Supply Chain Agility of E-Commerce Industry in Gaining Customer Trust

Diyaa Aaisyah Salmaa Putri Atmaja[1*], Nuryakin[2], Firman Pribadi[3]

[1,2,3] Department of Master of Management, University of Muhammadiyah Yogyakarta, DIY, Indonesia
[*]Corresponding Author:
E-mail:salmaaxia1@gmail.com

Abstract.
Supply chain agility is a supply chain capability derived from the intelligence, mindset, and integrative processes of all supply chain members to respond quickly to uncertainties and changes in the business environment in a reactive, proactive and predictive manner in meeting customer needs and demands. However, not all business people can perform system integration due to limited resources. In this case, the features presented by e-commerce can bridge business actors to achieve customer-centered supply chain agility competencies. This study aims to determine the effect of supply chain agility on the creation of customer trust which is supported by the use of e-tracing in the e-commerce industry. This approach uses multivariate analysis using SEM-PLS to determine the effect of each variable. Respondents were obtained by purposive random sampling technique and the survey was conducted online via Google Form aimed at the final 251 customers. The results show that supply chain agility has a positive and significant impact on customer trust. However, in this case, e-tracing has not been proven to strengthen or weaken the influence of supply chain agility on customer trust.

Keywords: *Supply Chain Agility, E-commerce, E-tracing, Customer Trust, Industry.*

I. INTRODUCTION

E-commerce users are increasing every year. E-commerce refers toonline business, where distribution, buying, selling, marketing of goods and services, and transfer of funds are carried out using the internet[1]. With e-commerce, users can transact over the internet without visiting a physical store. Sellers can create accounts to sell their products easily and buyers can find the items they want in a short time and save energy. Unfortunately, unlike an established business with formal management, buying goods from a small business is quite risky considering there are opportunities for fraud in the form of buyers not getting the goods and money not being returned.[2]. In this case, e-commerce has provided e-tracing features to strengthen the security of the flow of goods between sellers and buyers.Security of the flow of money and goods is important in business supply chain management[3]–[6].

Guaranteeing the security of the flow of money and goods is a task for business people, and small-scale businesses are no exception. Security of business operations is very important in achieving customer trust[7]–[10]. Customer trust is crucial in terms of customer value, satisfaction, loyalty and repurchase decisions. In this case, small businesses need to be serious in building customer trust[11]–[14].Business competition encourages organizations to have a competitive advantage[15]. Supply chain agility is one of the organizational competencies to gain competitive advantage[16], [17]. Supply chain agility enables supply chains to respond flexibly and responsively[18], [19]. Supply chain agility capabilities need to be customer oriented so as to produce competitive performance to meet customer needs and desires[20]–[22]. In this case, supply chain agility needs to be linked to customer focus[23]. However, the existing research on supply chains is still largely focused on the financial and operational areas. Therefore, this study tries to link supply chain agility to customer trust with e-tracing e-commerce features in ensuring the security of the flow of goods. Therefore, this study formulates the problem with the following questions;

1. How does supply chain agility affect customer trust in the e-commerce industry?
2. Can e-tracing moderate the influence of supply chain agility on customer trust in the e-commerce industry?

II. THEORICAL BACKGROUND AND HYPOTHESES DEVELOPMENT

Supply chain agility and customer oriented

Supply chain agility is defined as a collection of mindsets, intelligence, and processes across supply chain members that are used to respond quickly to uncertain and changing business environments through

reactive, proactive and predictive ways of working by relying on the integration of supply chain relationships for the purpose of meeting needs. customer[24].

CUstomer trust

Customer trust is a thought, feeling, emotion, or behavior that is manifested when the customer feels that the service provider or service can be relied on to act well when the customer gives up direct control to do certain things.[25].

E-Tracing

Electronic tracing is the ability to trace product status history and location records through electronic media using the internet[26].

Hypotheses

Customer trust is fundamental to an organization and can affect business relationships[27]–[29]. However, the very important customer trust does not necessarily present itself, organizations need to provide good service performance and customer relationship management.[30]. Organizations with supply chain agility capabilities can improve service performance while building good relationships with customers[24], [31], [32]. Based on this, this study proposes hypothesis 1 as follows;

Hypotheses 1. Supply chain agility has a positive effect on customer trust

Along with the development of the industrial world, customers want safe, targeted, and traceable shipping operations[33]–[36]. Guaranteeing the flow of goods is one of the focus of discussion in supply chain management[37]. Supply chain agility is an organizational competency to be able to respond responsively and flexibly to the development of customer wants and needs[19]. The e-tracing feature in e-commerce allows customers to monitor the delivery history of goods sent by sellers. In this case the transparency of the flow of goods encourages the creation of customer trust[3]. Therefore, this study proposes hypothesis 2 as follows;

Hypotheses 2.E-tracing in e-commerce moderates the relationship of supply chain agility to customer trust.

Research Model

The proposed research model can be seen in Figure 1. Research Model.

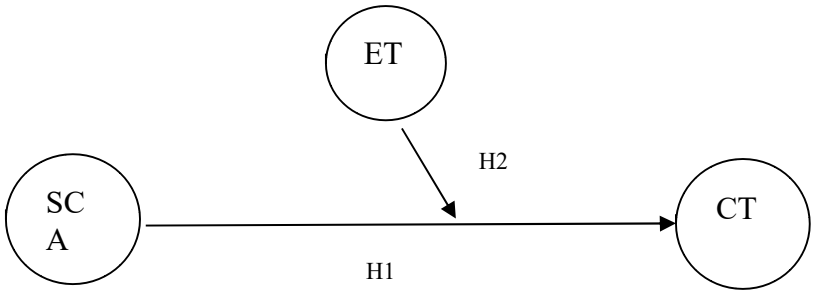

Fig 1. Research Model.

III. METHODS

The method used in this study is the Partial Least Square-Structural Equation Modeling (PLS-SEM) method with the SmartPLS analysis tool to evaluate the influence between research variables. The research was conducted in the province of Yogyakarta, Indonesia, taking into account that the province has the second national ranking of the 2019-2020 Technology and Communications Development Index. The data collection technique uses a purposive random sampling technique with the criteria of 1) Having experience using e-commerce, 2) Having experience using e-tracing features, 3) having experience using e-payment e-commerce features, and 4) being in Yogyakarta Province. The data used in this study is cross-sectional data taken during the timeframe of March-May 2022 with an online survey method using Google Form.All calculations applied in this study used a Likert scale of 1-7, with the number "1" indicating strongly disagree until the number "7" indicating "strongly agree". The supply chain agility is calculated using 6 measurement items from Gligor et al. (2020), customer trust is calculated using 7 measurement items developed from

Halim et al. (2020) & Uzir et al. (2021), while e-tracing was calculated using 23 measurement items developed from the measurement items Alalwan (2020) & Ul-Hameed et al. (2018)[1], [22], [26], [38], [39].

IV. RESULTS AND DISCUSSION

Measurement Model Evaluation

This study uses data from 114 respondents who were collected. In the evaluation of the measurement model, convergent validity, discriminant validity and construct reliability were tested. Convergent validity can be seen through the loading factor value. The indicator is declared valid if it has a loading factor value > 0.5. Discriminant validity can be seen through the value of the square root average (√AVE). The indicator is said to be valid if the value of AVE > 0.5. While construct reliability can be seen through the composite reliability value > 0.7 and Cronbach's Alpha > 0.6[40].

Table 1. Convergent Validity

Supply Chain Agility	SCA1	0.774	Valid
	SCA2	0.810	Valid
	SCA3	0.801	Valid
	SCA4	0.826	Valid
	SCA5	0.805	Valid
	SCA6	0.843	Valid
Customer Trust	CT1	0.825	Valid
	CT2	0.851	Valid
	CT3	0.872	Valid
	CT4	0.839	Valid
	CT5	0.874	Valid
	CT6	0.824	Valid
	CT7	0.853	Valid
E-Tracing	ET1	0.804	Valid
	ET2	0.811	Valid
	ET3	0.864	Valid
	ET4	0.839	Valid
	ET5	0.853	Valid
	ET6	0.820	Valid
	ET7	0.860	Valid
	ET8	0.854	Valid
	ET9	0.848	Valid
	ET10	0.806	Valid
	ET11	0.824	Valid
	ET12	0.836	Valid
	ET13	0.909	Valid
	ET14	0.858	Valid
	ET15	0.846	Valid
	ET16	0.809	Valid
	ET17	0.793	Valid
	ET18	0.823	Valid
	ET19	0.751	Valid
	ET20	0.737	Valid
	ET21	0.727	Valid
	ET22	0.729	Valid

	ET23	0.781	Valid

Source: SmartPLS Output Results (v.3.2.9)

From the convergent validity test, the loading factor value of each variable indicator of supply chain agility, customer trust and e-tracing has a value > 0.5 so that all indicators are declared valid.

Table 2. Discriminant Validity Test (√AVE)

Variable	AVE	Information
Supply Chain Agility	0.691	Valid
Customer Trust	0.743	Valid
E-Tracing	0.687	Valid

Source: SmartPLS Output Results (v.3.2.9)

From the discriminant validity test, the AVE value of each variable indicator of supply chain agility, customer trust and e-tracing has a value > 0.5 so that all indicators are declared valid.

Table 3. Reliability Test

Variable	Composite Reliability	rho_A	Cronbach Alpha	Information
Customer Trust	0.953	0.942	0.942	Reliable
E-Tracing	0.981	0.980	0.979	Reliable
Supply Chain Agility	0.931	0.911	0.911	Reliable

Source: SmartPLS Output Results (v.3.2.9)

Based on the reliability test, it can be seen that the Composite reliability value of each variable has a value > 0.7 and Cronbach's Alpha each variable has a value > 0.6. So it can be concluded that each variable has a high level of reliability.

Structural Model Evaluation

The inner model test is carried out by looking at the*R-square*the research model, the relationship between the constructs, and the significance value. The structural model was evaluated using data from 251 respondents. The profile of the respondents in this study can be described in the following table;

Table 4. Respondent Profiling

Gender	1.	Man	137
	2.	Woman	114
E-commerce used	1.	Shopee	188
	2.	Tokopedia	44
	3.	Lazada	10
	4.	OpenStore	5
	5.	Other	4
Age	1.	12-27 years old	190
	2.	28-41 years old	46
	3.	42 – 57 years old	12
	4.	Over 57 years	3
Education	1.	High School/Equivalent	70
	2.	Diploma/Bachelor S1	144
	3.	Master	23
	4.	Doctoral	3
	5.	Other	11
Work	1.	Full Housewife	8
	2.	Government employees	19
	3.	Private employees	62
	4.	Entrepreneur	11
	5.	Student/Student	130
	6.	Other	21

After profiling the respondents, the next step is to test the inner model. Testing of the inner model or structural model is carried out to see the relationship between the construct, the significance value and the R-square of the research model.

Inner Model Test

Table 5. R-square

Variable	Original samplee (O)	Sammop Mean (M)	Boothdart Deviation (STDEV)	T-Statisticsc (|O/SDEV|)	P-Value
CTR	0.760	0.765	0.036	21.137	0.000

Source: SmartPLS Output Results (v.3.2.9)

Table 6. R-Square Adjusted

Variable	Original samplee (O)	Sammop Mean (M)	Boothdart Deviation (STDEV)	T-Statisticsc (|O/SDEV|)	P-Value
CTR	0.757	0.762	0.036	20,802	0.000

Source: SmartPLS Output Results (v.3.2.9)

Table 7. Total Effects

Variable	Original samplee (O)	Sammop Mean (M)	Boothdart Deviation (STDEV)	T-Statisticsc (|O/SDEV|)	P-Value
H1: SCA -> CT	0.352	0.355	0.072	4,867	0.000
H2 : Moderating Effect 1 (SCA*ET) -> CTR	-0.013	-0.011	0.022	0.586	0.558

Source: SmartPLS Output Results (v.3.2.9)

In PLS statistical testing of each hypothesized relationship is carried out using simulation. In this case, it is done by bootstrapping the sample data. The test results show the value of the original sample on the R-square and R-square adjusted 0.5. This shows that the independent variables as a whole, namely SCA and ET, have a substantial effect on CT. Then in the table the total effect shows the effect of SCA on CT directly. The coefficient value is 0.352, the p-value is 0.000 and the t-statistic is 4.867. The p-values of 0.000 are less than 0.05 and the t-statistic value of 5.223 is more than the t-table of 1.96. These results indicate that SCA has a positive and significant effect on CT directly. So H1 is accepted.supplier flexibility has a positive effect on customer trust and affects long-term business relationships[41].

Supply chain agility enables organizations to flexibly manage customer demand and create customer trust[42]. However, unlike H1, H2 has a t-statistic number 1.96 and a p-value 0.05. This shows that the ET variable has no significant effect on moderating the effect of SCA on CT so that H2 is rejected. This may be because ET does allow customers to check the status and history of shipments[26], but the suitability of the quality of the product sent is not necessarily appropriate and the seller is not necessarily reliable[2]. Positive customer experiences in using e-tracing features in e-commerce cannot increase the organization's ability to be responsive and flexible to changes. IT integration does have a positive effect on the agility of the MSME supply chain. However, these IT competency need to have certain characteristics that are in accordance with supply chain agility competency [43].

V. CONCLUSION

This research was conducted to better understand the effect of supply chain agility on customer trust. Research shows that supply chain agility that makes organizations more responsive and flexible has a positive and significant impact on customer trust. The e-tracing feature in e-commerce does not have the characteristics of an IT competency that is aligned with supply chain agility. So in this case e-tracing in e-commerce is not a moderating variable on the effect of supply chain agility on customer trust.The research is limited to the realm of the influence of supply chain agility, customer trust, and the use of e-tracing features in e-commerce. In particular, it is possible that in different e-commerce features can have a significant impact on supply chain agility relationships on customer trust.

REFERENCES

[1] E. Halim, R. Januardin, and M. Hebrard, "The impacts of E-payment system and impulsive buying to purchase intention in E-commerce," *Proc. 2020 Int. Conf. Inf. Manag. Technol. ICIMTech 2020*, no. August, pp. 847–852, 2020, doi: 10.1109/ICIMTech50083.2020.9211154.

[2] A. Wongkitrungruenga and N. Assarut, "The role of live streaming in building consumer trust and engagement with social commerce sellers," ***J. Bus. Res.***, pp. 1–14, 2018, doi: doi:10.1016/j.jbusres.2018.08.032.

[3] Z. Li, G. Liu, L. Liu, and X. Lai, "IoT-based tracking and tracing platform for prepackaged food supply chain," *Ind. Manag. Data Syst.*, vol. 117, no. 9, pp. 1906–1916, 2017, doi: 10.1108/IMDS-11-2016-0489.

[4] S. Sutia, M. Fahlevi, M. Saparudin, D. Irma, and S. Maemunah, "Should e-Payment Trust be e-Commerce Implemented as a Consumer Satisfaction Factor?," *E3S Web Conf.*, vol. 202, 2020, doi: 10.1051/e3sconf/202020216002.

[5] P. Engelseth, W. Wongthatsanekorn, and C. Charoensiriwath, "Food product traceability and customer value," *Glob. Bus. Rev.*, vol. 15, no. 2010, pp. 87S-105S, 2014, doi: 10.1177/0972150914550549.

[6] M. Malik, H. Ghaderi, and A. Andargoli, "A resource orchestration view of supply chain traceability and transparency bundles for competitive advantage," *Bus. Strateg. Environ.*, vol. 30, no. 8, pp. 3866–3881, 2021, doi: 10.1002/bse.2845.

[7] M. Singh, "E□services and their role in B2C e□commerce," ***Manag. Serv. Qual. An Int. J.***, vol. 12, no. 6, pp. 434–446, 2002, doi: 10.1108/09604520210451911.

[8] M. K. Chang, W. Cheung, and M. Tang, "Building trust online: Interactions among trust building mechanisms," *Inf. Manag.*, vol. 50, no. 7, pp. 439–445., 2013, doi: doi:10.1016/j.im.2013.06.003.

[9] R. A. Paluri and A. Mishal, *Trust and commitment in supply chain management: a systematic review of literature*, vol. 27, no. 10. 2020.

[10] T. Hariguna and B. Berlilana, "Understanding of antecedents to achieve customer trust and customer intention to purchase e-commerce in social media, an empirical assessment," ***Int. J. Electr. Comput. Eng.***, vol. 7, no. 3, pp. 1240–1245, 2017, doi: 10.11591/ijece.v7i3.pp1240-1245.

[11] Y. J. Kiang, "An Empirical Study of Customer Value, Customer Trust and Customer Loyalty Based on E-Commerce," ***Bus. Econ. J.***, vol. 7, no. 3, 2016, doi: 10.4172/2151-6219.1000242.

[12] C. Correa, D. Alarcón, and I. Cepeda, "'I am Delighted!': The Effect of Perceived Customer Value on Repurchase and Advocacy Intention in B2B Express Delivery Services," *Sustain.*, vol. 13, no. 11, 2021, doi: 10.3390/su13116013.

[13] H. Setiawan and A. J. Sayuti, "Effects of service quality, customer trust and corporate image on customer satisfaction and loyalty: an assessment of travel agencies customer in South Sumatra," ***JIOSR ournal Bus. Manag.***, vol. 19, no. 5, pp. 31–40, 2017.

[14] E. Chompis, H. J. M. Horn, R. W. H. Bons, and F. Feldberg, "Social media in B2B financial services: A matter of trust and responsiveness?," *25th Bled eConference - eDependability Reliab. Trust. eStructures, eProcesses, eOperations Eser. Futur. Proc.*, pp. 211–237, 2012.

[15] P. M. Swafford, S. Ghosh, and N. Murthy, "The antecedents of supply chain agility of a firm: scale development and model testing," ***J. Oper. Manag.***, vol. 24, no. 2, pp. 170–188, 2006.

[16] A. Agarwal, R. Shankar, and M. K. Tiwari, "Modeling agility of supply chain," *Ind. Mark. Manag.*, vol. 36, no. 4, pp. 443–57, 2007.

[17] M. J. Braunscheidel and N. C. Suresh, "The organizational antecedents of a firm's supply chain agility for mitigation and response," ***J. Oper. Manag.***, vol. 27, no. 2, pp. 119–140, 2009.

[18] D. Gligor, N. Gligor, M. Holcomb, and S. Bozkurt, "Distinguishing between the concepts of supply chain agility and resilience: A multidisciplinary literature review," ***Int. J. Logist. Manag.***, vol. 30, no. 2, pp. 467–487, 2019, doi: 10.1108/IJLM-10-2017-0259.

[19] E. Al Humdan, Y. Shi, and M. Behnia, "Supply chain agility: a systematic review of definitions, enablers and performance implications," ***Int. J. Phys. Distrib. Logist. Manag.***, vol. 50, no. 2, pp. 287–312, 2020, doi: 10.1108/IJPDLM-06-2019-0192.

[20] P. Afflerbach and L. Frank, "Customer experience versus process efficiency: towards an analytical framework about ambidextrous BPM," 2016.

[21] D. Asamoah, D. Nuertey, B. Agyei-Owusu, and J. Akyeh, "The effect of supply chain responsiveness on customer development," ***Int. J. Logist. Manag.***, 2021, doi: 10.1108/IJLM-03-2020-0133.

[22] D. Gligor, S. Bozkurt, I. Gölgeci, and M. J. Maloni, "Does supply chain agility create customer value and satisfaction for loyal B2B business and B2C end-customers?," ***Int. J. Phys. Distrib. Logist.***, vol. 50, no. 7/8, pp. 721-743., 2020, doi: https://doi.org/10.1108/IJPDLM-01-2020-0004.

[23] J. N. Sheth, N. K. Sethia, and S. Srinivas, "Mindful consumption: a customer-centric approach to sustainability," ***J. Acad. Mark. Sci.***, vol. 39, pp. 21–39, 2011, doi: https://doi.org/10.1007/s11747-010-0216-3.

[24] S. Fayezi, A. Zutshi, and A. O'Loughlin, "How Australian manufacturing firms perceive and understand the concepts of agility and flexibility in the supply chain," ***Int. J. Oper. Prod. Manag.***, vol. 35, no. 2, pp. 246–281, 2015.

[25] A. S. Patrick, "Building trustworthy software agents," *IEEE Internet Comput.*, vol. 6, no. 6, pp. 46–53, 2002.

[26] Waseem-Ul-Hameed, S. Nadeem, M. Azeem, A. I. Aljumah, and R. A. Adeyemi, "Determinants of e-logistic customer satisfaction:

A mediating role of information and communication technology (ICT)," ***Int. J. Supply Chain Manag.***, vol. 7, no. 1, pp. 105–111, 2018.

[27] J. Gill and R. J. Butler, "Managing instability in cross-cultural alliances," *Long Range Plann.*, vol. 36, pp. 543–64, 2003.

[28] M. F. Luce, J. Jia, and G. W. Fischer, "How much do you like it? Within-alternative conflict and subjective confidence in consumer judgments," ***J. Consum. Res***., vol. 30, pp. 464–72, 2003.

[29] D. Ford, L.-E. Gadde, H. Hakansson, and I. Snehota, *Managing Business Relationships*, 2nd ed. Chichester: Wiley, 2003.

[30] P.-C. Sun and C.-M. Lin, "Building customer trust and loyalty: an empirical study in a retailing context," *Serv. Ind. J.*, vol. 30, no. 9, pp. 1439–1455, 2010, doi: 10.1080/02642060802621478.

[31] S. E. DeGroote and T. G. Marx, "The impact of IT on supply chain agility and firm performance: An empirical investigation," ***Int. J. Inf. Manage.***, vol. 33, no. 6, pp. 909–916, 2013, doi: https://doi.org/10.1016/j.ijinfomgt.2013.09.001.

[32] J. Um, "The impact of supply chain agility on business performance in a high level customization environment," *Oper. Manag. Res.*, vol. 10, pp. 10–19, 2017, doi: https://doi.org/10.1007/s12063-016-0120-1.

[33] K. L. Yam, P. T. Takhistov, and J. Miltz, "Intelligent packaging: concepts and applications," ***J. Food Sci.***, vol. 70, no. 1, 2005.

[34] J. P. Kerry, M. N. O'grady, and S. A. Hogan, "Past, current and potential utilisation of active and intelligent packaging systems for meat and muscle-based products: A review," *Meat Sci.*, vol. 74, no. 1, pp. 113–130, 2006.

[35] N. S. Al-Jahwari, F. R. Khan, G. K. Al Kalbani, and S. Al Khansouri, "Factors Influencing Customer Satisfaction of Online Shopping in Oman: Youth Perspective," *Humanit. Soc. Sci. Rev.*, vol. 6, no. 2, pp. 64–73, 2018, doi: DOI/10.18510/hssr.2018.628.

[36] H. Hasan, E. AlHadhrami, A. AlDhaheri, K. Salah, and R. Jayaraman, "Smart contract-based approach for efficient shipment management," *Comput. Ind. Eng.*, vol. 136, pp. 149–159, 2019, doi: 10.1016/j.cie.2019.07.022.

[37] S. Rahimpour Golroudbary, S. M. Zahraee, U. Awan, and A. Kraslawski, "Sustainable Operations Management in Logistics Using Simulations and Modelling: A Framework for Decision Making in Delivery Management," *Procedia Manuf.*, vol. 30, pp. 627–634, 2019, doi: https://doi.org/10.1016/j.promfg.2019.02.088.

[38] M. U. H. Uzir *et al.*, "The effects of service quality, perceived value and trust in home delivery service personnel on customer satisfaction: Evidence from a developing country," ***J. Retail. Consum. Serv***., vol. 63, no. April, p. 102721, 2021, doi: 10.1016/j.jretconser.2021.102721.

[39] A. A. Alalwan, "Mobile food ordering apps: An empirical study of the factors affecting customer e-satisfaction and continued intention to reuse," ***Int. J. Inf. Manage.***, vol. 50, pp. 28–44, 2020, doi: https://doi.org/10.1016/j.ijinfomgt.2019.04.008.

[40] J. F. Hair, J. J. Risher, M. Sarstedt, and C. M. Ringle, "When to use and how to report the results of PLS-SEM," *Eur. Bus. Rev.*, vol. 31, no. 1, pp. 2–24, 2019, doi: 10.1108/EBR-11-2018-0203.

[41] S. L. Han, H. S. Sung, and H. S. Shim, "Antecedents and performance outcomes of flexibility in industrial customer-supplier relationships," ***J. Bus. Res.***, vol. 67, no. 10, pp. 2115–2122, 2014, doi: 10.1016/j.jbusres.2014.04.020.

[42] S. Hua, S. R. Chatterjee, and Y. Kang-Kang, "Access flexibility, trust and performance in achieving competitiveness: An empirical study of Chinese suppliers and distributors," ***J. Chinese Econ. Foreign Trade Stud.***, vol. 2, no. 1, pp. 31–46, 2009.

[43] S. Malekifar, S. K. Taghizadeh, S. A. Rahman, and S. U. R. Khan, "Organizational Culture, IT Competence, and Supply Chain Agility in Small and Medium-Size Enterprises," *Glob. Bus. Organ. Excell.*, pp. 69–75, 2014.