4th INCOGITE and 2nd HOSPITOUR 2022
"Regenerative Economy, Business & Tourism: Through innovation & Sustainability"
Thursday, November 17th, 2022 – Universitas Pelita Harapan Tangerang

Relationship Quality and Flexibility of Partnering with Suppliers on the Performance of Innovations Mediated by Knowledge Sharing (Case Study on the Steel Industry in Indonesia)

[1] Giovani Anward, [2] Eka Pria Anas

[1] giovannianward@gmail.com

[1,2] Faculty of Economics and Business, Strategic Management Science, Universitas Indonesia, Indonesia

Abstract. Given that most of the operational costs of steel companies are in the main raw materials, steel companies need to pay attention to how they relate to suppliers to improve innovation performance. Thus, this study aims to determine whether the relationship quality and flexibility of partnering with suppliers can affect innovation performance, namely the quality and innovation speed through knowledge sharing. Data was collected through a questionnaire obtained from the national steel company association IISIA and obtained 107 company respondents. The data were processed and analyzed using structural equation modeling (SEM) to test the overall fit of the model and test the causality relationship between variables. The results of this study indicate that the relationship quality has a significant effect on the innovation quality only through knowledge sharing. On the other hand, the quality of the relationship can increase the innovation speed directly without sharing knowledge. The next result is that partner flexibility can increase the innovation speed significantly and also the innovation quality without knowledge sharing. Several managerial implications and suggestions for further research are also presented in this study.

Keywords: Relationship Quality; Flexibility of Partnering; Knowledge Sharing; Innovation speed; innovation quality

1. Introduction

National Steel demand is recorded to be greater than the supply that can be carried out by the domestic industry. In early 2020, the Minister of Industry, Agus Gumiwang Kartasasmita , said that the national steel company supplies only 40% of domestic steel needs and the rest is imported [1]. Of the 60% supplied from imports, half are products that cannot be supplied domestically at all, while the remaining 30% can be produced domestically so that the national steel contribution should reach around 70% [2]. Not only that, *the supply-demand* of steel is also very dependent on the size of the government's development projects that are planned every year . In 2021, the demand for steel will increase from the previous year due to the large number of development projects carried out by the government, namely as many as 25 projects with a value of 278.35 trillion rupiah. In this case, the potential for absorption of national steel consumption by domestic steel companies can still be maximized.

National steel companies need to innovate to increase their competitiveness and then maximize the absorption of steel consumption. In general, companies can increase their competitiveness by developing the core and specific competencies of the company [3]. The most influential core competence in steel companies is in the upstream process, namely regarding the raw materials, considering that raw materials have a portion of 65-70% of the total cost. The importance of raw materials in the steel industry implies that, in innovating, the role of suppliers can be said to be significant. On the other hand , the physical investment value of a steel company is very large so it is not easy for a steel company to develop independently, especially in production and

[1] I. N Agistia, IMM, & Nurcaya, 'INFLUENCE OF QUALITY OF SERVICE AND CUSTOMER VALUE ON CUSTOMER LOYALTY', *EJournal of Management.* , 2019.
[2] Agistia, IMM, & Nurcaya.
[3] Kenneth E. Marino, 'Developing Consensus on Firm Competencies and Capabilities', *Academy of Management Executive* , 10.3 (1996), 40–51 <https://doi.org/10.5465/ame.1996.970411473>; Young Sik Cho, 'The Effect of Business Diversification on a Firm's Performance, Depending on Its Dynamic Capabilities and Market Dynamism', *Journal of Management and Strategy* , 4.3 (2013), 1–8 <https://doi.org/10.5430/ jms.v4n3p1>; Liem Viet Ngo and others, 'Effective Sense-and-Respond Strategies: Mediating Roles of Exploratory and Exploitative Innovation', *Journal of Business Research* , 94.November 2017 (2019), 154–61 <https://doi.org/10.1016 /j.jbusres.2017.10.050>; Jieyu Zhou and others, 'Entrepreneurs' Socioeconomic Status and Government Expropriation in an Emerging Economy', *Strategic Entrepreneurship Journal* , 14.3 (2020), 396–418 <https://doi.org/10.1002/sej.1361>.

technology [4]. So that one of the other efforts that can be done in innovating is to collaborate with other companies, especially suppliers.

Relationships with suppliers can be one of the strategies in developing company innovation both in terms of quality and speed[5]. Several studies have revealed that the relationship between suppliers and consumers can effectively increase the competitiveness of companies [6]. The relationship that results from this supplier-consumer relationship provides a more focused development of innovation to increase the competitiveness of a company considering that both are in a related business[7]. The activity of exchanging information between suppliers and consumers will certainly help companies in adjusting to market needs [8]. Apart from that, the relationship between the two in both business and social contexts can be a good preparation in forming a new advantage [9].

An important part of establishing a relationship with a supplier is the sharing of knowledge. Through relationships with suppliers, companies can increase the knowledge needed to run their business [10]. This knowledge then becomes a valuable asset for the company in determining the direction of innovation and reconfiguring its capabilities to adapt to market needs [11]. In innovation with the context of new product creation and production efficiency, knowledge sharing can provide insight for companies in determining which products can be developed and which production lines can be further optimized so that they become more efficient. Investment in new equipment and technology can be maximized with the addition of new knowledge. On the other hand, in terms of production speed, the company will gain experience and knowledge from its partners on how to carry out production management to be more adaptive in adjusting production capabilities and consumer needs [12]. Matters related to this innovation in production speed are the need for knowledge on how to manage the supply of raw materials to product management. In the context of raw material management , how do companies find it easy to get raw materials in the right quantity and at the right time.

Relationships with suppliers can be seen from the quality of their relationships with certain suppliers or the flexibility of partnering with several suppliers. Both the quality of the relationship or the flexibility of partnering, both are needed by companies to increase their competitiveness. On the other hand, these two variables also have their respective advantages. The relationship quality with suppliers in this context is how far a company cooperates and is bound by one of its suppliers [13]. Broadly speaking, with a quality relationship between the company and its suppliers , it can improve the quality of information exchange, direct mutually beneficial transactions, give birth to new collaborations and get special benefits [14]. However, the relationship qualitys with suppliers makes companies tend to depend on most of their raw material needs to one particular supplier because of the attachment given that in the relationship quality variable there is a commitment parameter. For example, there is a long-term contract made by the two companies in the next few years that binds a certain quantity of raw material needs to a particular supplier. This becomes unprofitable if the needs or market competition change, so that the current long-term cooperation will feel less competitive. Thus companies need to have flexibility in partnering with other companies. Through the flexibility of partnering, the company will be able to adapt to changing market needs considering that each supplier has different capabilities and

---

[4] Simon Collinson, 'Knowledge Management Capabilities for Steel Makers: A British-Japanese Corporate Alliance for Organizational Learning', *Technology Analysis and Strategic Management* , 11.3 (1999), 337–58 <https://doi.org/10.1080/0953733299107393>.

[5] Wai Wai Joyce Ko and others, 'External Supply Chain Flexibility and Product Innovation Performance: A Study of Small- and Medium-Sized UK-Based Manufacturers', *European Journal of Marketing*, 52.9–10 (2018), 1981–2004 <https://doi.org/10.1108/EJM-07-2017-0466>.

[6] Brian Fynes, Chris Voss, and Seán De Búrca, 'The Impact of Supply Chain Relationship Quality on Quality Performance', *International Journal of Production Economics*, 96.3 (2005), 339–54 <https://doi.org/10.1016/j.ijpe.2004.05.008>.

[7] Gang Li, 'The Impact of Supply Chain Relationship Quality on Knowledge Sharing and Innovation Performance: Evidence from Chinese Manufacturing Industry', *Journal of Business and Industrial Marketing*, 36.5 (2020), 834–48 <https://doi.org/10.1108/JBIM-02-2020-0109>.

[8] Chandan Acharya and others, 'Modular Interconnected Processes, Fluid Partnering, and Innovation Speed: A Loosely Coupled Systems Perspective on B2B Service Supply Chain Management', *Industrial Marketing Management*, 89.May 2019 (2020), 209–19 <https://doi.org/10.1016/j.indmarman.2019.05.007>; Mona Ashok, Rajneesh Narula, and Andrea Martinez-Noya, 'How Do Collaboration and Investments in Knowledge Management Affect Process Innovation in Services?', *Journal of Knowledge Management*, 20.5 (2016), 1004–24 <https://doi.org/10.1108/JKM-11-2015-0429>; Rafał Drewniak and Robert Karaszewski, 'Diffusion of Knowledge in Strategic Alliance: Empirical Evidence', *International Entrepreneurship and Management Journal*, 16.2 (2020), 387–416 <https://doi.org/10.1007/s11365-019-00589-2>.

[9] D. DePamphilis, *Mergers and Acquisitions Basics Negotiation and Deal Structuring.* (Oxford: Academic Press, 2011).

[10] Juan Alcacer and Joanne Oxley, 'Learning by Supplying', *Strategic Management Journal*, 35.2 (2014), 204–23 <https://doi.org/10.1002/smj.2134>; Nisha Bamel and others, 'Knowledge Management within a Strategic Alliances Context: Past, Present and Future', *Journal of Knowledge Management*, June, 2021 <https://doi.org/10.1108/JKM-06-2020-0443>; Drewniak and Karaszewski; Gang Li.

[11] Vijita Aggarwal and Madhavi Kapoor, 'Innovation Growth from Knowledge Transfer in International Strategic Alliances', *Journal of Strategy and Management*, 11.4 (2018), 483–96 <https://doi.org/10.1108/JSMA-06-2018-0054>.

[12] Fynes, Voss, and De Búrca.

[13] Gang Li.

[14] P Muthusamy, S. K., & Dass, 'When "Trust" Becomes More or Less Salient for Alliance Performance? Contextual Effects of Mutual Influence, International Scope, and Coopetition', *Journal of General Management*, 46.2 (2021).

characters [15]. However, the flexibility of partnering tends not to be able to exploit the depth of cooperation with certain suppliers, especially in *research and development programs* or joint innovations.

The relationship quality with the supplier is judged by the presence of trust, commitment and good communication in the relationship [16]. The quality of good supplier relationships can be indicated by the extent to which the company cooperates with its suppliers in terms of sharing knowledge and technology, and is bound by a long-term contract [17]. In the context of the relationship quality with suppliers, the majority of raw material needs are supplied from the supplier company. As for the existence of a good quality relationship with one particular supplier, it is possible for the company to get special facilities from that supplier so that it can increase its competitiveness [18]. With a good quality relationship, the company will be able to get to know the character of its suppliers and exploit the advantages of cooperation both commercially and technically.

From some of the descriptions above, it can be said that building relationships with suppliers can be an option for companies in the steel industry to survive in the face of market competition. In this article, an empirical study will be presented on whether relationship quality and flexibility in partnering with suppliers can improve innovation performance through knowledge sharing. On the other hand, this study will also examine whether directly, relationship quality and partner flexibility can improve innovation performance.

2. Literature Review

Previous researchers have conducted studies of several theoretical frameworks to explain the importance of supplier relationships[19]. One of the theories used is resource based theory, which is then linked to social capital theory, as well as transactional cost theory[20]. Resource based theory emphasizes that the basic strength of a company is in the capabilities and resources of the company[21]. Thus the company will tend to seek to obtain strategic and unique resources to increase the company's capabilities[22].

Regarding raw material resources, resourced based theory explains that companies need a good relationship with their suppliers[23]. Moreover, related to steel companies, where as much as 65-70% of production costs are from raw materials[24], then matters relating to the supply of raw materials are strategic matters. Not only costs, other technical matters to carry out product development, production efficiency and even production speed can also be affected by the supply of raw materials. This implies that companies need to get closer to the owners of these raw material resources[25]. By building a relationship system with suppliers, companies have the opportunity to get easy supply of raw materials[26]. Some of these conveniences are the flexibility of variations in raw materials, ease of payment, speed of supply, and certainty of availability or continuity of supply of raw materials. Thus, companies need to develop their social capital which is in accordance with Social capital theory. The social capital in question is regarding the network structure of the company's relationship with its suppliers, that is whether the company needs to strengthen relations with a particular supplier or emphasize the flexibility of partnering with several suppliers.

Based on Social capital theory, one of the reasons companies increase their social capital is an increase in knowledge[27]. By improving the relationship qualitys with suppliers, companies will tend to share knowledge with their suppliers[28]. The existence of knowledge sharing between companies and their suppliers will be able to increase the company's ability to innovate. Based on the relational view, collaborative innovation with the

---

[15] Acharya and others.

[16] G Li, 'The Impact of Supply Chain Relationship Quality on Knowledge Sharing and Innovation Performance: Evidence from Chinese Manufacturing Industry', *Journal of Business and Industrial Marketing*, 36.5 (2020).

[17] S Shin, N., Park, S. H., & Park, 'Partnership-Based Supply Chain Collaboration: Impact on Commitment, Innovation, and Firm Performance', *Sustainability (Switzerland)*, 11.2 (2019).

[18] M Fayezi, S., & Zomorrodi, 'The Role of Relationship Integration in Supply Chain Agility and Flexibility Development: An Australian Perspective', *Journal of Manufacturing Technology Management,* 26.8 (2015).

[19] Fynes, Voss, and De Búrca.

[20] Shin, N., Park, S. H., & Park.

[21] J.B Barney, '"Firm Resources and Sustained Competitive Advantage', *Journal of Management*, 17.1 (1991), 19–120.

[22] K Chisholm, A. M., & Nielsen, 'Social Capital and the Resource-Based View of the Firm', *International Studies of Management & Organization*, 39.2 (2009), 7–32.

[23] H Li, W., Zhao, P., & Qu, 'The Empirical Research of the Effect about Communication, Trust and Commitment on Supply Chain Cooperation', *Advanced Materials Research*, 2012 <https://doi.org/10.4028/www.scientific.net/AMR.468-471.2963>.

[24] S Mandal, 'Supply and Demand Effects on Supply Chain Flexibility: An Empirical Exploration.', *Knowledge and Process Management*, 22.3 (2015), 206–19.

[25] P. Giovanis, A., & Athanasopoulou, 'Consumer-Brand Relationships and Brand Loyalty in Technology-Mediated.', 2016.

[26] Y. J. Ku, E. C. S., Wu, W. C., & Chen, 'The Relationships among Supply Chain Partnerships, Customer Orientation, and Operational Performance: The Effect of Flexibility', *Information Systems and E-Business Management*, 14.2 (2016), 415–41 <https://doi.org/10.1007/s10257-015-0289-0>.

[27] E. Lesser, *Leveraging Social Capital in Organizations, In Eric L., Editor. Knowledge and Social Capital Foundations and Applications* (Heinemann, Boston., 2000).

[28] J. M. Ben Arfi, W., Hikkerova, L., & Sahut, 'External Knowledge Sources, Green Innovation and Performance', *Technological Forecasting and Social Change,* 129 (2018).

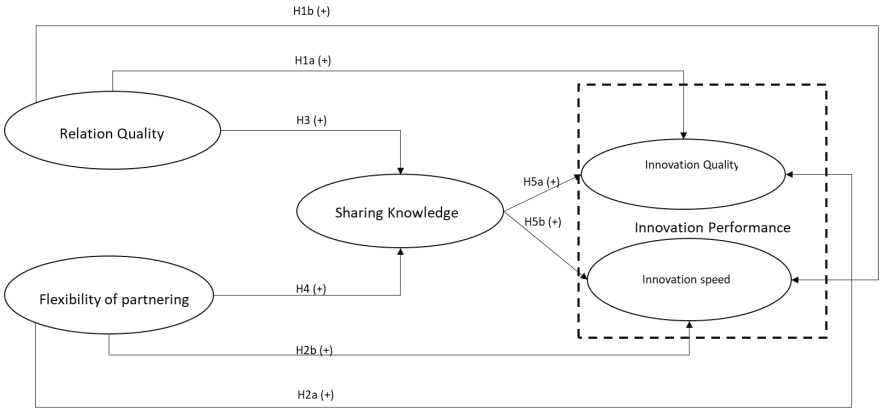
supply chain will result in joint value creation that cannot be achieved by individual and independent innovation. In addition, based on resource based theory, with a quality relationship with suppliers, it will be easier for the company to ensure the smooth supply of raw materials so that it can ensure the continuity of the production process or operation and then can also assist in achieving better innovation performance. Thus, it can be said that the stronger the company's relationship with a supplier, the more likely it is to share knowledge and get easy supply of raw materials so that it can improve innovation performance.

However, increasing the quality of the company's relationship with a supplier allows for dependence on that supplier. Thus, the company does not become flexible in its transaction activities, especially to get the lowest possible transaction costs and the capability to adapt to changing needs. The need for company flexibility in obtaining raw materials can be based on two theories, namely transaction cost theory and dynamic capabilities.

First, in accordance with the transaction cost theory, in establishing relationships with suppliers, companies also need to obtain a transaction structure with the lowest possible costs. This can be obtained by the flexibility of partnering, where companies can obtain a variety of transactions from different suppliers. The existence of this variation allows the company to get low costs in certain contexts and opportunities. The existence of the advantages of these suppliers allows modifications such as adjustments to payment methods or modification of raw materials specifically to adjust the company's production capabilities so that through these two companies get costs that are lower. low. Second, is about the dynamic capability that the company gets from the flexibility of partnering where the company can obtain a variety of raw materials that can match the needs of a project or market. Thus it can be said that through the flexibility of partnering, the company has gained dynamic capabilities (Mandal, 2015). For example, if a project requires certain material specifications, then through the flexibility of partnering, the company can find a supplier that excels in producing the related raw materials. Thus, it can be said that through the flexibility of partnering, companies get low operating costs and dynamic capabilities so that they can improve innovation performance both in terms of quality and speed.

On the other hand, through the flexibility of partnering, companies will be able to relate to many suppliers so that they can share knowledge with some of these suppliers[29]. Given that each supplier has a different character, the knowledge gained by the company is varied. The variety of knowledge obtained by the company will certainly increase the information capacity it has to improve its innovation performance[30]. Thus, it can also be said that the flexibility of partnering can increase the knowledge gained by the company to improve innovation performance.

Figure 1
Research Model



Relationship Quality to Innovation Performance

The relationship quality with suppliers is defined as a level of engagement between a company and one of its suppliers in an active relationship and in a long-term working relationship[31]. explains that if the two companies, especially in supply chain relationships, already have strategic interactions, the relationship between the companies is not only limited to buying and selling contracts. Through relationships with quality suppliers, it will reduce the tendency to take their own profits, so can increase the value creation between the two related companies. The relationship qualitys with suppliers can also be assessed from how high a company's experience

[29] Acharya, C., Ojha, D., Patel, P. C., & Gokhale.
[30] Acharya, C., Ojha, D., Patel, P. C., & Gokhale.
[31] J Song, H., Yu, K., Chatterjee, S. R., & Jia, 'Service Supply Chain: Strategic Interaction and Relationship Value', *Journal of Business and Industrial Marketing*, 31.6 (2016), 611–624 <https://doi.org/10.1108/JBIM-04-2014-0078>.

in alliances with its suppliers is[32]. Also explains that this experience is related to the high intensity of the relationship between the company and its suppliers.

Innovation can be defined as an adoption or creation of creating and developing new ideas, services, work processes and management which then results in a competitive advantage. As previously explained, the context of innovation in the steel industry is as described in[33], namely in managerial development and product and production process improvisation. The success of collaboration between the company and its suppliers can be judged from the extent to which the relationship can create sustainable innovation and have a competitive advantage[34]. Specifically, the cooperation between the company and its suppliers will make the exchange of information and knowledge so that it can improve the company's innovation performance[35]. Explained that the company's performance can be seen from the extent to which a company's innovation can develop a higher market share, quickly open new markets, can adjust customer needs and add higher product and service capabilities. On the other hand, given that innovation is closely related to capabilities, companies that want to innovate must increase their capabilities[36]. However, in industries with large working capital, such as the steel industry, this is not easy to do. Therefore, cooperation, especially with suppliers, can be an option in improving innovation performance.

H1a: Relationship quality has a positive effect on the innovation quality.
H1b: Relationship Quality has a positive effect on the innovation speed

Partner Flexibility and Innovation Performance

In general, there is some flexibility in the supply of raw materials, namely in operating systems, logistics processes, supplier partnerships, organizational design, information systems, customer satisfaction and supply assets. However, this study will only focus on the flexibility of partnering with suppliers. Partner flexibility is defined as how freely a company deals with various supplier partners to form a profitable partnership[37]. Partner flexibility is a dimension of the supply chain flexibility construct. The flexibility of partnering with suppliers can be assessed from the company's ability to reconfigure relationships with suppliers, to coordinate quickly all activities of various suppliers, to have an effective ability to maintain a network of supply chain shifts[38].

H2a: Partnering flexibility has a positive effect on the innovation quality
H2b: Partnering flexibility has a positive effect on the innovation speed

Quality Relationships and Knowledge Sharing

Several things that describe the relationship qualitys with suppliers are the existence of trust, communication, adaptation, dependence, commitment and cooperation[39]. Of these several dimensions, which can affect the sharing of information is the existence of trust and communication. The first is trust, the higher the level of trust between the companies involved in the alliance, the more open the actual sharing of information. Trust between allied companies describes the quality of the alliance's relationship. The quality of relations between companies will encourage the two companies to share information, both tacit and explicit information[40].

H3: The quality of relations with suppliers has a positive effect on information sharing.

Flexibility of partnering and Knowledge Sharing

With the presence of new partnerships, as well as maintaining relationships with previous partners, companies will gain a lot of knowledge from their partners[41]. There are studies which state that most suppliers develop their knowledge in the midst of their supply activities. In other words, information transactions will occur effectively between the company and its suppliers. One of the disadvantages of the flexibility of supplier

---

[32] H. Kale, P., Dyer, J. H., & Singh, 'Alliance Capability, Stock Market Response, and Long-Term Alliance Success: The Role of the Alliance Function', *Strategic Management Journal*, 23.8 (2002), 747–767 <https://doi.org/10.1002/smj.248>.

[33] S Collinson, 'Knowledge Management Capabilities for Steel Makers: A British-Japanese Corporate Alliance for Organizational Learning', *Technology Analysis and Strategic Management*, 11.3 (1999), 337–358 <https://doi.org/10.1080/095373299107393>.

[34] D. Lim, J.-S., Darley, W., & Marion, 'Market Orientation, Innovation Commercialization Capability and Firm Performance Relationships: The Moderating Role of Supply Chain Influence', *Journal of Business & Industrial Marketing*, 19.11 (2017), 5–14 <http://dx.doi.org/10.1108/08858620410523981%5Cnhttp://dx.doi.org/10.1108/00251749610113613%5Cnhttp://dx.doi.org/10.1108/02652320610671333%5Cnhttp://dx.doi.org/10.1108/10610421111108067%5Cnwww.emeraldinsight.com/researchregister%5Cnwww.emeraldinsight.com/0>.

[35] Syed Abdul Rehman Khan and others, 'Re-Investigating the Nexuses of Renewable Energy, Natural Resources and Transport Services: A Roadmap towards Sustainable Development', *Environmental Science and Pollution Research*, 29.9 (2022), 13564–79 <https://doi.org/10.1007/s11356-021-16702-4>.

[36] S Mohd Zawawi, N. F., Abd Wahab, S., Al-Mamun, A., Sofian Yaacob, A., Kumar AL Samy, N., & Ali Fazal, 'Defining the Concept of Innovation and Firm Innovativeness: A Critical Analysis from Resorce-Based View Perspective', *International Journal of Business and Management*, 11.6 (2016), 87 <https://doi.org/10.5539/ijbm.v11n6p87>.

[37] Acharya, C., Ojha, D., Patel, P. C., & Gokhale.

[38] Acharya, C., Ojha, D., Patel, P. C., & Gokhale.

[39] Fynes, Voss, and De Búrca.

[40] G Li.

[41] Acharya, C., Ojha, D., Patel, P. C., & Gokhale.

partnerships is the weakness of alliance relationships. However, there are studies that say that in the steel industry, companies tend to take advantage of this weak contractual alliance relationship to get a lot of information so that the information obtained can be more comprehensive. Given that the segmentation of needs in the steel industry is very diverse, the more information obtained, the more comprehensive the information. It is known that each supplier has its own character and uniqueness as well as the information knowledge and experience it has. When a company has the flexibility to partner with, the company will be richer in transaction information.
H4: The flexibility of partnering has a positive effect on information sharing.

Knowledge Sharing with innovation performance

Knowledge sharing is one of the keys in developing innovation[42]. In other words, knowledge sharing can be a big capital for companies in producing innovation[43]. The discovery of new knowledge and organizational learning can be a fundamental capital for companies that will innovate[44].

With knowledge sharing, companies can add the knowledge needed for an innovation quickly and effectively. An information and knowledge is very important for companies or individuals in developing innovation. The need for knowledge or information can strengthen the positive relationship between innovation and corporate learning. For example, there is information that in the next quarter, the stock of steel in the market of certain specifications and sizes will be depleted so that it is a good opportunity for the company to prepare ready stock for the material. However, companies need to innovate to fill the market void. If this information is wrong, the innovation produced by the company will be of less quality and vice versa.

Companies obviously incur a number of costs in innovation, and this has a risk if innovation is not on target. Mitigation of this risk is one of the reasons for delaying an innovation. In addition, quality information will trigger companies to make frequent innovations[45]. By sharing knowledge, companies can also effectively reduce risks, complexity and conditions for companies that will innovate[46], so that this can encourage companies to innovate faster.
H5a: Knowledge sharing has a positive effect on the innovation quality
H5b: Knowledge sharing has a positive effect on the innovation speed

3. Research Methods

Model study is depiction to something phenomenon which researched with describe the relationship between variables to explain the overall process of research [47]. The research model can serve as a visualization of theories and variables which explain whole contents from a phenomenon which will researched. On In this study, the population in question is the steel industry players in Indonesia. Data was collected through a questionnaire obtained from the national steel company association IISIA and obtained 107 company respondents. This study will use a 7-item Likert scale because the answer choices are more varied so that respondents will have a wider range of answer options. The data were processed and analyzed using structural equation modeling (SEM) to test the overall fit of the model and test the causality relationship between variables. This study has 20 indicators, so the minimum number of samples required is 100 respondents. In addition, the sample criteria used in this study are representatives of steel companies with a minimum level of middle management to business owners. Respondents must have a business that has been running for at least three years to indicate that they have experienced the dynamics of market competition in the steel industry. The respondents in this study were Indonesian steel companies in general, either in the manufacturing industry category or trading company.

4. Results and Discussion

4.1 Explanation of the results of testing the research hypothesis

Pre-testing is done by testing the validity and reliability of the research questionnaire. Validity and reliability tests are carried out to ensure that the research measuring instrument has measured what it is supposed

[42] and P. Roberts Saenz, C., S. Tapia, J. Chavez, 'Microencapsulation by Spray Drying of Bioactive Compounds from Cactus Pear', *Opuntia Ficus-Indica). Food Chemistry*, 2009.
[43] C Aggarwal, K. P., Narula, S., Kakkar, M., Tandon, 'Nephrolithiasis: Molecular Mechanism of Renal Stone Formation and the Critical Role Played by Modulators', *Hindawi*, 2013, 1–21.
[44] et al Zack, 'Knowledge Management and Organizational Performance: An Exploratory Survey"', *Journal of Knowledge Management*, 13.6 (2009), 392–409.
[45] Ben Arfi, W., Hikkerova, L., & Sahut.
[46] Ben Arfi, W., Hikkerova, L., & Sahut.
[47] Cooper dan Schindler., *Bussiners Research Method* (New York: McGrawHill, 2014).

to measure (valid) and has good consistency or is known as reliable. The validity of the indicator is shown through the value of Kaiser Meyer Olkin Measures of Sampling Adequacy (KMO-MSA) and factor loading or component matrix. Question indicators are said to be valid if the KMO value and factor loadings are 0.5 (Malhotra, 2010). Meanwhile, the reliability test was carried out to measure the level of consistency of the measurement indicators when repeated measurements were made (Malhotra, 2010). A result can be said to be reliable if it has a coefficient value of Cronbach's Alpha 0.6. Based on the measurement above, all indicators are found to ne valid and reliable.

In examining the causal relationship between variables of the entire research model, an analysis of causal relationships was carried out. The causal relationship in Structural Equation Modeling shows whether there is a relationship or influence between one variable and another. Researchers conducted a two-tailed test with a significance of 5%. Thus, a T-Value value greater than 1.96 will prove that there is a significant positive effect. On the other hand, a T-Value that is smaller than -1.960 will prove that there is a significant negative effect on a hypothesis. The following is an overview of the results of the causal relationship analysis processed with LISRELby table 2.

Table 2

Causal relationship beetween variables

Structural Model	SLF	T-value	T table	Conclusion
KR to KUA	-0,15	-0,61	1,96	No Significant effect
KR to KEC	0,72	2,41	1,96	Positively significant
FB to KUA	0,12	2,44	1,96	Positively significant
FB to KEC	0,92	7,41	1,96	Positively significant
KR to BP	1,06	11,33	1,96	Positively significant
FB to BP	-0,09	-1,82	1,96	No Significant effect
BP to KUA	1,12	4,56	1,96	Positively significant
BP to KEC	-0,72	-2,42	1,96	No Significant effect

1. **H1a- Relationship quality has a positive effect on the innovation quality.**
   Based on the results of hypothesis testing listed in table 2, it can be concluded that that hypothesis 1a rejected. Thing this could supported by findings *T-Value* as big as -0.61 and has a negative direction that can be seen from the SLF value of -0.15. Since *the T-Value* is not less than -1.96 and not greater than 1.96, then the hypothesis is rejected. The results of the study prove that the quality of relations with suppliers does not have a significant effect on the innovation quality in the Indonesian steel industry. This is different from the results obtained in previous research which states that the relationship qualitys can improve the innovation quality of a company. Thus, the positive influence of relationship quality on innovation quality needs to be re-examined in a specific context.
2. **H1b- Relationship Quality has a positive effect on the innovation speed**
   Based on the results of hypothesis testing listed in table 2, it can be concluded that that hypothesis 1b received. Thing this could supported by findings *T-Value* as big as 2,41 and the SLF value is 0,72. Since *the T-Value* is greater than 1.96, then the hypothesis is accepted. The results of the study prove that the quality of relations with suppliers can directly increase the innovation speed in the steel industry in Indonesia. This is in accordance with the resourced based theory where the increase in the company's innovation ability depends on the supply of raw materials. Thus, steel companies in Indonesia need to improve the quality of relations with their suppliers to create a number of innovations in a short time.
3. **H2a- Partnering Flexibility has a positive effect on the innovation quality**
   Based on the results of hypothesis testing listed in table 2, it can be concluded that that hypothesis 2a received. Thing this could supported by findings *T-Value* as big as 2,44 and the SLF value of 0.12. Since *the T-Value* is greater than 1.96, then the hypothesis is accepted. The results of the study prove that the flexibility of partnering with suppliers directly can improve the innovation quality in the steel industry in Indonesia. Thus, steel companies in Indonesia need to be flexible in partnering with suppliers to improve the quality of their innovations to outperform competitors.
4. **H2b- Partnering Flexibility has a positive effect on the innovation speed**
   Based on the results of hypothesis testing listed in table 2, it can be concluded that that hypothesis 2a received. Thing this could supported by findings *T-Value* as big as 7,41 and the SLF value of 0,92. Since *the T-Value* is greater than 1.96, then the hypothesis is accepted. The results of the study prove that the flexibility of partnering with suppliers directly can increase the innovation speed in the steel industry in Indonesia. Thus, steel companies in Indonesia need to be flexible in partnering with suppliers to create a

number of innovations in a short time to outperform competitors.

5. **H3- The quality of relations with suppliers has a positive effect on knowledge sharing.**
   Based on the results of hypothesis testing listed in table 2, it can be concluded that that hypothesis 2a received. Thing this could supported by findings *T-Value* as big as 11,33 and the SLF value of 1,06. Since *the T-Value* is greater than 1.96, then the hypothesis is accepted. The results of the study prove that the quality of direct relationships with suppliers can significantly increase knowledge sharing in the steel industry in Indonesia. This is in accordance with previous research which shows that the quality of relations between companies and their suppliers can directly increase knowledge sharing, either *tacit knowledge* or *explicit knowledge*. Thus, steel companies in Indonesia need to improve the quality of relations with suppliers to increase the level of knowledge sharing with these suppliers.
6. **H4- Partnership flexibility has a positive effect on knowledge sharing**
   Based on the results of hypothesis testing listed in table 2, it can be concluded that that hypothesis H4 rejected. Thing this could supported by findings *T-Value* as big as –1.82 and has a negative direction which can be seen from the SLF value of -0.09. Since *the T-Value* is not less than -1.96 and not greater than 1.96, then the hypothesis is rejected. The results of the study prove that the flexibility of partnering with suppliers does not have a significant effect on knowledge sharing in the context of the Indonesian Steel industry. Thus, it can be said that the increasing number of suppliers who can cooperate with a steel company, does not necessarily increase their knowledge sharing activities.
7. **H5a- Knowledge sharing has a positive effect on the innovation quality**
   Based on the results of hypothesis testing listed in table 2, it can be concluded that that hypothesis 5a received. Thing this could supported by findings *T-Value* as big as 4.56 and the SLF value of 1.12. Since *the T-Value* is greater than 1.96, then the hypothesis is accepted. The results of the study prove that sharing knowledge with suppliers can directly improve the innovation quality in the steel industry in Indonesia significantly. This is in accordance with previous research which shows that sharing knowledge between companies and their suppliers can directly increase the innovation quality. Thus, steel companies in Indonesia need to increase knowledge sharing with suppliers to create or develop innovations that are of higher quality and have a positive impact.
8. **H5b- Knowledge sharing has a positive effect on the innovation speed**
   Based on the results of hypothesis testing listed in table 2, it can be concluded that that hypothesis H5b rejected. Thing this could supported by findings *T-Value* as big as –2,42 and has a negative direction which can be seen from the SLF value of -0.72. Although the T value is smaller than -1.96, the value of the SLF is negative so that the hypothesis is rejected. The results of the study prove that sharing knowledge with suppliers does not have a positive effect on the innovation speed in the context of the Indonesian Steel industry.

Table 3
Goodness of fit

Goodness Of fit Indeks	Estimated Value / *Cut off Value*	Default model	Evaluation
CFI	CFI ≥ 0,95	0,95	Model fit
RMSEA	RMSEA ≤ 0,08	0,07	Model fit
IFI	IFI ≥ 0,9	0,95	Model fit
NNFI	NNFI ≥ 0,9	0,94	Model fit
NFI	NFI ≥ 0,90	0,92	Model fit
RFI	RFI ≥ 0,90	0,90	Model fit

In table 3 it can be seen that the conformity measurement index of the CFI model (0.95), RMSEA (0.07), IFI (0.95), NNFI (0.94), NFI (0.92), RFI (0.9) is within the range of expected values. Thus, the results of the model suitability test in the table above show that the structural model can be said to be fit. This states that the overall measurement model has correlation and covariance.

4.2 Research Discussion

In the research that has been done, the relationship quality is not proven to have a direct positive effect on the innovation quality in the steel industry in Indonesia. Although based on *resourced based theory* , that the existence of quality relationships with suppliers will make it easier for steel companies to improve their company performance, in terms of innovation, this needs to be reviewed specifically. In this study, the quality of the relationship is measured by trust, communication and commitment where all three are proven to provide

convenience for companies in transactional or commercial terms that can improve the company's innovation performance. For example, if one of the customers requires ease of payment, then with the quality of the relationship with the supplier, the company will be able to adjust its payment method to payment for the supply of raw materials. However, in this study it was found that in terms of innovation in the steel industry in Indonesia, a learning process is needed to achieve quality innovation. The learning process in question is the occurrence of knowledge sharing between companies and their suppliers. In other words, it is the relationship qualitys that can improve the company's learning process that can improve the innovation quality. Thus the company must be able to ensure knowledge sharing if it wants to improve the quality of its innovation from the quality of its relationships with its suppliers.

On the other hand, in this study it is proven that the quality of the relationship can directly have a positive influence on the innovation speed. To increase the innovation speed, companies need transactional convenience from their suppliers. According to resource-based theory, the existence of quality relationships with suppliers will be able to provide transactional convenience which can then increase the innovation speed. Relationship quality has a direct positive effect on innovation performance. However, in this study, the innovation performance that can be directly affected by the quality of the relationship is only the innovation speed [48].

In this study, the flexibility of partnering between the company and its suppliers proved to be very strong in influencing the innovation speed. A flexible company that can relate to various suppliers will get convenience in supplying varied raw materials. The variation in question can be in the form of raw material specifications, dimensions or sizes of raw materials, ease of payment methods, and variations in business processes. Thus the flexibility of partnering is very important for steel companies to create a number of innovations in a relatively short time. Coupled with the flexibility of partnering with suppliers, the company's ability to innovate is not limited to the ability of one supplier only. If a supplier takes a long time to fulfill an innovation, then the company with the flexibility of partnering can replace the supplier with the appropriate capability.

However, this study also finds that corporate flexibility does not directly have a positive effect on knowledge sharing. On the other hand, given the previous explanation that partnering flexibility can have a positive effect on the innovation quality and greatly affects the innovation speed, the researcher concludes that the effect of partnering flexibility on innovation is not through knowledge sharing. As for other things that affect the flexibility of partnering on innovation, it needs to be investigated further considering that there are not many studies that study this.

In the relationship of the effect of knowledge sharing on the quality and innovation speed, knowledge sharing was found to have a positive effect on the innovation quality, but had no effect on the innovation speed. First, the positive influence of knowledge sharing on the innovation quality proves that knowledge is one of the capitals for companies to be able to innovate to outperform their competitors. With the sharing of knowledge between companies and their suppliers, innovation can be more directed to match market needs. For example, in the steel industry, steel with special abilities is needed, so by sharing knowledge between steel companies and their suppliers, companies can find out how to create innovations in the production treatment of steel raw materials that can be obtained. Second, the ineffectiveness of knowledge sharing on innovation performance shows that to create a number of innovations in a short time it is not enough to only have knowledge. It is necessary to conduct further studies of what variables can increase the innovation speed. Thus it can be said that with knowledge sharing, companies can find out how to direct an innovation to be of high quality but knowledge is not a significant variable in realizing the innovation speed.

5. Closing

5.1 Conclusion

In this study it can be concluded that, the quality of the relationship does not have a direct positive effect on the innovation quality but has a direct positive effect on the innovation speed. On the other hand , knowledge sharing has a positive effect on the innovation quality but does not significantly affect the innovation speed. Thus knowledge sharing can mediate the relationship between the quality of the relationship to the innovation quality so that it becomes significant. However, knowledge sharing also cannot significantly mediate the effect of relationship quality on the innovation speed.

The next thing that can be concluded in this study is that the flexibility of partnering has a very positive effect on the innovation speed and also affects the innovation quality. However, the flexibility of partnering has no significant effect on knowledge sharing. On the other hand, the flexibility of partnering also has no significant effect on the innovation speed. So that knowledge sharing cannot be a mediator to strengthen the relationship of flexibility partnering innovation speed. However, because knowledge sharing also has a positive

[48] G Li.

effect on the innovation quality. Then knowledge sharing can mediate the positive effect of partner flexibility on innovation quality

5.2 Suggestion

Due to the limitations of this study, there are several suggestions for further research. First, further research is suggested to carry out this research in a larger context. For example, this research was conducted on all industry segments such as the food industry, petrochemical, oil and gas, automotive, and so on in order to obtain more universal results. Another example is to re-examine in different countries where there may be cultural differences with Indonesia, given that this study deals with relationships between companies.

Second, in measuring the relationship quality variable, the next research needs to be carried out on two related company perspectives. This aims to ensure that measurement tools on relationship quality variables such as communication, trust and commitment, can be confirmed more precisely. To do this, further research can determine the name of the supplier company on the questionnaire, and then conduct a survey or confirmation on the supplier.

Third, in future research, it is necessary to analyze the demographics of the companies involved in the study. By analyzing the demographics of the respondents, it is possible to obtain a descriptive picture of the effect of these demographic differences on the results. As for this demographic analysis, one of them can be done with the ANOVA method.

Fourth, in further research, it is necessary to obtain secondary data that can strengthen the measurement results. As explained earlier, this secondary data can be in the form of a description of the innovation and the number of innovations that have been carried out by the company in one period of time. This secondary data can be obtained from company websites, associations, or social media

References

Acharya, C., Ojha, D., Patel, P. C., & Gokhale, R, 'Modular Interconnected Processes, Fluid Partnering, and Innovation Speed: A Loosely Coupled Systems Perspective on B2B Service Supply Chain Management.', *Industrial Marketing Management*, 89 (2020)

Acharya, Chandan, Divesh Ojha, Pankaj C. Patel, and Rahul Gokhale, 'Modular Interconnected Processes, Fluid Partnering, and Innovation Speed: A Loosely Coupled Systems Perspective on B2B Service Supply Chain Management', *Industrial Marketing Management*, 89.May 2019 (2020), 209–19 <https://doi.org/10.1016/j.indmarman.2019.05.007>

Aggarwal, K. P., Narula, S., Kakkar, M., Tandon, C, 'Nephrolithiasis: Molecular Mechanism of Renal Stone Formation and the Critical Role Played by Modulators', *Hindawi*, 2013, 1–21

Aggarwal, Vijita, and Madhavi Kapoor, 'Innovation Growth from Knowledge Transfer in International Strategic Alliances', *Journal of Strategy and Management*, 11.4 (2018), 483–96 <https://doi.org/10.1108/JSMA-06-2018-0054>

Agistia, I. M. M., & Nurcaya, I. N, 'PENGARUH KUALITAS LAYANAN DAN NILAI PELANGGAN TERHADAP LOYALITAS PELANGGAN', *EJurnal Manajemen.*, 2019

Alcacer, Juan, and Joanne Oxley, 'Learning by Supplying', *Strategic Management Journal*, 35.2 (2014), 204–23 <https://doi.org/10.1002/smj.2134>

Ben Arfi, W., Hikkerova, L., & Sahut, J. M., 'External Knowledge Sources, Green Innovation and Performance', *Technological Forecasting and Social Change,* 129 (2018)

Ashok, Mona, Rajneesh Narula, and Andrea Martinez-Noya, 'How Do Collaboration and Investments in Knowledge Management Affect Process Innovation in Services?', *Journal of Knowledge Management*, 20.5 (2016), 1004–24 <https://doi.org/10.1108/JKM-11-2015-0429>

Bamel, Nisha, Vijay Pereira, Umesh Bamel, and Giuseppe Cappiello, 'Knowledge Management within a Strategic Alliances Context: Past, Present and Future', *Journal of Knowledge Management*, June, 2021 <https://doi.org/10.1108/JKM-06-2020-0443>

Barney, J.B, '"Firm Resources and Sustained Competitive Advantage', *Journal of Management*, 17.1 (1991), 19–120

Chisholm, A. M., & Nielsen, K, 'Social Capital and the Resource-Based View of the Firm', *International Studies of Management & Organization*, 39.2 (2009), 7–32

Collinson, S, 'Knowledge Management Capabilities for Steel Makers: A British-Japanese Corporate Alliance for Organizational Learning', *Technology Analysis and Strategic Management*, 11.3 (1999), 337–358 <https://doi.org/10.1080/095373299107393>

Collinson, Simon, 'Knowledge Management Capabilities for Steel Makers: A British-Japanese Corporate Alliance for Organizational Learning', *Technology Analysis and Strategic Management*, 11.3 (1999), 337–58 <https://doi.org/10.1080/095373299107393>

Cooper dan Schindler., *Bussiners Research Method* (New York: McGrawHill, 2014)

DePamphilis, D., *Mergers and Acquisitions Basics Negotiation and Deal Structuring.* (Oxford: Academic Press, 2011)

Drewniak, Rafał, and Robert Karaszewski, 'Diffusion of Knowledge in Strategic Alliance: Empirical Evidence', *International Entrepreneurship and Management Journal*, 16.2 (2020), 387–416 <https://doi.org/10.1007/s11365-019-00589-2>

Fayezi, S., & Zomorrodi, M, 'The Role of Relationship Integration in Supply Chain Agility and Flexibility Development: An Australian Perspective', *Journal of Manufacturing Technology Management,* 26.8 (2015)

Fynes, Brian, Chris Voss, and Seán De Búrca, 'The Impact of Supply Chain Relationship Quality on Quality Performance', *International Journal of Production Economics*, 96.3 (2005), 339–54 <https://doi.org/10.1016/j.ijpe.2004.05.008>

Giovanis, A., & Athanasopoulou, P., 'Consumer-Brand Relationships and Brand Loyalty in Technology-Mediated.', 2016

Kale, P., Dyer, J. H., & Singh, H., 'Alliance Capability, Stock Market Response, and Long-Term Alliance Success: The Role of the Alliance Function', *Strategic Management Journal*, 23.8 (2002), 747–767 <https://doi.org/10.1002/smj.248>

Khan, Syed Abdul Rehman, Muhammad Umer Quddoos, Muhammad Hanif Akhtar, Amir Rafique, Mustansar Hayat, Saqib Gulzar, and others, 'Re-Investigating the Nexuses of Renewable Energy, Natural Resources and Transport Services: A Roadmap towards Sustainable Development', *Environmental Science and Pollution Research*, 29.9 (2022), 13564–79 <https://doi.org/10.1007/s11356-021-16702-4>

Ko, Wai Wai Joyce, Gordon Liu, Isaac K. Ngugi, and Chris Chapleo, 'External Supply Chain Flexibility and Product Innovation Performance: A Study of Small- and Medium-Sized UK-Based Manufacturers', *European Journal of Marketing*, 52.9–10 (2018), 1981–2004 <https://doi.org/10.1108/EJM-07-2017-0466>

Ku, E. C. S., Wu, W. C., & Chen, Y. J., 'The Relationships among Supply Chain Partnerships, Customer Orientation, and Operational Performance: The Effect of Flexibility', *Information Systems and E-Business Management*, 14.2 (2016), 415–41 <https://doi.org/10.1007/s10257-015-0289-0>

Lesser, E., *Leveraging Social Capital in Organizations, In Eric L., Editor. Knowledge and Social Capital Foundations and Applications* (Heinemann, Boston., 2000)

Li, W., Zhao, P., & Qu, H, 'The Empirical Research of the Effect about Communication, Trust and Commitment on Supply Chain Cooperation', *Advanced Materials Research*, 2012 <https://doi.org/10.4028/www.scientific.net/AMR.468-471.2963>

Li, G, 'The Impact of Supply Chain Relationship Quality on Knowledge Sharing and Innovation Performance: Evidence from Chinese Manufacturing Industry', *Journal of Business and Industrial Marketing*, 36.5 (2020)

Li, Gang, 'The Impact of Supply Chain Relationship Quality on Knowledge Sharing and Innovation Performance: Evidence from Chinese Manufacturing Industry', *Journal of Business and Industrial Marketing*, 36.5 (2020), 834–48 <https://doi.org/10.1108/JBIM-02-2020-0109>

Lim, J.-S., Darley, W., & Marion, D., 'Market Orientation, Innovation Commercialization Capability and Firm Performance Relationships: The Moderating Role of Supply Chain Influence', *Journal of Business & Industrial Marketing*, 19.11 (2017), 5–14 <http://dx.doi.org/10.1108/08858620410523981%5Cnhttp://dx.doi.org/10.1108/00251749610113613%5Cnhttp://dx.doi.org/10.1108/02652320610671333%5Cnhttp://dx.doi.org/10.1108/10610421111108067%5Cnwww.emeraldinsight.com/researchregister%5Cnwww.emeraldinsight.com/0>

Mandal, S, 'Supply and Demand Effects on Supply Chain Flexibility: An Empirical Exploration.', *Knowledge and Process Management*, 22.3 (2015), 206–19

Marino, Kenneth E., 'Developing Consensus on Firm Competencies and Capabilities', *Academy of Management Executive*, 10.3 (1996), 40–51 <https://doi.org/10.5465/ame.1996.9704111473>

Mohd Zawawi, N. F., Abd Wahab, S., Al-Mamun, A., Sofian Yaacob, A., Kumar AL Samy, N., & Ali Fazal, S, 'Defining the Concept of Innovation and Firm Innovativeness: A Critical Analysis from Resorce-Based View Perspective', *International Journal of Business and Management*, 11.6 (2016), 87 <https://doi.org/10.5539/ijbm.v11n6p87>

Muthusamy, S. K., & Dass, P, 'When "Trust" Becomes More or Less Salient for Alliance Performance? Contextual Effects of Mutual Influence, International Scope, and Coopetition', *Journal of General Management*, 46.2 (2021)

Ngo, Liem Viet, Tania Bucic, Ashish Sinha, and Vinh Nhat Lu, 'Effective Sense-and-Respond Strategies: Mediating Roles of Exploratory and Exploitative Innovation', *Journal of Business Research*, 94.November 2017 (2019), 154–61 <https://doi.org/10.1016/j.jbusres.2017.10.050>

Saenz, C., S. Tapia, J. Chavez, and P. Roberts, 'Microencapsulation by Spray Drying of Bioactive Compounds from Cactus Pear', *Opuntia Ficus-Indica). Food Chemistry*, 2009

Shin, N., Park, S. H., & Park, S, 'Partnership-Based Supply Chain Collaboration: Impact on Commitment, Innovation, and Firm Performance', *Sustainability (Switzerland)*, 11.2 (2019)

Sik Cho, Young, 'The Effect of Business Diversification on a Firm's Performance, Depending on Its Dynamic Capabilities and Market Dynamism', *Journal of Management and Strategy*, 4.3 (2013), 1–8 <https://doi.org/10.5430/jms.v4n3p1>

Song, H., Yu, K., Chatterjee, S. R., & Jia, J, 'Service Supply Chain: Strategic Interaction and Relationship Value', *Journal of Business and Industrial Marketing*, 31.6 (2016), 611–624 <https://doi.org/10.1108/JBIM-04-2014-0078>

Zack, et al, 'Knowledge Management and Organizational Performance: An Exploratory Survey"', *Journal of Knowledge Management*, 13.6 (2009), 392–409

Zhou, Jieyu, Lipeng Gary Ge, Jiatao Li, and Subramanya Prasad Chandrashekar, 'Entrepreneurs' Socioeconomic Status and Government Expropriation in an Emerging Economy', *Strategic Entrepreneurship Journal*, 14.3 (2020), 396–418 <https://doi.org/10.1002/sej.1361>