1080/1331677X.2015.1087872>

Tung, D. X. 2009. Final report of survey on proportion, productivity, efficiency and organization of livestock sector in Vietnam. Ministry of Agriculture and Rural Development.

Villalobos, V., García, M., & Ávila, F. 2017. Innovation to achieve competitive, sustainable and inclusive agriculture. Inter-American Institute for Cooperation on Agriculture.

Vu, V., Ho, H., & Le, Q. 2019. Impact of farmer education on production efficiency: The case of rice farms in Vietnam. *Management Science Letters* 9(11): 1909–1918. <https://doi.org/10.5267/j.msl.2019.6.002>

Wakgari, G., Amentie, C., & Bali, N. 2024. Effect of innovation capability on competitiveness: A study on manufacturing firms in Ethiopia. *Journal of Science, Technology and Arts Research* 13(1): 119–148. <http://doi.org/10.20372/star.v13i1.08>

Walder, P., Sinabell, F., Unterlass, F., Niedermayr, A., Fulgeanu, D., Kapfer, M., Melcher, M., & Kantelhardt, J. 2019. Exploring the relationship

between farmers' innovativeness and their values and aims.
Sustainability 11(20): 5571.

Wang, J., & Hu, X. 2023. Factors influencing disease prevention and control behaviours of hog farmers. *Animals* 13(5): 787. <https://doi.org/10.3390/ani13050787>

Wongnaa, C. A., Ansah, R. O., Akutinga, S., Azumah, S. B., Acheampong, R., Nana, S. Y., Mensah, G. A., Gidisu, S., & Awunyo-Vitor, D. 2023. Profitability, market outlets and constraints to Ghana's pig production. *Cleaner and Circular Bioeconomy* 6: 100068. <https://doi.org/10.1016/j.clcb.2023.100068>

Zabatantou, L. H., Bouity, C. A., & Owonda, F. 2023. Impact of agricultural credit on productivity. *Theoretical Economics Letters* 13(6): 1434–1462. <https://doi.org/10.4236/tel.2023.136081>

Zelenyuk, V. 2023. Productivity analysis: Roots, foundations, trends and perspectives. *Journal of Productivity Analysis* 60(3): 229–247. <https://doi.org/10.1007/s11123-023-00692-1>

Zhu, D., Tang, Y., & Wu, L. 2023. Consumer preference for pork safety characteristics: Considering rational and irrational behavior. *Food Control* 148: 109659. <http://doi.org/10.1016/j.foodcont.2023.109659>