

**Use of Information Technology in agricultural supply chain for performance
improvement of marginalised suppliers and the overall supply chain- Emerging
economies perspective**



सिद्धिमूलं प्रबन्धनम्
भा. प्र. सं. इन्दौर
IIM INDORE

A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE FELLOW PROGRAMME IN MANAGEMENT INDIAN
INSTITUTE OF MANAGEMENT INDORE

BY

Suwarna Shukla

[FPM-2016-09]

MARCH 2022

THESIS ADVISORY COMMITTEE

PROF. ROHIT KAPOOR [CHAIRMAN]

PROF. Saurabh Chandra

[MEMBER]

PROF. Indrajit Thakurata

[MEMBER]

Table of Contents-

Abstract	1
Chapter 1: Introduction and Motivation	9
1.1 Essay 1.....	16
Research question 1.1.1.....	16
Research question 1.1.2.....	18
1.2 Essay 2.....	19
Research question 1.2.1.....	21
Research question 1.2.2.....	21
1.3 Essay 3.....	22
Research Question 1.3.1	24
Research Question 1.3.2.....	24
Research Question 1.3.3.....	24
Chapter 2: Literature Review	26
Figure I- Diagrammatic flow chart of the work	28
2.1 Essay 1	29
2.1.1 Poor as suppliers.....	29
2.1.2 ICT in supply chain	31
2.2 Essay 2.....	32

2.2.1 Knowledge transfer (KT)	32
2.2.2 Buyer supplier relationship (BSR)	34
2.3 Essay 3.....	36
2.3.1 Supply chain risk mitigation	36
2.3.2 ICT, risk and supply chain	38
What Next- Fitting the Missing?.....	40
Chapter3: Conceptual Models, Theory and Hypothesis Development.....	41
3.1 Conceptual model Theory and Hypothesis development (Farmers view)	42
Figure 1. Conceptual framework.....	43
3.1.1 Theoretical background and hypotheses development.....	44
3.1.1.1 Theoretical background- dynamic capability	44
Figure 2: Theoretical Framework Embedded in Simplified DC Schema	46
3.1.1.2 Hypotheses development.....	47
Hypothesis 1	49
Hypothesis 2	50
Hypothesis 3	52
Hypothesis 4	53
3.2 Conceptual model Theory and Hypothesis development (Farmers view)	54
3.2.1 Agency theory	54
Figure 2: Agency theory perspective	57

3.2.2 Hypothesis development	57
Figure 3: Conceptual framework	58
3.2.2.1 Knowledge transfer and buyer supplier relationship.....	58
Hypothesis 1	59
3.2.2.2 Buyer-supplier relationship (BSR) and Supplier performance improvement (SPI)	59
Hypothesis 2	61
3.2.2.3 Knowledge transfer and Supplier performance improvement	61
Hypothesis 3	62
3.2.2.4 The mediating role of Buyer supplier relationship (BSR)	62
Hypothesis 4	63
3.3 Conceptual model Theory and Hypothesis development (Agri-tech firms)	64
Figure 4 Conceptual Framework.....	64
3.3.1 Theoretical background.....	65
Figure 5 Diagrammatic schema of Resource based view	67
3.3.2 Hypothesis development	69
Hypothesis 1	70
Hypothesis 2	71
Hypothesis 3	73
Hypothesis 4	74
Hypothesis 5	74

Chapter 4: Research Methodology.....	76
Quantitative Study (PLS SEM Method).....	76
4.1 Study 1 Methodology for essay 1 and essay 2 (Farmer’s Group Survey).....	78
4.1.1 Details of measures in the study 1.....	78
Table I: Variables description and definition.....	78
4.1.2 PLS-SEM	81
4.1.3 Context-.....	82
4.1.3.1 Indian agriculture landscape.....	82
4.1.4 Data collection procedures	83
Table II: Respondent's profile	85
4.1.5 Scales validity and reliability	89
4.1.6 Empirical analysis for (study 1, essay 1)	89
4.1.6.1 Measurement model	89
Table III: Validity and reliability for constructs.....	90
4.1.6.2 Discriminant validity.....	94
Table IV: Fornell-Larcker Criterion.....	94
Table V: Heterotrait-Monotrait Ratio (HTMT).....	95
Table VI: Details of measures for study 1, essay 2.....	96
4.1.7 Measurement model (study 1, essay 2)	96
Table VII: Results from CFA	97
4.1.8 Common Method Variance (CMV)	98

Table VIII: Fornell-Larcker criterion	100
Table IX: Heterotrait-Monotrait ratio (HTMT)	102
Table X: Variance Inflation Factor (VIF) in study 1, essay 2.....	104
4.2 Research methodology for study 2, essay 3 (Agri-tech Firms study)	105
4.2.1 Methodology	105
4.2.2 Measures.....	105
Table XI: Variables description and definition.....	106
4.2. 3 Validity and reliability	107
4.2.4 Sampling and data collection procedures.....	107
Table XII: Respondent’s profile	109
4.2.5 Empirical analysis	111
4.2.5.1 Measurement model	111
Table XIII: Measurement model results.....	113
4.2.5.2 Common method bias (CMB).....	114
4.2.6 Findings and results.....	114
4.2.7 Discriminant Validity.....	114
Table XIV: Fornell-Larcker Criterion.....	116
Table XV : Heterotrait-Monotrait Ratio (HTMT).....	117
Chapter 5: Results Discussion	118
5.1 Structural model (farmers study 1, essay 1).....	119

Table I: Structural estimates (Hypotheses testing)	119
5.1.1 Conclusion and discussion	120
5.2 (farmers study 1, essay 2).....	122
Table II: Hypotheses testing	123
5.2.1 Conclusion and Discussion	124
5.3 (farmers study 2, essay3).....	128
5.3.1 Structural model	128
Table III: Structural estimates (Hypotheses Testing)	129
5.3.2 Discussion and conclusion	131
 Chapter 6: Qualitative Study (QCA Method)	 133
Figure I Diagrammatic representation of Chapter 6.....	134
6.1 Qualitative Comparative analysis (QCA)	135
Figure 1 Taken from (Legewie, 2013)	135
Figure 2 Taken from (Legewie, 2013).....	137
6.2 Methodology	139
6.2.1 Analytical Approach	139
6.3 Sample and Data.....	139
6.4 Results	140
6.4.1 FSQCA.....	140
Figure 3	142

Intermediate Solution	142
Figure 4	142
6.4.2 CSQCA.....	143
Figure 5	143
Figure 6	144
6.4.3 Combined data results, final FSQCA.....	144
Figure 7	145
Figure 8	146
Chapter 7: Contribution and Future Directions	149
7.1 Theoretical implications (farmers study 1, essay 1).....	150
7.1.2 Managerial relevance farmers study 1, essay1	150
7.2 (farmer’s study 1, essay 2)	151
7.2.1 Limitations and future scope (farmers study1, essay 2).....	152
7.2.2 (farmers study 1, essay2).....	153
7.3 Limitations and future scope for agri-tech firm, study2, essay3	154
7.3.1 Theoretical contribution	154
7.3.2 Limitations	154

Abstract

Introduction and Motivation: Agriculture is the backbone for the livelihood in the developing countries (World Bank, 2007). It plays a very crucial role in the development of Indian economy (Mohan, 2006). The agricultural sector covers around 24% of India's GDP, it covers around 15% from the total earnings from the export and about 56.7% of the country's population is employed in the agriculture (Rao, 2007). Recently, the increasing attention on agricultural sector has motivated the researchers to work on the improvement of agricultural supply chain. The correct information about the agricultural industry which includes farming techniques and market information (price, demand etc.) is very important for the farmers to work in the right direction that might help the farmers to cope with better agricultural output and income. The studies have shown that Indian community heavily relies upon the traditional means of accessing the information, which does not completely satisfy the adequate information needs (Rao, 2004).

With the rapid rate of globalization and privatization in agricultural economy, the traditional modes of getting information have failed to meet the growing information demand for the farmers (Parwez, 2014). Further, a report of Food and Agricultural Organisation (FAO) of the United Nations in 2016 had reported in its statistics that around 23% of the total damage caused due to medium and large scale natural disasters between 2006-2016 had been accounted by agriculture in developing countries. In case of drought, agriculture suffered 80% of the damage in this time range. The report highlighted that the agriculture could not just be the victim of the disasters but can also act as solution of disaster risk reduction like using agricultural technologies, to combat in these tough situations. These agricultural technologies help in reducing farm level risks much more effectively than the usual practices and have also been responsible for 2.5 times higher net economic benefits.

Our dissertation involves two studies understanding the role of information and communication technology (ICT) in agricultural supply chain while documenting evidence, through survey based research. The study 1 captures the farmers view and investigates two conceptual models, while the study 2 captures the agri-tech companies senior executives views and investigate one conceptual model.

Study 1 (Essay 1):The first essay investigates the extent to which Instrumental relationship commitment is responsible towards the poor farmer's IT adoption in the emerging economies. Collecting the data (despite being rare) from the 120 marginalised farmers (suppliers) from Indian villages, who were given the support of IT tools, knowledge transfer and technical exchange from the private firms (buyers) in order to involve them to the use of IT. Further, realising the need of dynamic capability in the context, we tried to bring more insightful results towards the theoretical as well as managerial contribution from this study. We performed structural equation modelling and found that instrumental relationship commitment as a barrier towards the adoption of IT in the agriculture unless a good incentive is given to the poor farmers. We also found the instrumental role of knowledge transfer and technical exchange to balancing on the harsh effects of instrumental relationship commitment and leading to the use of IT. This essay also stresses on importance of digitalization in the agriculture with the proper inflow of incentives to have the sustainable supply chain.

Study 1 (Essay 2):The second essay examines the performance of marginalized farmers in supply relationships with agri-tech firms in emerging rural agricultural economies. The complex relationship among the suppliers, dual relationship and knowledge transfer were studied. The essay empirically investigates the relationship between knowledge transfer to supplier's performance improvement via buyer-supplier relationship. Grounding on agency theory, a conceptual framework has been proposed to identify the mediation effect of BSR. The context deals with suppliers who are farmers in developing nations. The hypotheses were

tested using confirmatory factor analysis and structural equation with a sample of 121 marginalized farmers from Indian states. The data was collected using a survey instrument designed by adapting the well-cited and validated measures. These marginalized farmers worked in collaboration with the agri-tech firms facilitating them with the knowledge transfer.

Study 1 (Qualitative Investigation): The results very well explain variables and their relationship with one another. These established relationships also establish the fact that knowledge transfer is a powerful tool to make connect with farmers leading to their performance improvement. The knowledge transfer was found as a driver to improve performance of the marginalised farmers (poor suppliers) and the buyer supplier relationship acted as a positive mediator in this essay. The above two essays were further concretised in their results by running another statistically robust technique called Qualitative Content Analysis, which studied the qualitative and quantitative data both collected from the fields. The results again proved the use of IT and knowledge transfer to be the rigorous drivers for the improvement of farmer's performance which further strengthens our work and proves our claim.

Study 2 (Essay 3): Theorising from resource-based view ideology, our third essay studies the intersection of supply chain management and the use of IT. This essay aims to investigate supply chain performance as an essential outcome from the use of IT and explores the effect of supply chain collaboration on supply chain performance, which will eventually improve firm performance. In addition, the volume uncertainty has been explored and tested whether the risks due to the uncertainty can be mitigated via the use of IT. A sample of 121 senior executives from agri-tech firms was collected in person by travelling and meeting the executives in person in various states of India. Structural equation modelling (SEM) was used to test the hypothesized relationship of volume uncertainty to supply chain performance via

the use of IT and supply chain collaboration. The results show that volume uncertainty significantly impacts supply chain collaboration via the use of IT and on supply chain performance via supply chain collaboration. The use of IT positively and significantly impacts supply chain performance via supply chain collaboration.

Findings: The findings from our overall study in all the three essays are stated below.

Essay 1: IRC positively and significantly affected the TE but IRC does not lead to UOI when TE is the mediator. TE also positively and significantly affected the KT and UOI. TE also leads to UOI when KT is the mediator. In addition, the relationship between the KT to UOI was also seen to be positive and significant. Thus we see that IRC positively and significantly leads to UOI when TE and KT both are acting as the mediators.

Essay 2: The KT was found as a driver to improve performance (SPI), and the BSR acted as a positive mediator in this study. The complex relationships among the KT, BSR and SPI hold. The relationship between the KT and BSR was coming to be strong and significant and was supported empirically. Thus, all in all, our study explored the various relationships between KT to BSR and SPI. The KT to SPI directly and via the BSR is positive and significant.

Essay3: Results show that volume uncertainty significantly impacts supply chain collaboration via the use of IT and on supply chain performance via supply chain collaboration. The use of IT positively and significantly impacts supply chain performance via supply chain collaboration.

Thesis Contribution: The thesis contributes in the various dimensions of managerial theoretical and practical implications, stemming from its findings. This work can be subscribed to various nuanced understandings of the agricultural supply chain context in emerging economies, in the specialized cases where farmers belong to the marginalized communities. The thesis has the scope to replicate using a qualitative and quantitative mixed-method approach in emerging economies beyond India. The key academic contribution of the thesis are:

- ✓ *Advances the agency theory, dynamic capability and resource based view literature in the supply chain discipline of emerging rural economies.*
- ✓ *The marginalized farmers with knowledge transfer and improved buyer-supplier relationship can become a part of the mainstream value chain, their debts can be reduced, suicides can be prevented, and the quality of their family life can be significantly improved.*
- ✓ *How the agri-tech firms (non-traditional buyer) and supplier relationship and KT helps improve the economic sustainability of smallholder farmers in India. The study offers strategic implications for agri-tech practitioners, policymakers, and academic debate.*

The authors immersed themselves in fieldwork by interacting and meeting in person with 121 farmers residing in the remotest of the remote rural areas across multiple states of India. This resulted in the collection of real and authentic data and capturing the ground realities from one of the fastest-growing and largest emerging economies. Witnessing the potential benefits of the emerging use of IT in risk mitigation and uncertainty reduction as reported in the third essay, agri-tech firms operating in emerging rural and agricultural economies need to ensure supply chain collaboration to improve the supply chain performance. The volume uncertainty

at agri-tech firm's end as well as a farmer's end is a ground reality, which has been leading to an inability to plan and prepare systematically. These results in massive wastages in the agricultural supply chain, supply chain disruption at one end, and the farmer's suicide on the other end. The key academic contributions from study 2 are:

✓ *How the risks in the agricultural supply chain sourced due to the volume uncertainty can be mitigated by the use of IT and supply chain collaboration to influence the supply chain performance in rural agricultural and developing economies.*

Limitations: The key limitations in each essay are:

In essay 1, work is focussed to shed light on how such small sized firms are able to create value in the supply chain. The current model attempts to capture the antecedents of UOI. However, we are unable to capture the supply chain performance due to lack of data from the upstream players. It would be interesting to observe how the overall supply chain profit behaves when ICT is used specifically to cater to farmers performance improvement. Also, one of main limitations in capturing the UOI in agricultural sector is the lack of explanations in the construct items. The construct items provide a macro-level perspective on the business thereby restricting the robustness in the findings. We believe that a single in-depth case study in a similar firm would significantly enhance the validity of our work as a future study.

In essay 2, The supplier performance improvement (SPI) has been addressed by the various links like knowledge transfer (KT), buyer supplier relationship (BSR) and knowledge transfer (KT) via buyer supplier relationship as a mediator. We tried to check the relationship of KT with SPI, where we did not specify the exact kind of KT (ICT, advisory services,apps, mobile phones) because we just wanted to understand the role of KT. Future studies can look into the

specific kind of KT to understand the impact in-depth concerning the SPI. The authors tried their best to collect the data from maximum parts of rural India, but several issues like transportation, logistics, the data remain less and so future studies can get into depth with newer insights with larger sample size. This work deals completely with the farmer's point of view regarding their performance improvement when they avail KT, so there is a good scope for future studies to look at it from buying firms' point of view when they facilitate the farmers with KT, their challenges, problems, benefits etc. Due to sample restrictions, the results from this work may not be generalisable to other contexts and needs further research.

In essay 3, we stepped on to certain limitations. First, we considered a situation in the agricultural sector where the UOI is rare in developing countries like India. This is because the rural sector does not have the bandwidth to transform the agricultural supply chain towards Industry 4.0 (Ivanov et al., 2019). This creates a lacuna in understanding the nature of the business at the field level and thereby shortens the total population concerning Agriculture 4.0 (Yost *et al.*, 2019) in developing nations like India. This provides an opportunity for future researchers to delve deeper into such individual companies and understand the operational constraints and needs which prompted them to use digitization as a tool. Second, our work here focused on understanding how SCP is enhanced through digitization from the perspective of agricultural companies.

The agricultural companies may concede that due to ICT's, better SCC leads to SCP. However, whether the farming community, especially the BoP segment, appreciates and benefits from such collaboration is unknown. As a result, our work only addresses the concern of supply chain performance from digitization from the perspective of an upstream player (Hirose and Matsumura, 2017), as our target respondents were the firm's employees. Future studies need to conduct a similar perspective from the downstream player and then

validate whether digitization contributes to SCP and the degree to which the risk or volume uncertainty is taken care of through the UOI from the farmer's perspectives.

Keywords: Supply Chain, Digitization, Information and communication technology, supply chain collaboration, use of IT, supply chain performance, volume uncertainty, Agency theory, Knowledge transfer, Buyer-supplier relationship, Supplier performance, Emerging agricultural economies, Technical Exchange, Agricultural Supply Chain, Poor Farmers, Instrumental Relationship Commitment, Structural Equation Modelling

References

- Aaldering, L. J., & Song, C. H. (2021). Of leaders and laggards-Towards digitalization of the process industries. *Technovation*, *105*, 102211.
- Ableeva, A. M., Salimova, G. A., Rafikova, N. T., Fazrahmanov, I. I., Zalilova, Z. A., Lubova, T. N., ... Hazieva, A. M. (2019). Economic evaluation of the efficiency of supply chain management in agricultural production based on multidimensional research methods. *International Journal of Supply Chain Management*, *8*(1), 328–338.
- Adams, F. G., Richey, R. G., Autry, C. W., Morgan, T. R., & Gabler, C. B. (2014). Supply chain collaboration, integration, and relational technology: How complex operant resources increase performance outcomes. *Journal of Business Logistics*, *35*(4), 299–317. <https://doi.org/10.1111/jbl.12074>
- Afshan, N., Chatterjee, S., & Chhetri, P. (2018). Impact of information technology and relational aspect on supply chain collaboration leading to financial performance: A study in Indian context. *Benchmarking*, *25*(7), 2496–2511. <https://doi.org/10.1108/BIJ-09-2016-0142>
- Alam, A., Bagchi, P. K., Kim, B., Mitra, S., & Seabra, F. (2014). The mediating effect of logistics integration on supply chain performance: a multi-country study. *The International Journal of Logistics Management*.
- Ali, F., Kim, W. G., & Ryu, K. (2016). The effect of physical environment on passenger delight and satisfaction: Moderating effect of national identity. *Tourism Management*, *57*(June 2016), 213–224. <https://doi.org/10.1016/j.tourman.2016.06.004>
- Ali, J., & Kumar, S. (2011a). Information and communication technologies (ICTs) and farmers' decision-making across the agricultural supply chain. *International Journal of*

Information Management, 31(2), 149–159.

<https://doi.org/10.1016/j.ijinfomgt.2010.07.008>

Ali, J., & Kumar, S. (2011b). Information and communication technologies (ICTs) and farmers' decision-making across the agricultural supply chain. *International Journal of Information Management*, 31(2), 149–159.

Alo, O. (2020). Lost in Transfer? Exploring the Influence of Culture on the Transfer of Knowledge Categories. *Africa Journal of Management*, 6(4), 350–376.

Altay, N., Gunasekaran, A., Dubey, R., & Childe, S. J. (2018). Agility and resilience as antecedents of supply chain performance under moderating effects of organizational culture within the humanitarian setting: a dynamic capability view. *Production Planning & Control*, 29(14), 1158–1174.

Anastasiadis, F., & Poole, N. (2015). Emergent supply chains in the agrifood sector: insights from a whole chain approach. *Supply Chain Management: An International Journal*.

Aqlan, F., & Lam, S. S. (2015). Supply chain risk modelling and mitigation. *International Journal of Production Research*, 53(18), 5640–5656.

Arnold, V., Benford, T., Hampton, C., & Sutton, S. G. (2010). Competing pressures of risk and absorptive capacity potential on commitment and information sharing in global supply chains. *European Journal of Information Systems*, 19(2), 134–152.
<https://doi.org/10.1057/ejis.2009.49>

Asongu, S. A., Anyanwu, J. C., & Tchamyou, V. S. (2019). Technology-driven information sharing and conditional financial development in Africa. *Information Technology for Development*, 25(4), 630–659.

- Balboni, B., Marchi, G., & Vignola, M. (2017). Knowledge transfer in the context of buyer–supplier relationship: An analysis of a supplier’s customer portfolio. *Journal of Business Research*, 80(November 2016), 277–287. <https://doi.org/10.1016/j.jbusres.2017.06.022>
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120.
- Bayo-Moriones, A., & Lera-López, F. (2007). A firm-level analysis of determinants of ICT adoption in Spain. *Technovation*, 27(6–7), 352–366.
- Belekoukias, I., Garza-Reyes, J. A., & Kumar, V. (2014). The impact of lean methods and tools on the operational performance of manufacturing organisations. *International Journal of Production Research*, 52(18), 5346–5366.
- Béné, C., Oosterveer, P., Lamotte, L., Brouwer, I. D., de Haan, S., Prager, S. D., ... Khoury, C. K. (2019). When food systems meet sustainability—Current narratives and implications for actions. *World Development*, 113, 116–130.
- Benitez, G. B., Ferreira-Lima, M., Ayala, N. F., & Frank, A. G. (2021). Industry 4.0 technology provision: the moderating role of supply chain partners to support technology providers. *Supply Chain Management: An International Journal*.
- Benton Jr, W. C., Prahinski, C., & Fan, Y. (2020). The influence of supplier development programs on supplier performance. *International Journal of Production Economics*, 230, 107793.
- Beske, P., Land, A., & Seuring, S. (2014). Sustainable supply chain management practices and dynamic capabilities in the food industry: A critical analysis of the literature. *International Journal of Production Economics*, 152, 131–143.

- Bhoi, B. K., & Dadhich, C. L. (2019). *Agrarian distress in India: Possible solutions*. Indira Gandhi Institute of Development Research, Mumbai, India.
- Blichfeldt, H., & Faullant, R. (2021). Performance effects of digital technology adoption and product & service innovation—A process-industry perspective. *Technovation*, 102275.
- Blome, C., Paulraj, A., & Schuetz, K. (2014). Supply chain collaboration and sustainability: A profile deviation analysis. *International Journal of Operations and Production Management*, 34(5), 639–663. <https://doi.org/10.1108/IJOPM-11-2012-0515>
- Boh, W. F., Nguyen, T. T., & Xu, Y. (2013). Knowledge transfer across dissimilar cultures. *Journal of Knowledge Management*.
- Boynton, A. C., Zmud, R. W., & Jacobs, G. C. (1994). The influence of IT management practice on IT use in large organizations. *MIS Quarterly: Management Information Systems*, 18(3), 299–316. <https://doi.org/10.2307/249620>
- Brown, J. R., Lusch, R. F., & Nicholson, C. Y. (1995). Power and relationship commitment: their impact on marketing channel member performance. *Journal of Retailing*, 71(4), 363–392. [https://doi.org/10.1016/0022-4359\(95\)90019-5](https://doi.org/10.1016/0022-4359(95)90019-5)
- Butt, A. S., & Ahmad, A. B. (2019). Are there any antecedents of top-down knowledge hiding in firms? Evidence from the United Arab Emirates. *Journal of Knowledge Management*, 23(8), 1605–1627. <https://doi.org/10.1108/JKM-04-2019-0204>
- Cai, Z., Huang, Q., Liu, H., & Liang, L. (2016). The moderating role of information technology capability in the relationship between supply chain collaboration and organizational responsiveness: evidence from China. *International Journal of Operations & Production Management*.

- Cannon, J. P., & Perreault Jr, W. D. (1999). Buyer–seller relationships in business markets. *Journal of Marketing Research*, 36(4), 439–460.
- Cao, M., & Zhang, Q. (2011). Supply chain collaboration: Impact on collaborative advantage and firm performance. *Journal of Operations Management*, 29(3), 163–180.
<https://doi.org/10.1016/j.jom.2010.12.008>
- Carr, A. S., & Pearson, J. N. (1999). Strategically managed buyer–supplier relationships and performance outcomes. *Journal of Operations Management*, 17(5), 497–519.
- Cash, D. W. (2001). “In order to aid in diffusing useful and practical information”:
Agricultural extension and boundary organizations. *Science, Technology, & Human Values*, 26(4), 431–453.
- Chang, H. H., Tsai, Y., & Hsu, C. (2013). *E-procurement and supply chain performance*.
<https://doi.org/10.1108/13598541311293168>
- Chang, S. J., Van Witteloostuijn, A., & Eden, L. (2010). From the Editors: Common method variance in international business research. *Journal of International Business Studies*.
<https://doi.org/10.1057/jibs.2009.88>
- Chatterjee, S., Rana, N. P., & Dwivedi, Y. K. (2021). How does business analytics contribute to organisational performance and business value? A resource-based view. *Information Technology and People*. <https://doi.org/10.1108/ITP-08-2020-0603>
- Chen, D. Q., Preston, D. S., & Xia, W. (2013a). Enhancing hospital supply chain performance : A relational view and empirical test. *Journal of Operations Management*, 31(6), 391–408. <https://doi.org/10.1016/j.jom.2013.07.012>
- Chen, D. Q., Preston, D. S., & Xia, W. (2013b). Enhancing hospital supply chain

- performance: A relational view and empirical test. *Journal of Operations Management*, 31(6), 391–408.
- Chen, J. V., Wang, C. L., & Yen, D. C. (2014). A causal model for supply chain partners commitment. *Production Planning and Control*, 25(9), 800–813.
<https://doi.org/10.1080/09537287.2013.764578>
- Chen, J. V., Yen, D. C., Rajkumar, T. M., & Tomochko, N. A. (2011). The antecedent factors on trust and commitment in supply chain relationships. *Computer Standards and Interfaces*, 33(3), 262–270. <https://doi.org/10.1016/j.csi.2010.05.003>
- Chen, Y., Li, Y., & Li, C. (2020). Electronic agriculture, blockchain and digital agricultural democratization: Origin, theory and application. *Journal of Cleaner Production*, 268, 122071.
- Chin, W. W. (1998). The partial least squares approach to structural equation modeling. *Modern Methods for Business Research*, 295(2), 295–336.
- Chin, W. W., Peterson, R. A., & Brown, S. P. (2008). Structural equation modeling in marketing: Some practical reminders. *Journal of Marketing Theory and Practice*, 16(4), 287–298.
- Chu, Z., Wang, Q., Lai, F., & Collins, B. J. (2019). Managing interdependence: Using Guanxi to cope with supply chain dependency. *Journal of Business Research*, 103(June 2016), 620–631. <https://doi.org/10.1016/j.jbusres.2017.11.035>
- Cieslik, K., Cecchi, F., Damtew, E. A., Tafesse, S., Struik, P. C., Lemaga, B., & Leeuwis, C. (2021). The role of ICT in collective management of public bads: The case of potato late blight in Ethiopia. *World Development*, 140, 105366.

- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. Hillsdale. Erlbaum.
- Conner, BE (1988). *The Box in the Barn*. Columbus: Highlights for
- Corsten, D., & Felde, J. (2005). Exploring the performance effects of key-supplier collaboration: An empirical investigation into Swiss buyer-supplier relationships. *International Journal of Physical Distribution and Logistics Management*, 35(6), 445–461. <https://doi.org/10.1108/09600030510611666>
- Cousins, P. D. (2005). The alignment of appropriate firm and supply strategies for competitive advantage. *International Journal of Operations & Production Management*.
- Daneshvar Kakhki, M., & Gargeya, V. B. (2019). Information systems for supply chain management: a systematic literature analysis. *International Journal of Production Research*, 57(15–16), 5318–5339.
- Das, B. (2018). Sources of technological knowledge and farm output: evidences from a large-scale farmers' survey. *Agricultural Economics Research Review*, 31(347-2019–572), 241–250.
- de Janvry, A., & Sadoulet, E. (2020a). Using agriculture for development: Supply- and demand-side approaches. *World Development*, 133, 105003. <https://doi.org/10.1016/j.worlddev.2020.105003>
- de Janvry, A., & Sadoulet, E. (2020b). Using agriculture for development: Supply- and demand-side approaches. *World Development*, 133. <https://doi.org/10.1016/j.worlddev.2020.105003>
- De Janvry, A., & Sadoulet, E. (2020). Using agriculture for development: Supply-and demand-side approaches. *World Development*, 133, 105003.

- Dehgani, R., & Jafari Navimipour, N. (2019). The impact of information technology and communication systems on the agility of supply chain management systems. *Kybernetes*, 48(10), 2217–2236. <https://doi.org/10.1108/K-10-2018-0532>
- Delgosha, M. S., Hajiheydari, N., & Talafidaryani, M. (2021). Discovering IoT implications in business and management: A computational thematic analysis. *Technovation*, 102236.
- Dev, S.Mahendra. (2009). Challenges for Revival of Indian Agriculture. *Agricultural Economics Research Review*, 22(June), 21–45.
- Devalkar, S. K., Seshadri, S., Ghosh, C., & Mathias, A. (2018). Data Science Applications in Indian Agriculture. *Production and Operations Management*, 27(9), 1701–1708. <https://doi.org/10.1111/poms.12834>
- Ding, Y., Lu, D., & Fan, L. (2017). How China's demand uncertainty moderates the response of operational performance to supply chain integration in automotive industry. *Cogent Business & Management*, 4(1), 1318465.
- Dutta, B., Madalli, D. P., Sinha, B., Chandra, S., & Garg, M. (2015). Development of ontology from Indian agricultural e-governance data using IndoWordNet: a semantic web approach. *Journal of Knowledge Management*.
- Dyer, J. H. (1996). Specialized supplier networks as a source of competitive advantage: Evidence from the auto industry. *Strategic Management Journal*, 17(4), 271–291.
- Eggleston, K., Jensen, R., & Zeckhauser, R. (2002). Information and communication technologies, markets, and economic development. *The Global Information Technology Report 2001-2002: Readiness for the Networked World*.
- Eisenhardt, Kaathleen M. (1989). Eisenhardt (1989) - Agency theory.pdf. *Academy of*

- Management Review*, Vol. 14, pp. 57–74. Retrieved from http://www.petersvmd.com/PrincipalAgent/short_principal_agent/agency.pdf
- Eisenhardt, Kathleen M. (1989). Agency theory: An assessment and review. *Academy of Management Review*, 14(1), 57–74.
- Ekanayake, S. (2004). Agency theory, national culture and management control systems. *Journal of American Academy of Business*, 4(1/2), 49–54.
- Ekinci, Y., Serban, N., & Duman, E. (2019). Optimal ATM replenishment policies under demand uncertainty. *Operational Research*, 1–31.
- Fait, M., Scorrano, P., Mastroleo, G., Cillo, V., & Scuotto, V. (2019). A novel view on knowledge sharing in the agri-food sector. *Journal of Knowledge Management*.
- Fawcett, S. E., Fawcett, A. M., Watson, B. J., & Magnan, G. M. (2012). Peeking inside the black box: Toward an understanding of supply chain collaboration dynamics. *Journal of Supply Chain Management*, 48(1), 44–72. <https://doi.org/10.1111/j.1745-493X.2011.03241.x>
- Florea, A. M., Bercu, F., Radu, R. I., & Stanciu, S. (2019). A Fuzzy Set Qualitative Comparative Analysis (fsQCA) of the agricultural cooperatives from South East Region of Romania. *Sustainability (Switzerland)*, 11(21). <https://doi.org/10.3390/su11215927>
- Ford, M. W. (2017). Specialization, slack orientation, and adaptive capacity in uncertain environments. *Journal of Strategic Innovation and Sustainability*, 12(1), 55–67.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.

- Frederico, G. F., Garza-Reyes, J. A., Anosike, A., & Kumar, V. (2019). Supply Chain 4.0: concepts, maturity and research agenda. *Supply Chain Management: An International Journal*.
- Fu, S., Li, Z., Wang, B., Han, Z., & Huo, B. (2018). Cooperative behavior between companies and contract farmers in Chinese agricultural supply chains: Relational antecedents and consequences. *Industrial Management & Data Systems*.
- Fu, S., Zhan, Y., & Tan, K. H. (2017). Managing social responsibility in Chinese agriculture supply chains through the “a company+ farmers” model. *European Business Review*.
- García-Alcaraz, J. L., Maldonado-Macías, A. A., Alor-Hernández, G., & Sánchez-Ramírez, C. (2017). The impact of information and communication technologies (ICT) on agility, operating, and economical performance of supply chain. *Advances in Production Engineering & Management*, 12(1), 29.
- Golait, R. (2007). *Current issues in agriculture credit in India: An assessment*. Reserve Bank of India.
- Gollakota, K. (2008). ICT use by businesses in rural India: The case of EID Parry’s Indiagriline. *International Journal of Information Management*, 28(4), 336–341.
- Hair et.al. (2019). *Multivariate Data Analysis*, Eighth Edition. In *Annabel Ainscow*.
- Hair Jr, Joe F, Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*.
- Hair Jr, Joseph F, Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.

- Hair Jr, Joseph F, Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.
- Hajmohammad, S., & Vachon, S. (2016). Mitigation, avoidance, or acceptance? Managing supplier sustainability risk. *Journal of Supply Chain Management*, 52(2), 48–65.
- Hançerlioğulları, G., Şen, A., & Aktunç, E. A. (2016). Demand uncertainty and inventory turnover performance: An empirical analysis of the US retail industry. *International Journal of Physical Distribution & Logistics Management*.
- Haque, M., & Islam, R. (2018). Impact of supply chain collaboration and knowledge sharing on organizational outcomes in pharmaceutical industry of Bangladesh. *Journal of Global Operations and Strategic Sourcing*, 11(3), 301–320.
<https://doi.org/10.1108/JGOSS-02-2018-0007>
- Harkness, J. A., van de Vijver, F. J. R., Mohler, P. P., & Wiley, J. (2003). *Cross-cultural survey methods* (Vol. 325). Wiley-Interscience Hoboken, NJ.
- Hart, S. L. (1995). A natural-resource-based view of the firm. *Academy of Management Review*, 20(4), 986–1014.
- Hazell, P. (2010). The role of markets for managing agricultural risks in developing countries. In *Community, Market and State in Development* (pp. 291–310). Springer.
- He, Q., Ghobadian, A., & Galleary, D. (2013). Knowledge acquisition in supply chain partnerships: The role of power. *International Journal of Production Economics*, 141(2), 605–618.
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of*

Marketing Science, 43(1), 115–135.

Hirose, K., & Matsumura, T. (2017). *Comparing welfare and profit in quantity and price competition within Stackelberg mixed duopolies*.

Hong, J., Zhang, Y., & Shi, M. (2018a). The impact of supply chain quality management practices and knowledge transfer on organisational performance: an empirical investigation from China. *International Journal of Logistics Research and Applications*, 21(3), 259–278. <https://doi.org/10.1080/13675567.2017.1394992>

Hong, J., Zhang, Y., & Shi, M. (2018b). The impact of supply chain quality management practices and knowledge transfer on organisational performance: an empirical investigation from China. *International Journal of Logistics Research and Applications*, 21(3), 259–278.

Hossain, M. A., Standing, C., & Chan, C. (2017). The development and validation of a two-staged adoption model of RFID technology in livestock businesses. *Information Technology and People*, 30(4), 785–808. <https://doi.org/10.1108/ITP-06-2016-0133>

Hsu, C. C., Kannan, V. R., Tan, K. C., & Leong, G. K. (2008). Information sharing, buyer-supplier relationships, and firm performance: A multi-region analysis. *International Journal of Physical Distribution and Logistics Management*, 38(4), 296–310. <https://doi.org/10.1108/09600030810875391>

Huo, B., Zhang, C., & Zhao, X. (2015). The effect of IT and relationship commitment on supply chain coordination: A contingency and configuration approach. *Information and Management*, 52(6), 728–740. <https://doi.org/10.1016/j.im.2015.06.007>

Ivanov, D., Sokolov, B., Dolgui, A., & Sethi, S. (2019). Scheduling in Production, Supply Chain and Industry 4.0 Systems by Optimal Control: Fundamentals, State-of-the-Art,

and Applications. *Supply Chain and Industry*, 4.

- Iyer, A. (2018). Moving from Industry 2.0 to Industry 4.0: A case study from India on leapfrogging in smart manufacturing. *Procedia Manufacturing*, 21, 663–670.
- Jacobs, M. A., Yu, W., & Chavez, R. (2016). The effect of internal communication and employee satisfaction on supply chain integration. *International Journal of Production Economics*, 171, 60–70. <https://doi.org/10.1016/j.ijpe.2015.10.015>
- Jaffee, S., Siegel, P., & Andrews, C. (2010). Rapid agricultural supply chain risk assessment: A conceptual framework. *Agriculture and Rural Development Discussion Paper*, 47(1), 1–64.
- Jiang, F., Zheng, X., Fan, D., Zhang, P., & Li, S. (2021). The Sharing Economy and Business Model Design: A Configurational Approach. *Journal of Management Studies*, 58(4), 949–976. <https://doi.org/10.1111/joms.12711>
- Joshi, A. W. (2009). Improvement : Effects of Collaborative Communication and. *American Marketing Association*, 73(January), 133–150.
- Kahan, D. (2008). *Managing risk in farming*. Food and agriculture organization of the united nations.
- Kamble, S. S., Gunasekaran, A., & Sharma, R. (2018). Analysis of the driving and dependence power of barriers to adopt industry 4.0 in Indian manufacturing industry. *Computers in Industry*, 101, 107–119.
- Kameda, T., Yamada, S., Uwabe, C., & Suganuma, N. (2012). Digitization of clinical and epidemiological data from the Kyoto Collection of Human Embryos: maternal risk factors and embryonic malformations. *Congenital Anomalies*, 52(1), 48–54.

- Kent, R., & Olsen, W. (2008). *Using fsQCA a brief guide and workshop for fuzzy-set qualitative comparative analysis*.
- Ketchen, D. J., & Giunipero, L. C. (2004). The intersection of strategic management and supply chain management. *Industrial Marketing Management*, 33(1), 51–56.
<https://doi.org/10.1016/j.indmarman.2003.08.010>
- Ketchen Jr, D. J., & Giunipero, L. C. (2004). The intersection of strategic management and supply chain management. *Industrial Marketing Management*, 33(1), 51–56.
- Khatri-Chhetri, A., Aggarwal, P. K., Joshi, P. K., & Vyas, S. (2017). Farmers' prioritization of climate-smart agriculture (CSA) technologies. *Agricultural Systems*, 151, 184–191.
- Kim, I.-H., Lee, J.-H., Koh, J., & Kim, H.-W. (2010). The Effect of Motivation-Reward Fit on Commitment and Knowledge Sharing Activities in Communities of Practice. *The KIPS Transactions: PartD*, 17(3), 209–222.
- Kim, J.-O., & Mueller, C. W. (1978). *Factor analysis: Statistical methods and practical issues* (Vol. 14). sage.
- Kim, M. (2010). *Impact of strategic sourcing, e-procurement and integration on supply chain risk mitigation and performance*. State University of New York at Buffalo.
- Kim, M. G., Hwang, Y. M., & Rho, J. J. (2016). The impact of RFID utilization and supply chain information sharing on supply chain performance: Focusing on the moderating role of supply chain culture. *Maritime Economics & Logistics*, 18(1), 78–100.
- Kotabe, M., Martin, X., & Domoto, H. (2003a). Gaining from vertical partnerships: Knowledge transfer, relationship duration, and supplier performance improvement in the U.S. and Japanese automotive industries. *Strategic Management Journal*, 24(4), 293–

316. <https://doi.org/10.1002/smj.297>

- Kotabe, M., Martin, X., & Domoto, H. (2003b). Gaining from vertical partnerships: knowledge transfer, relationship duration, and supplier performance improvement in the US and Japanese automotive industries. *Strategic Management Journal*, 24(4), 293–316.
- Kou, T. C., Chiang, C. T., & Chiang, A. H. (2018). Effects of IT-based supply chains on new product development activities and the performance of computer and communication electronics manufacturers. *Journal of Business and Industrial Marketing*, 33(7), 869–882. <https://doi.org/10.1108/JBIM-11-2016-0269>
- Krause, D. R. (1999). The antecedents of buying firms' efforts to improve suppliers. *Journal of Operations Management*, 17(2), 205–224.
- Krause, D. R., Scannell, T. V., & Calantone, R. J. (2000). A structural analysis of the effectiveness of buying firms' strategies to improve supplier performance. *Decision Sciences*, 31(1), 33–55.
- Kuciapski, M. (2017). A model of mobile technologies acceptance for knowledge transfer by employees. *Journal of Knowledge Management*, 21(5), 1053–1076.
<https://doi.org/10.1108/JKM-03-2016-0136>
- Kumar, A., Singh, R. K., & Modgil, S. (2020). Exploring the relationship between ICT, SCM practices and organizational performance in agri-food supply chain. *Benchmarking: An International Journal*.
- Kumar, D., & Rahman, Z. (2016). Buyer supplier relationship and supply chain sustainability: Empirical study of Indian automobile industry. *Journal of Cleaner Production*, 131, 836–848. <https://doi.org/10.1016/j.jclepro.2016.04.007>

- Kumar, V., Verma, P., Sharma, R. R. K., & Khan, A. F. (2017). Conquering in emerging markets: critical success factors to enhance supply chain performance. *Benchmarking: An International Journal*.
- Kushwaha, G. S. (2011). Competitive advantage through information and communication technology (ICT) enabled supply chain management practices. *International Journal of Enterprise Computing and Business Systems*, 1(2), 1–13.
- Lassar, W. M., & Kerr, J. L. (1996). Strategy and control in supplier–distributor relationships: An agency perspective. *Strategic Management Journal*, 17(8), 613–632.
- Leat, P., & Revoredo-Giha, C. (2013). Risk and resilience in agri-food supply chains: The case of the ASDA PorkLink supply chain in Scotland. *Supply Chain Management: An International Journal*.
- Lee, H. L., & Tang, C. S. (2018). Socially and environmentally responsible value chain innovations: New operations management research opportunities. *Management Science*, 64(3), 983–996.
- Legewie, N. (2013). An Introduction to Applied Data Analysis with Qualitative Comparative Analysis. *Forum, Qualitative Social Research / Forum, Qualitative Sozialforschung*, 14(3), 45. <https://doi.org/10.17169/fqs-14.3.1961>
- Leguizamon, F., Selva, G., & Santos, M. (2016). Small farmer suppliers from local to global. *Journal of Business Research*, 69(10), 4520–4525. <https://doi.org/10.1016/j.jbusres.2016.03.017>
- Li, W., Humphreys, P. K., Yeung, A. C. L., & Cheng, T. C. E. (2007). The impact of specific supplier development efforts on buyer competitive advantage: an empirical model. *International Journal of Production Economics*, 106(1), 230–247.

- Liao, S. H., Hu, D. C., & Ding, L. W. (2017). Assessing the influence of supply chain collaboration value innovation, supply chain capability and competitive advantage in Taiwan's networking communication industry. *International Journal of Production Economics*, *191*, 143–153. <https://doi.org/10.1016/j.ijpe.2017.06.001>
- Lieberman, M. B., & Asaba, S. (1997). Inventory reduction and productivity growth: A comparison of Japanese and US automotive sectors. *Managerial and Decision Economics*, *18*(2), 73–85.
- Liu, J., Ding, F., & Lall, V. (2000). Using data envelopment analysis to compare suppliers for supplier selection and performance improvement. *Supply Chain Management: An International Journal*.
- Liu, Y., Li, Y., Shi, L. H., & Liu, T. (2017). Knowledge transfer in buyer-supplier relationships: The role of transactional and relational governance mechanisms. *Journal of Business Research*, *78*, 285–293. <https://doi.org/10.1016/j.jbusres.2016.12.024>
- Lowder, S. K., Skoet, J., & Raney, T. (2016). The number, size, and distribution of farms, smallholder farms, and family farms worldwide. *World Development*, *87*, 16–29.
- Luo, Y., & Bu, J. (2016). How valuable is information and communication technology? A study of emerging economy enterprises. *Journal of World Business*, *51*(2), 200–211.
- MacDuffie, J. P., & Helper, S. (1997). Creating lean suppliers: diffusing lean production through the supply chain. *California Management Review*, *39*(4), 118–151.
- Maestrini, V., Luzzini, D., Caniato, F., & Ronchi, S. (2018a). Effects of monitoring and incentives on supplier performance: An agency theory perspective. *International Journal of Production Economics*, *203*(June), 322–332. <https://doi.org/10.1016/j.ijpe.2018.07.008>

- Maestrini, V., Luzzini, D., Caniato, F., & Ronchi, S. (2018b). Effects of monitoring and incentives on supplier performance: An agency theory perspective. *International Journal of Production Economics*, *203*, 322–332.
- Mahler, T., & Bing, J. (2006). Contractual risk management in an ICT context—searching for a possible interface between legal methods and risk analysis. *Scandinavian Studies in Law*, *49*, 339–357.
- Majchrzak, A., Markus, M. L., & Wareham, J. (2016). Designing for digital transformation: Lessons for information systems research from the study of ICT and societal challenges. *MIS Quarterly*, *40*(2), 267–277.
- Mandal, S. (2019). The influence of big data analytics management capabilities on supply chain preparedness, alertness and agility: An empirical investigation. *Information Technology and People*, *32*(2), 297–318. <https://doi.org/10.1108/ITP-11-2017-0386>
- Mao, H., Liu, S., Zhang, J., Zhang, Y., & Gong, Y. (2021). Information technology competency and organizational agility: roles of absorptive capacity and information intensity. *Information Technology and People*, *34*(1), 421–451. <https://doi.org/10.1108/ITP-12-2018-0560>
- McMichael, A. J., Campbell-Lendrum, D. H., Corvalán, C. F., Ebi, K. L., Githeko, A., Scheraga, J. D., & Woodward, A. (2003). *Climate change and human health: risks and responses*. World Health Organization.
- Meera, S. N., Balaji, V., Muthuraman, P., Sailaja, B., & Dixit, S. (2012). Changing roles of agricultural extension: harnessing information and communication technology (ICT) for adapting to stresses envisaged under climate change. In *Crop stress and its Management: Perspectives and strategies* (pp. 585–605). Springer.

- Mendoza-Fong, J. R., García-Alcaraz, J. L., Macías, E. J., Ibarra Hernández, N. L., Díaz-Reza, J. R., & Fernández, J. B. (2018). Role of information and communication technology in green supply chain implementation and companies' performance. *Sustainability (Switzerland)*, *10*(6). <https://doi.org/10.3390/su10061793>
- Mesic, Ž., Molnár, A., & Cerjak, M. (2018). Assessment of traditional food supply chain performance using triadic approach: the role of relationships quality. *Supply Chain Management: An International Journal*.
- Mirkovski, K., Lowry, P. B., & Feng, B. (2016). Factors that influence interorganizational use of information and communications technology in relationship-based supply chains: evidence from the Macedonian and American wine industries. *Supply Chain Management: An International Journal*.
- Mishra, A. N., Konana, P., & Barua, A. (2007). Antecedents and consequences of Internet use in procurement: An empirical investigation of U.S. manufacturing firms. *Information Systems Research*, *18*(1), 103–120. <https://doi.org/10.1287/isre.1070.0115>
- Mittal, S. (2012). *Modern ICT for agricultural development and risk management in smallholder agriculture in India*. CIMMYT.
- Modi, S. B., & Mabert, V. A. (2007a). Supplier development: Improving supplier performance through knowledge transfer. *Journal of Operations Management*, *25*(1), 42–64. <https://doi.org/10.1016/j.jom.2006.02.001>
- Modi, S. B., & Mabert, V. A. (2007b). Supplier development: Improving supplier performance through knowledge transfer. *Journal of Operations Management*, *25*(1), 42–64.
- Mohan, R. (2006). Agricultural credit in India: Status, issues and future agenda. *Economic*

and Political Weekly, 1013–1023.

Mohanty, B. B. (2005). ‘We are like the living dead’: farmer suicides in Maharashtra, western India. *Journal of Peasant Studies*, 32(2), 243–276.

Monczka, R. M., Trent, R. J., & Callahan, T. J. (1993). Supply base strategies to maximize supplier performance. *International Journal of Physical Distribution & Logistics Management*.

Myers, M. B., & Cheung, M.-S. (2008). Sharing global supply chain knowledge. *MIT Sloan Management Review*, 49(4), 67.

Najib, M. F., Kartini, D., Suryana, Y., & Sari, D. (2017). Market orientation, buyer-supplier relationship and firm performance with dynamic capabilities as an intervening variable: a research model. *International Journal of Business and Globalisation*, 19(4), 567–582.

Nandi, M. L., Nandi, S., Moya, H., & Kaynak, H. (2020). Blockchain technology-enabled supply chain systems and supply chain performance: a resource-based view. *Supply Chain Management: An International Journal*.

Nylund, P. A., Brem, A., & Agarwal, N. (2021). Enabling technologies mitigating climate change: The role of dominant designs in environmental innovation ecosystems. *Technovation*, 102271.

O’Connor, C., & Kelly, S. (2017). Facilitating knowledge management through filtered big data: SME competitiveness in an agri-food sector. *Journal of Knowledge Management*.

Oghazi, P., Rad, F. F., Zaefarian, G., Beheshti, H. M., & Mortazavi, S. (2016). Unity is strength: A study of supplier relationship management integration. *Journal of Business Research*, 69(11), 4804–4810. <https://doi.org/10.1016/j.jbusres.2016.04.034>

- Ouakouak, M. L., & Ouedraogo, N. (2019). Fostering knowledge sharing and knowledge utilization: the impact of organizational commitment and trust. *Business Process Management Journal*.
- Ouhimmou, M., Nourelfath, M., Bouchard, M., & Bricha, N. (2019). Design of robust distribution network under demand uncertainty: A case study in the pulp and paper. *International Journal of Production Economics*, 218, 96–105.
- Pakdeechoho, N., & Sukhotu, V. (2018). Sustainable supply chain collaboration: Incentives in emerging economies. *Journal of Manufacturing Technology Management*, 29(2), 273–294. <https://doi.org/10.1108/JMTM-05-2017-0081>
- Panahifar, F., Byrne, P. J., Salam, M. A., & Heavey, C. (2018). Supply chain collaboration and firm's performance: The critical role of information sharing and trust. *Journal of Enterprise Information Management*, 31(3), 358–379. <https://doi.org/10.1108/JEIM-08-2017-0114>
- Pappas, I. O., & Woodside, A. G. (2021). Fuzzy-set Qualitative Comparative Analysis (fsQCA): Guidelines for research practice in Information Systems and marketing. *International Journal of Information Management*, 58(September 2020), 102310. <https://doi.org/10.1016/j.ijinfomgt.2021.102310>
- Park, Y. K., & Mithas, S. (2020). Organized complexity of digital business strategy: A configurational perspective. *MIS Quarterly: Management Information Systems*, 44(1), 85–127. <https://doi.org/10.25300/MISQ/2020/14477>
- Parwez, S. (2014a). An Empirical Evaluation of Agricultural Supply Chain in India: Special Reference to Public Distribution System (PDS) and Contract Farming. *SIES Journal of Management*, 10(1), 43–56. Retrieved from

<http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=97751832&site=ehost-live&scope=site>

- Parwez, S. (2014b). Underdeveloped Supply Chain Dynamics of Indian Agriculture: Reference to Information Technology and Knowledge Management. *Asia-Pacific Journal of Management Research and Innovation*, 10(1), 57–66.
<https://doi.org/10.1177/2319510x14529488>
- Peng, H., Shen, N., Liao, H., Xue, H., & Wang, Q. (2020). Uncertainty factors, methods, and solutions of closed-loop supply chain—A review for current situation and future prospects. *Journal of Cleaner Production*, 254, 120032.
- Pereira, J. V. (2009). The new supply chain's frontier: Information management. *International Journal of Information Management*, 29(5), 372–379.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879.
- Pradabwong, J., Braziotis, C., Tannock, J. D. T., & Pawar, K. S. (2017). Business process management and supply chain collaboration: effects on performance and competitiveness. *Supply Chain Management*, 22(2), 107–121.
<https://doi.org/10.1108/SCM-01-2017-0008>
- Prahinski, C., & Benton, W. C. (2004). Supplier evaluations: Communication strategies to improve supplier performance. *Journal of Operations Management*, 22(1), 39–62.
<https://doi.org/10.1016/j.jom.2003.12.005>
- Preston, D. S., Chen, D. Q., Swink, M., & Meade, L. (2017). Generating supplier benefits through buyer-enabled knowledge enrichment: A social capital perspective. *Decision*

Sciences, 48(2), 248–287.

Ragin, C. C. (2000). *Fuzzy-set social science*. University of Chicago Press.

Ragin, C. C. (2006). Set relations in social research: Evaluating their consistency and coverage. *Political Analysis*, 14(3), 291–310.

Ragin, C. C., & Fiss, P. C. (2008). Net effects analysis versus configurational analysis: An empirical demonstration. *Redesigning Social Inquiry: Fuzzy Sets and Beyond*, 240, 190–212.

Rao, N. H. (2007a). A framework for implementing information and communication technologies in agricultural development in India. *Technological Forecasting and Social Change*, 74(4), 491–518. <https://doi.org/10.1016/j.techfore.2006.02.002>

Rao, N. H. (2007b). A framework for implementing information and communication technologies in agricultural development in India. *Technological Forecasting and Social Change*, 74(4), 491–518.

Rao, S. S. (2004). Role of ICTs in India's rural community information systems. *Info*.

Rigdon, E. E. (2016). Choosing PLS path modeling as analytical method in European management research: A realist perspective. *European Management Journal*, 34(6), 598–605.

Rodrigues, A. M., Stank, T. P., & Lynch, D. F. (2004). Linking strategy, structure, process, and performance in integrated logistics. *Journal of Business Logistics*, 25(2), 65–94.

Rodríguez, J. A., Giménez Thomsen, C., Arenas, D., & Pagell, M. (2016). NGOs' initiatives to enhance social sustainability in the supply chain: poverty alleviation through supplier development programs. *Journal of Supply Chain Management*, 52(3), 83–108.

- Routroy, S., & Behera, A. (2017a). Agriculture supply chain: A systematic review of literature and implications for future research. *Journal of Agribusiness in Developing and Emerging Economies*.
- Routroy, S., & Behera, A. (2017b). Agriculture supply chain: A systematic review of literature and implications for future research. *Journal of Agribusiness in Developing and Emerging Economies*, 7(3), 275–302. <https://doi.org/10.1108/JADEE-06-2016-0039>
- Rungtusanatham, M., Rabinovich, E., Ashenbaum, B., & Wallin, C. (2007). Vendor-owned inventory management arrangements in retail: an agency theory perspective. *Journal of Business Logistics*, 28(1), 111–135.
- Saba, M., Bou Saba, P., & Harfouche, A. (2018). Hidden facets of IT projects are revealed only after deployment: The case of French agricultural cooperatives. *Information Technology and People*, 31(1), 239–255. <https://doi.org/10.1108/ITP-06-2016-0144>
- Salam, M. A. (2017). The mediating role of supply chain collaboration on the relationship between technology, trust and operational performance: An empirical investigation. *Benchmarking*, 24(2), 298–317. <https://doi.org/10.1108/BIJ-07-2015-0075>
- Salehi, M., Majbouri Yazdi, H., & Nekoei, M. (2018). The effect of communication capabilities of suppliers and external green integration on the green and financial performance in Iran. *Qualitative Research in Financial Markets*, 10(3), 309–323. <https://doi.org/10.1108/QRFM-11-2017-0100>
- Sarstedt, M., Ringle, C. M., Smith, D., Reams, R., & Hair Jr, J. F. (2014). Partial least squares structural equation modeling (PLS-SEM): A useful tool for family business researchers. *Journal of Family Business Strategy*, 5(1), 105–115.
- Satyasai, K. J. S., & Balanarayana, M. (2018). Can mechanization in agriculture help

achieving sustainable development goals? *Agricultural Economics Research Review*, 31(347-2018–5155), 147–156.

Schwarz, N., & Oyserman, D. (2001). Asking questions about behavior: Cognition, communication, and questionnaire construction. *The American Journal of Evaluation*, 22(2), 127–160.

Seo, Y. J., Dinwoodie, J., & Roe, M. (2015). Measures of supply chain collaboration in container logistics. *Maritime Economics and Logistics*, 17(3), 292–314.
<https://doi.org/10.1057/mel.2014.26>

Shevchenko, A., Pagell, M., Lévesque, M., & Johnston, D. (2020a). Preventing supplier non-conformance: extending the agency theory perspective. *International Journal of Operations and Production Management*, 40(3), 315–340.
<https://doi.org/10.1108/IJOPM-08-2019-0601>

Shevchenko, A., Pagell, M., Lévesque, M., & Johnston, D. (2020b). Preventing supplier non-conformance: extending the agency theory perspective. *International Journal of Operations & Production Management*.

Shih, S. C., Hsu, S. H. Y., Zhu, Z., & Balasubramanian, S. K. (2012). Knowledge sharing-A key role in the downstream supply chain. *Information and Management*, 49(2), 70–80.
<https://doi.org/10.1016/j.im.2012.01.001>

Shukla, S., & Sengupta, T. (2021). Business model innovation in the agricultural supply chain at Bottom of the Pyramid: Evidence from India. *Strategic Change*, 30(5), 461–466. <https://doi.org/10.1002/jsc.2460>

Sikombe, S., & Phiri, M. A. (2019). Exploring tacit knowledge transfer and innovation capabilities within the buyer–supplier collaboration: A literature review. *Cogent*

Business & Management, 6(1), 1683130.

Sillanpää, I., Shahzad, K., & Sillanpää, E. (2015). Supplier development and buyer-supplier relationship strategies—a literature review. *International Journal of Procurement Management*, 8(1–2), 227–250.

Sodhi, M. S., & Tang, C. S. (2014). Supply-chain research opportunities with the poor as suppliers or distributors in developing countries. *Production and Operations Management*, 23(9), 1483–1494.

Solaimani, S., & van der Veen, J. (2021). Open supply chain innovation: an extended view on supply chain collaboration. *Supply Chain Management: An International Journal*.

Solomon, S. J., Bendickson, J. S., Marvel, M. R., McDowell, W. C., & Mahto, R. (2021). Agency theory and entrepreneurship: A cross-country analysis. *Journal of Business Research*, 122(August 2020), 466–476. <https://doi.org/10.1016/j.jbusres.2020.09.003>

Squire, B., Cousins, P. D., & Brown, S. (2009). Cooperation and knowledge transfer within buyer-supplier relationships: The moderating properties of trust, relationship duration and supplier performance. *British Journal of Management*, 20(4), 461–477.
<https://doi.org/10.1111/j.1467-8551.2008.00595.x>

Sreedevi, R., & Saranga, H. (2017a). Uncertainty and supply chain risk: The moderating role of supply chain flexibility in risk mitigation. *International Journal of Production Economics*, 193(July 2015), 332–342. <https://doi.org/10.1016/j.ijpe.2017.07.024>

Sreedevi, R., & Saranga, H. (2017b). Uncertainty and supply chain risk: The moderating role of supply chain flexibility in risk mitigation. *International Journal of Production Economics*, 193, 332–342.

- Srivastava, P., Srinivasan, M., & Iyer, K. N. S. (2016). Relational Resource Antecedents and Operational Outcome of Supply Chain Collaboration: The Role of Environmental Turbulence. *Transportation Journal*, 54(2), 240–274.
<https://doi.org/10.5325/transportationj.54.2.0240>
- Starbird, S. A. (2001). Penalties, rewards, and inspection: provisions for quality in supply chain contracts. *Journal of the Operational Research Society*, 52(1), 109–115.
- Swafford, P. M., Ghosh, S., & Murthy, N. (2008). Achieving supply chain agility through IT integration and flexibility. *International Journal of Production Economics*, 116(2), 288–297. <https://doi.org/10.1016/j.ijpe.2008.09.002>
- Tang, C. S., Sodhi, M. S., & Formentini, M. (2016). An analysis of partially-guaranteed-price contracts between farmers and agri-food companies. *European Journal of Operational Research*, 254(3), 1063–1073. <https://doi.org/10.1016/j.ejor.2016.04.038>
- Teece, D. J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28(13), 1319–1350.
- Teece, D. J. (2018). Business models and dynamic capabilities. *Long Range Planning*, 51(1), 40–49.
- Thun, E. (2018). Innovation at the middle of the pyramid: State policy, market segmentation, and the Chinese automotive sector. *Technovation*, 70, 7–19.
- Tortorella, G. L., & Fettermann, D. (2018). Implementation of Industry 4.0 and lean production in Brazilian manufacturing companies. *International Journal of Production Research*, 56(8), 2975–2987.

- Trebbin, A., & Hassler, M. (2012). *Farmers ' producer companies in India : a new concept for collective action ?* 44, 411–428. <https://doi.org/10.1068/a44143>
- Tungjitjarurn, W., Suthiwartnarueput, K., & Pornchaiwiseskul, P. (2012a). The Impact of supplier development on supplier performance: The role of buyer-supplier commitment, Thailand. *European Journal of Business and Management*, 4(16), 183–193.
- Tungjitjarurn, W., Suthiwartnarueput, K., & Pornchaiwiseskul, P. (2012b). The Impact of Supplier Development on Supplier Performance: the Role of Buyer-Supplier Commitment, Thailand. *European Journal of Business and Management*, 4(16), 183–194. Retrieved from <http://iiste.org/Journals/index.php/EJBM/article/view/3017>
- Urbinati, A., Bogers, M., Chiesa, V., & Frattini, F. (2019). Creating and capturing value from Big Data: A multiple-case study analysis of provider companies. *Technovation*, 84, 21–36.
- Valkila, J., Haaparanta, P., & Niemi, N. (2010). Empowering coffee traders? The coffee value chain from Nicaraguan fair trade farmers to Finnish consumers. *Journal of Business Ethics*, 97(2), 257–270.
- Vanalle, R. M., Ganga, G. M. D., Godinho Filho, M., & Lucato, W. C. (2017). Green supply chain management An investigation of pressures, practices, and performance within the Brazilian automotive supply chain. *Journal of Cleaner Production*, 151, 250–259. <https://doi.org/10.1016/j.jclepro.2017.03.066>
- Vijayasathya, L. R. (2010). Supply integration: an investigation of its multi-dimensionality and relational antecedents. *International Journal of Production Economics*, 124(2), 489–505.
- Viswanathan, M., & Rosa, J. A. (2007). Product and market development for subsistence

- marketplaces: Consumption and entrepreneurship beyond literacy and resource barriers. In *Product and market development for subsistence marketplaces*. Emerald Group Publishing Limited.
- Von Braun, J., & Gatzweiler, F. W. (2014). *Marginality: Addressing the nexus of poverty, exclusion and ecology*. Springer Nature.
- Wang, C., & Hu, Q. (2020). Knowledge sharing in supply chain networks: Effects of collaborative innovation activities and capability on innovation performance. *Technovation, 94*, 102010.
- Wang, M. (2018). Impacts of supply chain uncertainty and risk on the logistics performance. *Asia Pacific Journal of Marketing and Logistics*.
- Westermann-Behaylo, M. K., Van Buren, H. J., & Berman, S. L. (2016). Stakeholder capability enhancement as a path to promote human dignity and cooperative advantage. *Business Ethics Quarterly, 26*(4), 529–555.
- Whipple, J. M., & Roh, J. (2010). Agency theory and quality fade in buyer-supplier relationships. *The International Journal of Logistics Management*.
- Woo, C., Kim, M. G., Chung, Y., & Rho, J. J. (2016). Suppliers' communication capability and external green integration for green and financial performance in Korean construction industry. *Journal of Cleaner Production, 112*, 483–493.
<https://doi.org/10.1016/j.jclepro.2015.05.119>
- Wu, G., Cheng, Y., & Huang, S. (2010). The study of knowledge transfer and green management performance in green supply chain management. *African Journal of Business Management, 4*(1), 044–048.

- Wu, I. L., & Chiu, M. L. (2018). Examining supply chain collaboration with determinants and performance impact: Social capital, justice, and technology use perspectives. *International Journal of Information Management*, 39(November 2017), 5–19. <https://doi.org/10.1016/j.ijinfomgt.2017.11.004>
- Wu, J., Wu, Z., & Si, S. (2016). The influences of Internet-based collaboration and intimate interactions in buyer-supplier relationship on product innovation. *Journal of Business Research*, 69(9), 3780–3787. <https://doi.org/10.1016/j.jbusres.2015.12.070>
- Wu, W. Y., Chiag, C. Y., Wu, Y. J., & Tu, H. J. (2004). The influencing factors of commitment and business integration on supply chain management. *Industrial Management and Data Systems*, 104(3), 322–333. <https://doi.org/10.1108/02635570410530739>
- Xie, X., Fang, L., & Zeng, S. (2016). Collaborative innovation network and knowledge transfer performance: A fsQCA approach. *Journal of Business Research*, 69(11), 5210–5215. <https://doi.org/10.1016/j.jbusres.2016.04.114>
- Xiong, J., & Zuo, M. (2019). How does family support work when older adults obtain information from mobile internet? *Information Technology and People*, 32(6), 1496–1516. <https://doi.org/10.1108/ITP-02-2018-0060>
- Xue, L. (2014). Governance–knowledge fit and strategic risk taking in supply chain digitization. *Decision Support Systems*, 62, 54–65.
- Xue, L., Zhang, C., Ling, H., & Zhao, X. (2013). Risk mitigation in supply chain digitization: System modularity and information technology governance. *Journal of Management Information Systems*, 30(1), 325–352. <https://doi.org/10.2753/MIS0742-1222300110>
- Yadav, G., Kumar, A., Luthra, S., Garza-Reyes, J. A., Kumar, V., & Batista, L. (2020). A

framework to achieve sustainability in manufacturing organisations of developing economies using industry 4.0 technologies' enablers. *Computers in Industry*, 122, 103280.

Yam, R. C. M., & Chan, C. (2015). Knowledge sharing, commitment and opportunism in new product development. *International Journal of Operations & Production Management*.

Yang, J., Wong, C. W. Y., Lai, K. hung, & Ntoko, A. N. (2009). The antecedents of dyadic quality performance and its effect on buyer-supplier relationship improvement. *International Journal of Production Economics*, 120(1), 243–251.
<https://doi.org/10.1016/j.ijpe.2008.07.033>

Yang, Y., Pham, M. H., Yang, B., Sun, J. W., & Tran, P. N. T. (2021). Improving vegetable supply chain collaboration: a case study in Vietnam. *Supply Chain Management: An International Journal*.

Yeh, C. C., Ku, E. C. S., & Ho, C. H. (2016). Collaborating pivotal suppliers: Complementarities, flexibility, and standard communication between airline companies and travel agencies. *Journal of Air Transport Management*, 55, 92–101.
<https://doi.org/10.1016/j.jairtraman.2016.05.004>

Yost, M. A., Sudduth, K. A., Walthall, C. L., & Kitchen, N. R. (2019). Public–private collaboration toward research, education and innovation opportunities in precision agriculture. *Precision Agriculture*, 20(1), 4–18.

Zelbst, P. J., Jr, K. W. G., Sower, V. E., Baker, G., Zelbst, P. J., Sower, V. E., & Baker, G. (2012). *RFID utilization and information sharing : the impact on supply chain performance*. <https://doi.org/10.1108/08858621011088310>

Zhang, X., van Donk, D. P., & van Der Vaart, T. (2011). Does ICT influence supply chain management and performance? A review of survey-based research. *International Journal of Operations & Production Management*.

Zhang, Y., Wang, L., & Duan, Y. (2016). Agricultural information dissemination using ICTs: A review and analysis of information dissemination models in China. *Information Processing in Agriculture*, 3(1), 17–29. <https://doi.org/10.1016/j.inpa.2015.11.002>

Zlatanova, S., & Fabbri, A. G. (2009). Geo-ICT for risk and disaster management. In *Geospatial Technology and the Role of location in Science* (pp. 239–266). Springer.

Zsidisin, G. A., Hartley, J. L., Bernardes, E. S., & Saunders, L. W. (2015). Examining supply market scanning and internal communication climate as facilitators of supply chain integration. *Supply Chain Management: An International Journal*.

Zu, X., & Kaynak, H. (2012). An agency theory perspective on supply chain quality management. *International Journal of Operations & Production Management*.

