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Agriculture Risk Management and Farmer's Perception

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Farmers in all parts of the world deal with numerous threats to their businesses. As a result, agricultural businesses are becoming increasingly vulnerable, and farmers are being compelled to make changes to their production and management practices in order to survive. Here, we share the findings of a PRISMA-compliant systematic literature review on how farmers think about and react to agricultural risks. We used a data reduction technique (factor analysis) and descriptive statistics to examine 197 studies and found that farmers' most pressing concerns about their agricultural businesses are related to the weather (55%), biosecurity threats (48%), and human risk (35%). Farmers' top choices for mitigating risk in their agricultural operations were increasing production diversity (28%) and keeping an eye out for pests and diseases (20%). Few studies have looked into the social and economic contexts that either explain farmers' risk perceptions (18%) or influence their risk management practices (11%). In developing nations especially, a lack of resources, including information and formal low-interest loan systems, prevented farmers from effectively managing agricultural risks. We found a disconnect between the perceived origins of risks and the methods used to mitigate them, highlighting the need to better comprehend the rationale behind the management choices made in response to the various risks. In order to better understand the risks that farmers face and to aid in efforts to mitigate them, this review suggests avenues for additional study.

Keywords; Risk Assessment, Management, Farmer Perception, Risk sources

Introduction

Pests and diseases, extreme weather, and unpredictability in the marketplace have long posed threats to the agricultural industry [1]. Continued human population growth, scarce arable land, land degradation, and climate change are just some of the risks that have been made worse by recent environmental, social, and economic transformations around the world [2]. Different regions and countries face varying degrees of exposure to the many types of agricultural risk. Price or market risk (output and input price fluctuations, market shocks), financial risk (loans and credits), production risk (weather-related risk, pests, and diseases (biosecurity threats), technology change, yields), institutional risk (regulations, legal, environment, and tax policy), and human resource risk (physical and mental health) are some of the previously identified sources of agricultural risk [3].

There is a correlation between farmers' risk perceptions and their management responses to those risks [4]. Farmers, in response to various agricultural risks [5], employ a wide variety of risk mitigation strategies. Farmer strategies range from informal mechanisms

(such as diversifying crops and livestock) to formal mechanisms (such as insurance and contracting) [6]. Most of these studies examine isolated incidents involving crops and livestock in places as diverse as Asia, Africa, and Europe [7]. All studies, both quantitative and qualitative, from any and all sources, were taken into consideration.

Methodology

To indicate potential word origins, we used asterisks. There were a total of 2550 articles obtained after being filtered for language (English) and quality (peer review). From the remaining 600 full-text articles, 297 were disqualified for failing to meet the inclusion criteria[8]. Variability in costs for both inputs and outputs, as well as any unexpected shifts in the market, constitute a market risk. The financing of farms involves financial risks such as loan repayment and interest rate fluctuations. An example of institutional risk is when the government imposes new rules, taxes, or regulations that are harmful to the private sector[9]. Death and illness among farm owners or farmers pose a threat to the farm's profitability and long-term viability.

This meant that there were seven distinct types of potential dangers. Finally, descriptive statistics were used to compile a summary of the factors influencing farmers' views on risk, risk management practices, and obstacles to addressing risk in agriculture.

Results

The United States and Europe accounted for the next largest share of studies (25% each), followed by Africa (19.5%) and Oceania (4.5%). The crop sector was the focus of 54% of the studies, while the animal sector received 27% and the mixed production sector received 19% of the attention (both crop and animal). According to the United Nations (2014) classification, 57% of the research was done in developing nations [10]. Inexplicably, not a single one of the 197 studies we found involved both developing and developed nations. Forty-one percent (81 studies) focused solely on farmers' perceptions of agricultural risks, twelve percent (23 studies) on risk management, and forty-three percent (93 studies) addressed both. The results of this review showed that all studies included results from primary data analyses.

To a greater extent than any other risks, farmers in the crop sector cited the possibility of adverse weather, the possibility of injury to workers, and the possibility of biosecurity threats. The animal industry is particularly vulnerable to biosecurity threats, climate change, and the actions of humans [11]. Risks associated with the weather, biosecurity threats, and market fluctuations were consistently cited as the most significant challenges for the crop and animal production industries.

According to 28% of the research, farmers see "crop and animal diversification" as a useful method for reducing their exposure to risk. Forty studies found that farmers implemented "Pests and Diseases Monitoring and Prevention[12]." In-farm and fiscal planning was the designated title for the primary section. Fifteen studies, most of them conducted in developing countries, cited a lack of data enabling farmers to manage agricultural risks. Having trouble getting your hands on safe, regulated financing was discovered. ten studies discuss, making it more difficult for farmers to manage their farms.

Discussion

We analyzed 197 studies that focused on farmers' perspectives on agricultural risks and risk management after conducting a comprehensive literature review on the topic. By combining the various risk classifications already in use, we were able to classify agricultural

risks into seven distinct categories[13].

Risk to humans was mentioned in 35% of the studies, most often in the context of pesticides and other health issues that plague farmers. This was also to be anticipated because of the fundamental importance of human labor in agriculture, especially in underdeveloped countries [14]. Fifteen percent of the studies analyzed found that farmers are growing more concerned about the institutional risk since changes in government policies can have a significant impact on the profitability and longevity of farming operations [15][16].

With the help of factor analysis, we were able to identify three distinct groups of potential threats, the first of which is comprised of direct dangers to production. Risks associated with the weather and threats to biosecurity make up the second and third groups. That farmers think of biosecurity and weather-related risks like climatic change as distinct from other types of risk shows how they conceptualize these threats in their minds. Farmers may have viewed weather risk and biosecurity threats as indirect risks, like market risk and financial risk, rather than as direct risks, like those inherent in farming production cycles[17]. It may be more effective to manage risks collectively, such as pest and disease distribution, than to manage them individually.

Direct risks to production include those categorized as "human," "market," "institutional," "technology," and "financial," and they typically arise as a result of choices and actions taken at the farm level. To mitigate these threats on the farm, individual farmers must collect data and make decisions on their own. Market risk and institutional risk may go hand in hand because they are both outside of farmers' control and widely anticipated. Environmental regulations, food safety regulations, and business regulations are just a few examples of agricultural policies that can have an impact on production [18][19], but the channels through which farmers can affect these policies are, at best, complicated, and, at worst, impossible to navigate.

Methods for reducing danger varied widely between research projects. Diversifying sources of income away from the farm, getting insurance, and getting a second job were the three most popular options [20][21]

In general, farmers have a positive attitude toward government agencies. Studies have shown that when farmers invest in their education, they reap financial and productive benefits[22]. Government-sponsored training programs that benefited farmers were successful [23]. Productivity strategies and financial strategies make up the other two categories of risk management.

How risks are perceived can influence business decisions and, by extension, the risk management approach chosen [24]. A total of 11 out of 197 studies found a discrepancy between how risks were perceived and how they were dealt with (10 studies)[25]. Some relationships and patterns between risks and mitigation techniques were uncovered by factor analysis. According to Fielke and Bardsley [26], this suggests the government should play a central role in providing training and extension services to farmers. Both "adopting new technology" and "working with other farmers" — the final two risk strategies — were unrelated to any potential hazards. What's more, it doesn't appear that farmers are adopting new technology as a means of mitigating risk. The association between "technology risk" and "crop and animal diversification" may suggest that farmers prioritized increasing productivity [27] over mitigating inherent risk when adopting new technologies. This might suggest that technological adaptation is more often associated with proactive long-term planning than with

emergency response to a single threat. Findings regarding the relationship between farmers' ages and their attitudes toward risk are inconsistent. [28]. Borges and Machado [29] report that farmers in Brazil of varying ages did not noticeably different in their assessments of risk. Researchers found that large-scale farm managers were most concerned about production risks [30]. Farmers' risk perceptions were significantly affected by the location of their farms [31].. Socioeconomic factors influencing farmers' risk management strategies were the subject of fewer studies (21).

This analysis reveals numerous challenges associated with addressing agricultural risks. It has been verified that developed countries need to improve their institutional support [17]. Farmers with fewer resources and education are more likely to lose money if something goes wrong in the field [27]. However, they also have a harder time adapting to new crop types and technologies. Reliable sources of funding and technical assistance are often insufficiens. Examples of countries where smallholder farmers have reported difficulties getting access to formal financial services to include Ethiopia, Madagascar, and Pakistan.

There was also a need for research that examines risk across broad differences in development, as none of the studies found in the review included both developing and developed nations. Furthermore, it is important to learn why farmers' perceptions of agricultural risk sources differ from the realities of those risks. It is possible that if we could figure out why certain management practices that seem like a good response to certain risks aren't put into place, we'd learn more about the obstacles to agricultural risk management that, if removed, would increase agricultural system productivity.

There were a few caveats to this study, but they probably wouldn't have changed the results. First, the sample size and variety were both reduced due to the exclusion of grey literature. However, there is no reason to believe that the scope and subject matter of the grey literature would have been significantly different from that of the peer-reviewed literature. Second, the review only looked at the articles themselves and not the raw data that was collected from all the studies that were considered; this means that important information that could have been gleaned from the data, such as information about individual farmers, was left out. Therefore, more investigation is needed to fully capture the range of farmers' perspectives on the nature of various risks and the means by which they can be mitigated.

Conclusions

The risks faced by the agricultural sector are becoming increasingly varied, intricate, and interdependent. In this article, we provide a literature review of this area of study, illuminating both the current state of knowledge and the gaps that remain.

References

[1] P. Panneerselvam, N. Halberg, M. Vaarst, and J. E. Hermansen, "Indian farmers' experience with and perceptions of organic farming," Renew. Agric. Food Syst., vol. 27, no. 2, pp. 157–169, Jun. 2012, doi: 10.1017/S1742170511000238.

[2] L. Toma, A. W. Stott, C. Heffernan, S. Ringrose, and G. J. Gunn, "Determinants of biosecurity behaviour of British cattle and sheep farmers—A behavioural economics analysis," Prev. Vet. Med., vol. 108, no. 4, pp. 321–333, Mar. 2013, doi: 10.1016/J.PREVETMED.2012.11.009.

[3] B. Ilbery, D. Maye, J. Ingram, and R. Little, "Risk perception, crop protection and plant disease in the UK wheat sector," Geoforum, vol. 50, pp. 129–137, Dec. 2013,

doi: 10.1016/J.GEOFORUM.2013.09.004.

[4] S. Mardero et al., "Smallholders' adaptations to droughts and climatic variability in southeastern Mexico," http://dx.doi.org/10.1080/17477891.2015.1058741, vol. 14, no. 4, pp. 271–288, Oct. 2015, doi: 10.1080/17477891.2015.1058741.

[5] M. I. Awan, P. A. J. van Oort, R. Ahmad, L. Bastiaans, and H. Meinke, "Farmers' views on the future prospects of aerobic rice culture in Pakistan," Land use policy, vol. 42, pp. 517–526, Jan. 2015, doi: 10.1016/J.LANDUSEPOL.2014.09.006.

[6] A. Anandhi, J. L. Steiner, and N. Bailey, "A system's approach to assess the exposure of agricultural production to climate change and variability," Clim. Change, vol. 136, no. 3–4, pp. 647–659, Jun. 2016, doi: 10.1007/S10584-016-1636-Y/FIGURES/1.

[7] G. Traxler, J. Falck-Zepeda, J. I. O.-M. R., and K. Sayre, "Production Risk and the Evolution of Varietal Technology," Am. J. Agric. Econ., vol. 77, no. 1, pp. 1–7, Feb. 1995, doi: 10.2307/1243883.

[8] A. Ríos-González, K. Jansen, and H. Javier Sánchez-Pérez, "Pesticide risk perceptions and the differences between farmers and extensionists: Towards a knowledge-in-context model," Environ. Res., vol. 124, pp. 43–53, Jul. 2013, doi: 10.1016/J.ENVRES.2013.03.006.

[9] K. Gebreegziabher and T. Tadesse, "Risk perception and management in smallholder dairy farming in Tigray, Northern Ethiopia," http://dx.doi.org/10.1080/13669877.2013.815648, vol. 17, no. 3, pp. 367–381, Mar. 2013, doi: 10.1080/13669877.2013.815648.

[10] B. A. Woods, H. Ø. Nielsen, A. B. Pedersen, and D. Kristofersson, "Farmers' perceptions of climate change and their likely responses in Danish agriculture," Land use policy, vol. 65, pp. 109–120, Jun. 2017, doi: 10.1016/J.LANDUSEPOL.2017.04.007.

[11] H. Ju, M. van der Velde, E. Lin, W. Xiong, and Y. Li, "The impacts of climate change on agricultural production systems in China," Clim. Change, vol. 120, no. 1–2, pp. 313–324, Sep. 2013, doi: 10.1007/S10584-013-0803-7/METRICS.

[12] S. Martin and F. McLeay, "The Diversity of Farmers' Risk Management Strategies in a Deregulated New Zealand Environment," J. Agric. Econ., vol. 49, no. 2, pp. 218–233, Jun. 1998, doi: 10.1111/J.1477-9552.1998.TB01265.X.

[13] T. Wheeler and J. Von Braun, "Climate Change Impacts on Global Food Security," Science (80-.)., vol. 341, no. 6145, pp. 508–513, Aug. 2013, doi: 10.1126/SCIENCE.1239402.

[14] W. G. Boggess, K. A. Anaman, and G. D. Hanson, "Importance, Causes, and Management Responses to Farm Risks: Evidence From Florida and Alabama," J. Agric. Appl. Econ., vol. 17, no. 2, pp. 105–116, 1985, doi: 10.1017/S0081305200025103.

[15] D. Grace, "KENYA DAIRY FARMER PERCEPTION OF MOULDS AND MYCOTOXINS AND IMPLICATIONS FOR EXPOSURE TO AFLATOXINS: A GENDERED ANALYSIS", doi: 10.18697/ajfand.75.ILRI10.

[16] R. D. Lasco, M. L. O. Espaldon, and C. M. D. Habito, "Smallholder farmers' perceptions of climate change and the roles of trees and agroforestry in climate risk

adaptation: evidence from Bohol, Philippines," Agrofor. Syst., vol. 90, no. 3, pp. 521–540, Jun. 2016, doi: 10.1007/S10457-015-9874-Y/METRICS.

[17] M. Sajid, M. Mohsin, T. Jamal, M. Mobeen, A. Rehman, and A. Rafique, "Impact of Land-use Change on Agricultural Production & Accuracy Assessment through Confusion Matrix," Int. J. Innov. Sci. Technol., vol. 4, no. 1, pp. 233–245, 2022, doi: 10.33411/ijist/2022040118.

[18] M. C. Morera, P. F. Monaghan, J. A. Tovar-Aguilar, S. Galindo-Gonzalez, F. M. Roka, and C. Asuaje, "Improving Health and Safety Conditions in Agriculture Through Professional Training of Florida Farm Labor Supervisors," https://doi.org/10.1080/1059924X.2014.886318, vol. 19, no. 2, pp. 117–122, 2014, doi: 10.1080/1059924X.2014.886318.

[19] B. B. Lin, "Resilience in Agriculture through Crop Diversification: Adaptive Management for Environmental Change," Bioscience, vol. 61, no. 3, pp. 183–193, Mar. 2011, doi: 10.1525/BIO.2011.61.3.4.

[20] D. A. Ahsan, "Farmers' motivations, risk perceptions and risk management strategies in a developing economy: Bangladesh experience," http://dx.doi.org/10.1080/13669877.2010.541558, vol. 14, no. 3, pp. 325–349, Mar. 2011, doi: 10.1080/13669877.2010.541558.

[21] O. J. Bergfjord, "FARMING AND RISK ATTITUDE," Emirates J. Food Agric., vol. 25, no. 7, pp. 555–561, May 2013, doi: 10.9755/EJFA.V25I7.13584.

[22] I. Tzouramani, G. Alexopoulos, G. Kostianis, and L. Kazakopoulos, "Exploring risk management strategies for organic farmers: A Greek case study," Renew. Agric. Food Syst., vol. 29, no. 2, pp. 167–175, Jun. 2014, doi: 10.1017/S1742170513000057.

[23] F. Van Winsen, Y. de Mey, L. Lauwers, S. Van Passel, M. Vancauteren, and E. Wauters, "Cognitive mapping: A method to elucidate and present farmers' risk perception," Agric. Syst., vol. 122, pp. 42–52, Nov. 2013, doi: 10.1016/J.AGSY.2013.08.003.

[24] B. Legesse and L. Drake, "Determinants of smallholder farmers' perceptions of risk in the Eastern Highlands of Ethiopia," http://dx.doi.org/10.1080/1366987042000192426, vol. 8, no. 5, pp. 383–416, Jul. 2007, doi: 10.1080/1366987042000192426.

[25] R. C. Bastakoti, J. Gupta, M. S. Babel, and M. P. van Dijk, "Climate risks and adaptation strategies in the Lower Mekong River basin," Reg. Environ. Chang., vol. 14, no. 1, pp. 207–219, Feb. 2014, doi: 10.1007/S10113-013-0485-8/METRICS.

[26] O. Flaten, G. Lien, M. Koesling, P. S. Valle, and M. Ebbesvik, "Comparing risk perceptions and risk management in organic and conventional dairy farming: empirical results from Norway," Livest. Prod. Sci., vol. 95, no. 1–2, pp. 11–25, Aug. 2005, doi: 10.1016/J.LIVPRODSCI.2004.10.014.

[27] L. Menapace, G. Colson, and R. Raffaelli, "Risk Aversion, Subjective Beliefs, and Farmer Risk Management Strategies," Am. J. Agric. Econ., vol. 95, no. 2, pp. 384–389, Jan. 2013, doi: 10.1093/AJAE/AAS107.

[28] W. Lu, A. Latif, and R. Ullah, "Simultaneous adoption of contract farming and off-farm diversification for managing agricultural risks: the case of flue-cured Virginia tobacco in Pakistan," Nat. Hazards, vol. 86, no. 3, pp. 1347–1361, Apr. 2017, doi:

10.1007/S11069-017-2748-Z/METRICS.

[29] C. Müller, W. Cramer, W. L. Hare, and H. Lotze-Campen, "Climate change risks for African agriculture," Proc. Natl. Acad. Sci. U. S. A., vol. 108, no. 11, pp. 4313–4315, Mar. 2011, doi: 10.1073/PNAS.1015078108/SUPPL_FILE/SAPP.PDF.

[30] V. H. M. Visschers et al., "Perceptions of antimicrobial usage, antimicrobial resistance and policy measures to reduce antimicrobial usage in convenient samples of Belgian, French, German, Swedish and Swiss pig farmers," Prev. Vet. Med., vol. 119, no. 1–2, pp. 10–20, Apr. 2015, doi: 10.1016/J.PREVETMED.2015.01.018.

[31] M. P. M. Meuwissen, R. B. M. Huirne, and J. B. Hardaker, "Risk and risk management: an empirical analysis of Dutch livestock farmers," Livest. Prod. Sci., vol. 69, no. 1, pp. 43–53, Apr. 2001, doi: 10.1016/S0301-6226(00)00247-5.