

Collaboration and Electronic Supply Chain Management Model for SME

Inayatulloh¹

¹Information System Department, School of Information System, Bina Nusantara University Jakarta Indonesia,
Computer Science Department, BINUS Graduate, Program Doctor of Computer Science Bina Nusantara University Jakarta
inay@binus.ac.id

Harjanto Prabowo², Harco Leslie Hendric Spits Warnars³, Togar Alam Napitupulu⁴

^{2,3,4}Computer Science Department, BINUS Graduate, Program Doctor of Computer Science Bina Nusantara University
Jakarta Indonesia

harprabowo@binus.edu², spits.hendric@binus.ac.id³, tnapitupulu@binus.edu⁴

Abstract - It is caught on that moving forward execution has ended up an imperative neutral of supply chains. As such, techniques have been embraced as an exertion near expanding execution. Among these procedures, organization, Cooperation, and integration were recognized. The common benefit of these methods is that they promote solidity between the parties by sharing information and assets together to achieve their ideals. However, it has been observed that the extent to which partnerships, collaborations, and integrations have a collective effect on supply chain execution can be a problem of invalidity. Remember to study the impact of supply chain performance associations, collaboration, and integration, especially within the small and medium-sized enterprise segment. The social vision hypothesis was adopted to support a conceptual show of research. The company used Smart PLS to analyze the information. Observation confirmed three theories employing a test of 60 SMEs arranged in a few cities in Indonesia. The discoveries uncovered that the investigate builds corporation, teamwork, and combination impact supply chain execution in a positive approach. Suggestions of the think about are advance given.

Index Terms - Supply Chain Management, collaboration, SMEs, Electronic.

INTRODUCTION

Supply chain corporations have been recognized as important in supporting supply chains [1][2]. As such, companies have progressively assumed the task to advance corporations within their supply chains [3][4].

The unbiased is to continue viable not only by taking risk, but also by completing the sustained concentration and usage of profits resulting from alliances [5] [6][7]. According to research, some of the benefits of collaboration include low costs, profit, forecasting models, and asset tracking [7]. The framework for this is that collaboration inspires participants to participate in collaborative programs, predicting, and information, resource, and reward sharing [6]. Researchers, on the other hand, argue that superiority is critical in connectivity if performance is to be optimized, and that accomplishing quality involves taking not only inside but also outside supply chain situations [8].

As a result, the value of collaborating with other institutions has become clear. More specifically, the subject of interoperability is what connects the elements, that is, partnership and collaboration, that encapsulate these advantages. attest to this, arguing that the way to demonstrate organizational interoperability is dependent on the attendance of affiliation and collaboration between many relational participants [9]. As per Relational View theory, this network of relational companies did succeed on the assumption that compatibility is elicited [10]. As a result, the value of collaborating with other institutions has become clear. More specifically, the topic of compatibility is what connects the components, that is, partnership and collaboration, that encapsulate these advantages. attest to this and make the argument that the ability to demonstrate overall organizational compatibility [9]. According to the theory of Relational View, this network between relational firms succeeds on the premise that compatibility is elicited [10]

What the study seeks to investigate, however, is the influence that partnership, collaboration, and integration have on the supply chain performance of SMEs operating in several city, Indonesia. To do this, the study puts forward the following three research questions:

How do supply chain partnerships affect supply chain performance?

How does supply chain collaboration affect supply chain performance?

How does supply chain integration affect supply chain performance?

In answering these questions, there is some understanding of why SMEs hesitate to connect with other organizations and as a result become unable to compete. The respite of the article is organized as follows: Literature reviews can be found in the "Literature Review" part. In the "Conceptual Models and Research Hypotheses" part, theoretical models are presented, and hypotheses are created. The "Investigation Methods" part clarifies the methodology and design, and the "Discussion and Conclusions" section ends the investigation. Management impacts, endorsements, and advice for upcoming study can be found in the research impacts and limits and upcoming studies sections

LITERATURE REVIEW

I. Relational Analysis

From a relation standpoint, emphasis is placed on the company network that serve as the unit of analysis According to theory, competitive advantage can be gained across connections among members where development their own skills. These distinct abilities emerge when networks enable businesses to: (1) spend in partnership investments, (2) create routines for sharing expertise among businesses; (3) Use of strong governance processes; and (4) Use of skill sets. this network promotes the growth of a teamwork culture in which activity preparation and distribution are effective. SMEs collaborate in the supply chain to enable the delivery of goods to customers. To effectively participate, the supply chain must be far above ordinary. Allowing to the concept of relational perspectives, this linkage encourages the growth of a teamwork culture in which activity strategic plan and communicating are effective. SMEs collaborate in the supply chain to enable the provision of products or services to end customers. To compete, the supply chain must be far above ordinary. According with theory of relational viewpoints, you can improve your performance by participating in a system where SMEs provide advantages. Because collaborations, partnerships, and integrations shape networking [11].

II. Supply chain corporation

The commercial world has changed dramatically in current years, and as a result, supply chains are becoming increasingly complicated.

As a result, the principle of supply chain corporations has derive to be viewed as especially significant [12][13]. With consumers' environmental consciousness and retailer moral responsibilities in the supply chain, suitable environmental quality is achieved. Partnerships in the supply chain have been identified as critical to achieving these goals. [14]. The context and dimensions of supply chain collaboration are decided complete systematically and organizational-wide struggles that include strategic and tactical exchanges. [15]. Trust is necessary in supply chain partnership [16].

III. Supply Chain Collaboration

Several companies have formed alliances with the other stakeholders over the last 3 decades [16]. Several studies have examined the advantages of supply chain collaborative efforts as cost savings, revenue, forecasting models, and asset tracking [17][18]. To achieve these benefits, involved parties must incorporate the seven factors of cooperative arrangements: knowledge exchange, team cohesion, decision interconnection, performance reporting, information exchange, conversation, and joint organizational learning. Collaborations, on the other hand, are categorized by unpredictable circumstances [19]. Once a collaborative connection is formed, trust will show an significant role in its advancement. It has also been affirmed that there is a connection among faith, promise, and partnership [20].

IV. Supply Chain Integration

Integration is viewed as a strategic plan in modern organizations [21]. Firms are thought to approach incorporation to gain advantages such as enhanced value, lower manufacture, improved supply chain effectiveness, and a strategic benefit over competing companies [22]. The literature on supply chain collaboration supports the idea that integration can impact business results in a variety of ways [23]. However, although integration strengthens the driven edge of supply chain partners, it is argued that incorporation increases rivalry between the two firms ([24].

V. Supply Chain Performance

In past ages, nearby has been a rising trend among business owners to expand their product portfolio to provide more choice for consumers and create an opportunity to stay competitive [25]. To respond to changes in customer needs, supply chain members must work together. Furthermore, it is identified in the literature that it is important to determine not only how pre-emptive supply chain members are, but also how they strive for sustainable development [26]. The performance of a shortlisting of operations is referred to as SC performance. For the context of this research, SC performance will be described as a SC capacity to fulfill the organizational goals cost-effectively while reducing expenses, with the primary aim of attaining the needs of the final buyer [27]

CONCEPTUAL MODEL AND HYPOTHESIS

Research models are conceptualized based on supply chain literature reviews and theories of relationship perspectives. Next, a fictional relationship is created. For conceptualized research models, supply chain partnerships, supply chain collaboration, and supply chain integration are predictors, and supply chain performance is the result. This prototypical was established to explain the relationships among components in the setting of SME. 3 hypotheses are considered. Figure 1 shows the suggested theoretical model.

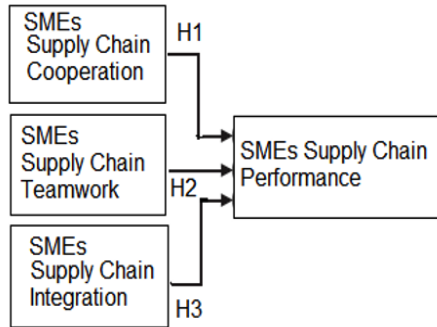


FIGURE 1 PROPOSED THEORETICAL MODEL

I. Supply Chain Partnership and Supply Chain Performance

In general, supply chain partnerships have a lot of admiration because they provide companies with the opportunity to progress SC performance. One of the goals of starting a SC partnership is to help organizations improve supply chain performance while meeting industry standards [28]. Supply chain partnerships are business symmetry, top management. Benefits of support, information sharing, etc. have been proven [29].

Therefore, this study suggests a connection among SC partnerships and SC performance, especially SC SME partnerships. It suggests a progressive impact on SC performance. Therefore, the following hypothesis is made.

H1: SC partnerships have a positive impact on SME SC performance.

II. Supply chain collaboration and supply chain performance

Supply chain partnership has converted one of the key standards for many corporations everywhere the world. Rendering to the literature, the advantages of supply chain partnership contain cost reserves, incomes, prediction correctness, account management, etc. [30]. Consequently, SC collaboration has a positive role in SC performance. Of course, it is acceptable to fulfill Collaboration in supply chains leads to benefits such as shorter lead times, reduced whipping effects, development of special skills, improved flexibility, improved end-user satisfaction, market segment and revenues.

Nevertheless, very insufficient companies have achieved real-world collaboration [31], which means that trust and involvement in supply chain collaboration is important for improving supply chain performance. Means [32]. Therefore, this study proposes a similar concept. This study suggests that SC collaboration between SMEs has a positive impact on SC performance. Therefore, the above hypothesis is formulated as follows.

H2: Supply chain partnership has a positive impact on SME supply chain performance

III. Supply Chain Integration and Supply Chain Performance

SC integration is recognized as an significant competitive strategy and can be seen as a legitimate pioneer in SC performance [33]. The benefits of SC integration contain quality enhancements and developed costs. Attractiveness such as reduction, efficiency, etc. is included [34]. Supply chain integration can only benefit supply chain performance if done with the context of the organization in mind [35]. Therefore, this study suggests that SC integration has a positive impact on SC performance. This study shows that the integration of SMEs into the supply chain is the supply chain. It suggests that it has a positive impact on the performance of. Therefore, the following hypothesis is made.

H3: Supply chain integration has a positive impact on SME supply chain performance.

RESEARCH METHOD

This study uses a quantitative approach involving 60 SMEs spread across several cities in Indonesia as respondents who fill out online questionnaires with Google Forms

**TABLE I
FIT MODEL**

Model	Saturated Mode	Estimated
SRMR	0.117	0.117
d_ULS	3.456	3.456
d-G	2.022	2.022
Chi-Square	507.071	507.071
NFI		0.622
Rms Theta	0.210	

Table 1 show the Fit Model that explain preparation model to run data. MRS and NFI explain the fit of the model and show the reliability of the data generated from the model. The results of the run information show that the SRMR Immersed Demonstrate is 0.117 and the Model Estimated 0.117 so the model meets the compliance requirements. The results of run information get a value of 0.713 close to 1. The goodness of the statistical model describes how well the model fits a series of observations made.

TABLE 2
RESULT BOOTSTRAPPING TABLE

Indicator	Original Sample (O)	Standard Deviation (STDV)	O/STDV	P Value
SME SC Cooperation -> SMEs SC Performance	0.595	0.628	2.987	0.003
SMEs SC Integration -> SMEs SC Performance	0.051	0.073	0.422	0.673
SMEs SC Teamwork -> SMEs SC Performance	0.148	0.115	0.576	0.565

Table 1 explain the result of bootstrapping that show original sample, standard deviation, and P Value. Base on table 1 we can create Figure 1. Figure 1 shows that only the inner loading factor is valid, namely cooperation because the p value is 0.003 below 0.005 or the t statistic is 2.987 above 1.97.

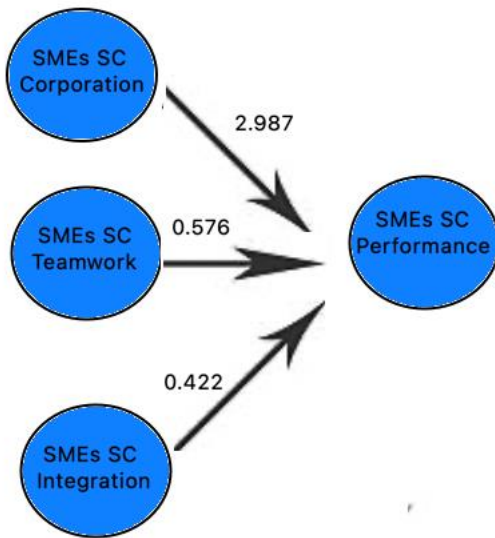


FIGURE 2 RELATION BETWEEN FACTOR IMPACT ON SMEs PERFORMANCE

The value of SMEs SC (Supply Chain) Corporation is 2,987, which means that corporations between SMEs are very significant on the performance of SC SMEs. However, the scores of SMEs SC (Supply Chain) Teamwork and SC (Supply Chain) Integration are only 0.576 and 0.422, respectively, meaning that teamwork and SC (Supply Chain) integration have no significant effect on SC (Supply Chain) performance.

RESULT AND DISCUSSION

Based on the results of observations and statistical calculations above, it is stated that the corporation between SME has a important influence on the performance of SME’s SC. Several studies have shown that the corporation between SMEs has an significant role in the electronic SC of SMEs. [36]. Collaboration and information distribution were found to be significant in affecting Indonesia SMEs’ electronic supply chain [37].

Electronic supply chain is a system that connects companies with suppliers, customers and other company partners via the internet to buy, sell, move products/services and money. The organizational structure of the future will have the component of an electronic E-CSM, where IT linkages bind multiple companies and outsourced functions together enable low cost partner switching and high flexibility. [38]

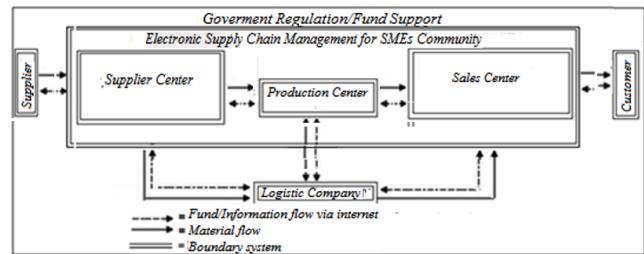


FIGURE 3 PROPOSED SUPPLY CHAIN MODEL FOR SMEs

Figure 3 show the proposed model. Electronic supply chain management for SMEs is an electronic-based system that integrates suppliers and customers in the SME production process. The implementation of SME E-SCM depends on government support with financial and regulatory assistance [39].The successful implementation of SME e-SCM is also influenced by the SME community [40].

CONCLUSION

This study aims to create an Electronic Supply Chain Management (E-SCM) model for SMEs. The study was conducted with a quantitative approach to determine the components that significantly affect the E-SCM of SMEs. From the results of data processing, it was found that corporations are a significant factor in SME E-SCM. The research is continued by building an SME E-SCM model by considering other factors such as government assistance and logistics companies that affect SME E-SCM

REFERENCES

- [1] M. B. M. de Koster, “Managing supply chains: challenges and opportunities.,” Copenhagen Business School Press DK, 2017.
- [2] Kulwant. Pawar, Developments in logistics and supply chain management : past, present and future. Palgrave Macmillan, 2015.

- [3] M. S. Sodhi and C. S. Tang chris, "Corporate Social Sustainability in Supply Chains: A Thematic Analysis of the Literature," 2018. [Online]. Available: <http://openaccess.city.ac.uk/>
- [4] C. Wu and D. Barnes, "Design of agile supply chains including the trade-off between number of partners and reliability," *International Journal of Advanced Manufacturing Technology*, vol. 97, no. 9–12, pp. 3683–3700, Aug. 2018, doi: 10.1007/s00170-018-2205-5.
- [5] Karthik N.S.Iyera Prashant Srivastavab Mahesh Srinivasan, "Performance implications of lean in supply chains: Exploring the role of learning orientation and relational resources," *International Journal of Production Economics*, vol. 216, no. 94–104, pp. 94–104, Oct. 2019.
- [6] T. M. Mofokeng and R. Chinomona, "Supply chain partnership, supply chain collaboration and supply chain integration as the antecedents of supply chain performance," *South African Journal of Business Management*, vol. 50, no. 1, Feb. 2019, doi: 10.4102/sajbm.v50i1.193.
- [7] U. Ramanathan, E. Mazzola, U. Mohan, M. Bruccoleri, A. Awasthi, and J. A. Garza-Reyes, "How selection of collaborating partners impact on the green performance of global businesses? An empirical study of green sustainability."
- [8] Jiangtao, "The effect of supply chain quality management practices and capabilities on operational and innovation performance: Evidence from Chinese manufacturers," *International Journal of Production Economics*.
- [9] A. , G. A. , & L. S. (2014) Leischnig, "On the role of alliance management capability, organizational compatibility, and interaction quality in interorganizational technology transfer. ," *Journal of Business Research*, vol. 67, no. 6, pp. 1049–1057, 2014.
- [10] J. E. Austin and M. M. Seitanidi, "Collaborative Value Creation: A Review of Partnering Between Nonprofits and Businesses. Part 2: Partnership Processes and Outcomes," *Nonprofit and Voluntary Sector Quarterly*, vol. 41, no. 6, pp. 929–968, Dec. 2012. doi: 10.1177/0899764012454685.
- [11] L. M. Camarinha-Matos, R. Fornasiero, J. Ramezani, and F. Ferrada, "Collaborative networks: A pillar of digital transformation," *Applied Sciences (Switzerland)*, vol. 9, no. 24, Dec. 2019, doi: 10.3390/app9245431.
- [12] P. C. E. D. Thi Thanh Huong Tran, "Supply chain information sharing: challenges and risk mitigation strategies," *Journal of Manufacturing Technology Management*, vol. 27, no. 8, 2016.
- [13] M. Tenreng, A. Idrus, A. Lalo, and S. Badruddin, "Perceived Service quality, Supply Chain Collaboration, Supply Chain management as Antecedents of Loyalty and Customer Satisfaction: Exploring Moderating Role of WOM," 2019. [Online]. Available: <http://excelingtech.co.uk/>
- [14] Gilbert N.NyagaaJudith M.Whippleb1Daniel F.Lynch, "Examining supply chain relationships: Do buyer and supplier perspectives on collaborative relationships differ," *Journal of Operations Management*, vol. 28, no. 2, 2010.
- [15] H. Dekker, C. Donada, C. Mothe, and G. Nogatchewsky, "Boundary spanner relational behavior and inter-organizational control in supply chain relationships," 2018.
- [16] M. A. Salam, "The mediating role of supply chain collaboration on the relationship between technology, trust and operational performance: An empirical investigation," *Benchmarking*, vol. 24, no. 2, pp. 298–317, 2017, doi: 10.1108/BIJ-07-2015-0075.
- [17] A. A. R. Hassan Barau Singhry, "Enhancing supply chain performance through collaborative planning, forecasting, and replenishment," *Business Process Management Journal*, vol. 28, no. 4, 2019.
- [18] Francesco Longoa Letizia Nicolettib Antonio Padovanoa Gianfrancod' Atric MarcoFortec, "Blockchain-enabled supply chain: An experimental study," *Computers & Industrial Engineering*, vol. 136, 2019.
- [19] M. H. Jarrahi, "Artificial Intelligence and the Future of Work: Human-AI Symbiosis in Organizational Decision Making." [Online]. Available: <https://deepmind.com/research/alpha>
- [20] S. C. P. C. Impact of information technology and relational aspect on supply chain collaboration leading to financial performance: A study in Indian context Nikhat Afshan, "Impact of information technology and relational aspect on supply chain collaboration leading to financial performance: A study in Indian context," *Benchmarking: An International Journal*, vol. 25, no. 7, 2018.
- [21] L. Kozubíková, L. Homolka, and D. Kristalas, "The Effect of Business Environment and Entrepreneurs' Gender on Perception of Financial Risk in The Smes Sector," *Journal of Competitiveness*, vol. 9, no. 1, pp. 36–50, Mar. 2017, doi: 10.7441/joc.2017.01.03.
- [22] B. S. Sibel Yildiz Çankaya, "Effects of green supply chain management practices on sustainability performance," *Journal of Manufacturing Technology Management*, vol. 30, no. 18, 2018.
- [23] E. Vanpoucke, A. Vereecke, and S. Muylle, "Leveraging the impact of supply chain integration through information technology," *International Journal of Operations and Production Management*, vol. 37, no. 4, pp. 510–530, 2017, doi: 10.1108/IJOPM-07-2015-0441.
- [24] M. Irfan, M. Wang, and N. Akhtar, "Enabling supply chain agility through process integration and supply flexibility: Evidence from the fashion industry," *Asia Pacific Journal of Marketing and Logistics*, vol. 32, no. 2, pp. 519–547, Jan. 2020, doi: 10.1108/APJML-03-2019-0122.
- [25] P. F. Burke, G. Dowling, and E. Wei, "The Relative Impact of Corporate Reputation on Consumer Choice: Beyond a Halo Effect."
- [26] J. Z. H. Zhao, "Design of prototype system for multi-agent supply chain information sharing benefit distribution management," *Information Systems & e-Business Management*, vol. 18, no. 4, 2020.
- [27] M.J.RamezankhaniS. AliTorabiF.Vahidi, "Supply chain performance measurement and evaluation: A mixed sustainability and resilience approach," *Computers & Industrial Engineering*, vol. 126, 2018.
- [28] Joakim Kembroa Dag Näslundab Jan Olhagera, "Information sharing across multiple supply chain tiers: A Delphi study on antecedents," *International Journal of Production Economics*, vol. 193, 2017.
- [29] S. P. C. M. and S. M. R. Sendhil Kumar, "An empirical study on effect of information sharing on supply chain performance - the case of Indian automotive industry," *International Journal of Logistics Systems and Management*, vol. 31, no. 3, 2018.
- [30] I. I. el Farouk, I. Moufad, Y. Fricchi, J. Arif, and F. Jawab, "Proposing a supply chain collaboration framework for synchronous flow implementation in the automotive industry: A moroccan case study," *Information (Switzerland)*, vol. 11, no. 9, Sep. 2020, doi: 10.3390/INFO11090431.
- [31] B. Jardini, "The Prevention and Reduction of the Bullwhip Effect by Electronic Data Interchange and Collaborative Forecasting," *European Scientific Journal ESJ*, vol. 17, no. 23, Jul. 2021, doi: 10.19044/esj.2021.v17n23p163.
- [32] S. C. P. C. Nikhat Afshan, "Impact of information technology and relational aspect on supply chain collaboration leading to financial performance: A study in Indian context," *Benchmarking: An International Journal*, vol. 25, no. 17, 2018.
- [33] Chad W. Autry, "Supply chain research: considering the discipline's evolving relationship with marketing, current issues, and future research directions," *Journal of Marketing Theory and Practice*, 2021.

- [34] S. H. , H. D. C. , & D. L. W. Liao, “ 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., 2017.
- [35] N. Altay, A. Gunasekaran, R. Dubey, and S. J. Childe, “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 and Control*, vol. 29, no. 14, pp. 1158–1174, Oct. 2018, doi: 10.1080/09537287.2018.1542174.
- [36] V. Scuotto, F. Caputo, M. Villasalero, and M. del Giudice, “A multiple buyer–supplier relationship in the context of SMEs’ digital supply chain management*,” *Production Planning and Control*, vol. 28, no. 16, pp. 1378–1388, Dec. 2017, doi: 10.1080/09537287.2017.1375149.
- [37] K. O. B. L. S. Y. T. Alain Yee-Loong Chong, “Influence of interorganizational relationships on SMEs’ e-business adoption,” *Internet Research*, vol. 19, no. 3, 2009.
- [38] L. R. Williams, T. L. Esper, and J. Ozment, “The electronic supply chain: Its impact on the current and future structure of strategic alliances, partnerships and logistics leadership,” *International Journal of Physical Distribution and Logistics Management*, vol. 32, no. 8, pp. 703–719, 2002, doi: 10.1108/09600030210444935.
- [39] M. N. Jesca, “Supply chain management constraints in Tanzanian small and medium enterprises,” *African Journal of Business Management*, vol. 13, no. 16, pp. 564–570, Oct. 2019, doi: 10.5897/ajbm2019.8876.
- [40] K. Shibin, R. Dubey, A. Gunasekaran, Z. Luo, T. Papadopoulos, and D. Roubaud, “Frugal Innovation for Supply Chain Sustainability in SMEs: Multi-method Research Design. *Planning and Control*,” 2018. [Online]. Available: <http://kar.kent.ac.uk/67373/14-0381-8>.

AUTHOR INFORMATION

Inayatulloh, Lecturer, School of Information System Bina Nusantara University Jakarta Indonesia.

Harjanto Prabowo, Professor, Computer Science Department, BINUS Graduate, Program Doctor of Computer Science Bina Nusantara University Jakarta West Jakarta Indonesia

Spit Warnars, Lecturer, Computer Science Department, BINUS Graduate, Program Doctor of Computer Science Bina Nusantara University Jakarta West Jakarta Indonesia

Togar Alam, lecturer, Computer Science Department, BINUS Graduate, Program Doctor of Computer Science Bina Nusantara University Jakarta West Jakarta Indonesia