The Design of the SMEs Digital Innovation Business Collaboration Model

Suhartini
Industrial Engineering Faculty of Industrial Technology
Institut Teknologi Adhi Tama Surabaya
Jl. Arief Rahman Hakim No. 100 Surabaya, Jawa Timur, Indonesia 60117
suhartini@itats.ac.id

Nina Aini Mahbubah
Industrial Engineering Faculty of Industrial Technology
Universitas Muhammadiyah Gresik
Jl. Sumatera 101 GKB Gresik, Jawa Timur, Indonesia 61121
n.mahbubah@umg.ac.id

Mochammad Basjir
Mechanical Engineering Faculty of Engineering
Universitas Islam Malang
Jl. Mayjen Maryono No. 193 Malang, Jawa Timur, Indonesia 65144
m.basjir@unisma.ac.id

Abstract

Currently, the number of SMEs reaches 64.2 million, while those with a digital ecosystem account for 23.9% of the total number of SMEs in Indonesia. In 2022, Indonesia will begin to enter the stage of faster and more transformative SMEs economic recovery. Based on Presidential Decree No. 18 of 2020, the Presidential Regulation aims to improve the economy and welfare by accelerating the national digital transformation. SMEs problems are found in several fields: management, organization, technology, capital, operational and technical, limited market access, business licensing constraints, and non-technical costs. With these conditions, an acceleration of digital transformation is needed to facilitate activities in running a business for SMEs. This study aims to create collaborations for SMEs business innovations due to the lack of capabilities in determining the suitable collaboration model for conducting SMEs business. The methods used in this research are Service Quality and Quality Function Deployment (QFD) methods. In this study, there are 15 attributes of a business collaboration system desired by SMEs, namely product trends, product ideas, selling price information, return processes, product quality strengths and weaknesses, product testing, customer needs, idea development opportunities, raw material prices, delivery processes, availability of materials, complaint process, product specification requirements, production process. The technical characteristics used are 9 attributes. The attributes are information on customer characteristics, delivery schedule information, raw material requirements, product quality information, customer needs information, product development frequency information, product testing schedule information, production flow information, and process time information.

Keywords
Service Quality, Quality Function Deployment, Collaboration, Innovation, SMEs

1. Introduction
Presidential Decree No. 18 of 2020 aims to accelerate the development of quality and competitive human resources (HR) so that they can improve the economy by accelerating national digital transformation. 2022 is the stage of faster and transformative SMEs economic recovery. The number of SMEs has become a digital ecosystem supporting government programs toward a digital economy (Kompas, 2021). In 2021), the number of SMEs joining the digital ecosystem will be 15.3 million out of the 64.2 million total. The government has a target that by 2030 the number who

join the digital ecosystem will be as many as 30 SMEs. Digital business systems have advantages for SMEs activities. By using a digital system to run their business, SMEs can solve problems in management, organization, technology, capital, operational and technical fields, limited market access, licensing constraints, and non-technical costs in the field. With these conditions, we need an acceleration of digital transformation (Saragih et, al, 2021).

This study aims to create a collaborative model of an agile innovation business for SMEs. With the hope that SMEs can deal agilely with any changes in their business activities. The innovation business collaboration system is expected to increase the ability of SMEs to run an agile (agile) innovation business. Business Innovation in the form of services for agile products can meet market demands. This research is expected to provide product services to customers so that they can increase the productivity of SMEs and be competitive. The problem in this research is the pandemic condition that causes SMEs to carry out business activities in a digital way to make it easier to market products. Marketing products with a digital system to be accepted by customers, SMEs must collaborate with businesses. The collaboration model used is to form business innovation in agile ways. The method used in this research is Quality Function Deployment (QFD). The QFD method is used to determine the collaboration model desired by SMEs to increase SMEs productivity.

1.1 Research Objectives

Following the formulation of the problem above, the objectives of this study are as follows:

a. Knowing consumer desires (the voice of customer) for business collaboration systems.
b. Determine the target description of the technical characteristics of the business collaboration system using the Quality Function Deployment (QFD) method.
c. Knowing the priorities in designing a business collaboration system according to the Quality Function Deployment (QFD) method.

2. Literature Review

Research aimed at exploring the collaborative role of social and knowledge in achieving proactive e-business to deal with the COVID-19 crisis. The results show the positive impact of collaborative and proactive e-business on agile organizations during a crisis (Ghezzi et, al, 2020). A case study that explores several digital platform startups to develop a framework for the relationship between BMI, LSA, and Agile Development (AD), in the context of Strategic Agility. The results show that LSA can be used as an agile method in Business Model Innovation in Digital Entrepreneurship (Chuang et, al, 2020). In the relationship between social information processing capabilities (internal capability), customer co-creation (external capability), and social media agility, empirical studies have not provided convincing evidence about social media's benefits. The results reveal that these two types of ability to interact with social media agility positively correlated with the strength of the customer relationship with the company (Saura, et, al, 2021). The study's results classify the types of CRM and the use of AI-based CRM in B2B digital marketing (Sarangee, et, al, 2022).

The ability to reach the market more quickly and respond to changing market conditions or shifting customer preferences facilitates the shift to agile new product development processes (Setkute, et, al, 2022). The benefits of digital marketing are widely recognized. Many SMEs have been slow to adopt B2-B practices. These companies' characteristics and ways of working mean that digital marketing as practiced in B2C may not be appropriate in large companies (Sultana, et, al, 2022). There are three benefits to agility capabilities – customer, partnering, and operational – in enabling tourism organizations to leverage digital technologies to produce or deliver customer value, responding to discrepancies in every dimension of agility. Customer agility allows tourism organizations to leverage digital technology to interact with customers to get ideas, test services, and attract new customers (Hadjielias, et, el, 2022). In this study, we discuss the relationship between digital platform capabilities and organizational agility in the small and medium-sized enterprise (SMEs) manufacturing sector by investigating the mediating role of intellectual capital and its moderating role in a dynamic environment.

The study's results explain the importance of capital in creating an increase in organizational agility for manufacturing SMEs through the capabilities of digital platforms within the limits of dynamic environmental conditions (Ahmed, et, al, 2022). This study explores how manufacturing companies and their customers come together to create digital service innovations to tackle digitalization. This paper provides insight into how companies engage in agile co-creation processes, with important recommendations for innovation in enterprise manufacturing in the digitalization era

(Sjodin, et,el, 2021). The study examines the relationship between intellectual agility, entrepreneurial leadership, and innovation of micro and small businesses in an efficiency-driven economy (Dabie, et, al, 2021). Cognitive computing ushered in the industrial revolution through increased accuracy, scalability, and personalization. Therefore, business-to-business (B2B) organizations consider making decisions to be adopted into digital marketing initiatives (Behera, et,al, 2022).

This study aims to improve agile party marketing. The dimensions used are customer, responsiveness, flexibility, collaboration, and rapid and continuous improvement (Moi et al., 2021). This study aims to develop theoretical models and hypotheses on supply chain collaboration. The factors used are responses to environmental context factors, supply uncertainty, competition intensity, technological turbulence, and market turbulence. The result of this research is to improve the company's performance by making a strategy in the form of a lean and agile framework (Srinivasan et al., 2020). This study aims to improve performance in hospitals. The results showed a positive influence between management system control and the budget (Adhikara et al., 2022). According to (Suhartini et al., 2021), the research discusses SMEs' strategies to increase productivity. One of the strategies used by SMEs is collaboration.

3. Methods

The stages in this research consist of four stages: the preliminary stage, the data collection stage, the data processing stage, the additional analysis stage, and the conclusion. The following is a description of each stage:

a. Preliminary stage
   In the preliminary stage, identification of problems in the implementation of SMEs innovation business collaboration. The problem faced by MSMEs is that at least SMEs have collaborated in business due to limited information systems. From these problems, the identification of the collaboration system needed by SMEs will be carried out. Thus, information related to the needs of SMEs will be analyzed to be seen as the most critical priority for designing a business collaboration system.
b. Stages of data collection
   The data needed in this study are data on customer needs regarding business collaboration systems, technical response data, data on the number of respondents, data from questionnaire results, namely the value of the level of importance, level of satisfaction and level of expectation, and the adequacy of data on filling out the questionnaire.
c. Stages of data processing
   Data on customer needs is done by conducting interviews with SMEs. The questionnaire design is used as the basis for conducting interviews with respondents. Designing the questionnaire must go through two stages: the first stage of the questionnaire is called the open questionnaire, and the second stage of the questionnaire is called the closed questionnaire. The first stage of the questionnaire produces 12 attributes required by customers. After testing the validity and reliability test, the attributes required by the customer are said to be valid and reliable. While the data adequacy test was processed by the Bernoulli method, the test results were said to be sufficient by processing the data of 103 respondents. Further data processing by compiling the House of Quality. Meanwhile, compiling the House of Quality is processed by calculating the improvement ratio, Sales Point, Raw Weight, and Normalized Raw Weight.
d. Stages of analysis and discussion
   At this stage, the needs of SMEs will be analyzed in implementing business collaboration. The needs that have been identified will be ranked and then used as an alternative solution to determine the attributes of the business collaboration system that are the most prioritized by SMEs.
e. Conclusion
   From the data analysis, the next step is to conclude. The conclusion is the answer to the research formulation.

Figure 1 shows the flowchart of the steps that will be carried out in this study.

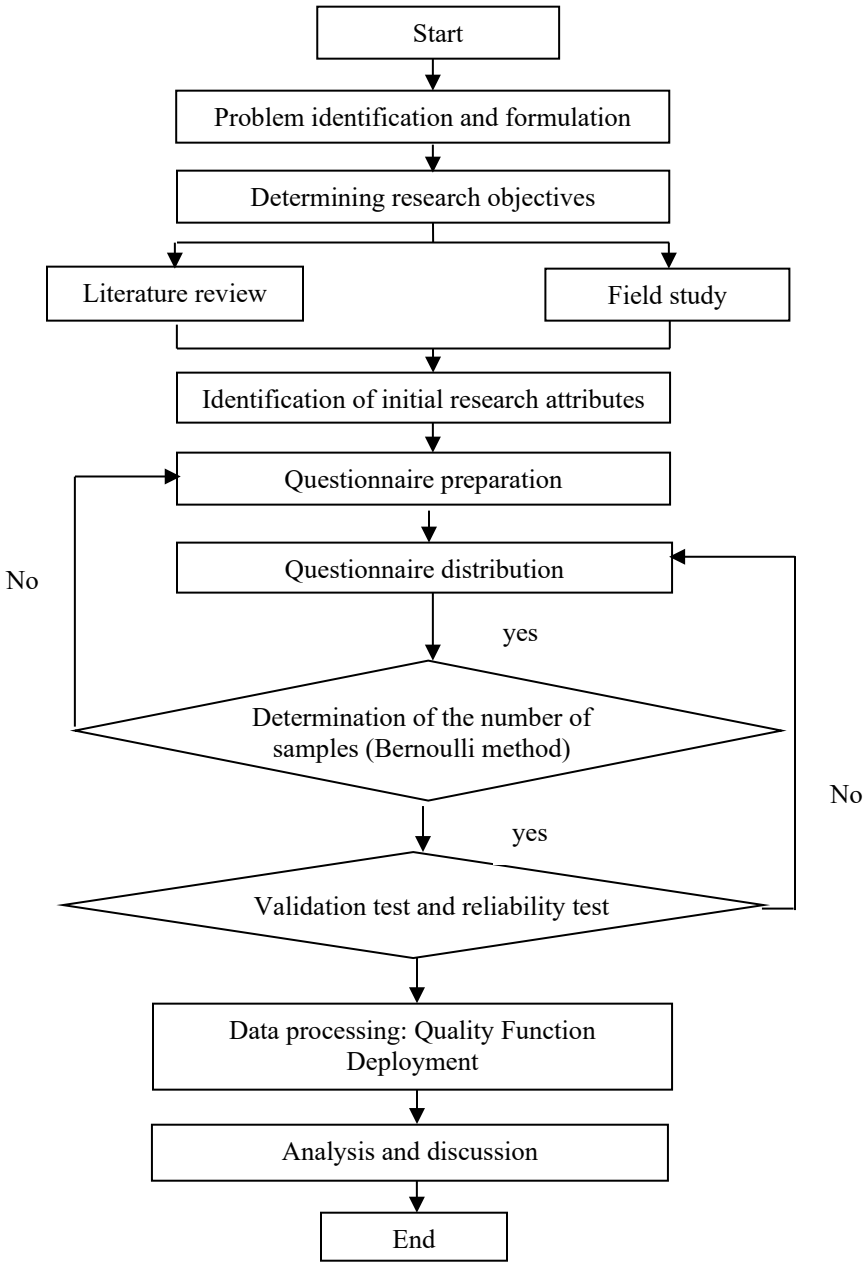

Figure 1. Flowchart research

4. Data Collection

This study uses quantitative and qualitative data. The qualitative data was obtained from the results of the first stage of the questionnaire. The first phase of the questionnaire was designed based on the needs of SMEs regarding business collaboration. The first phase of the questionnaire involved 35 respondents. The results of the questionnaire were used to design the second phase of the questionnaire. The second stage of the questionnaire aims to determine the level of importance, satisfaction, and expectations of the SMEs business collaboration system. The second stage of the questionnaire involved 105 respondents. The number of respondents who filled out incompletely there were two respondents, so there were 103 questionnaires that could be processed for data processing.

5. Results and Discussion

5.1 Develop House of Quality (HoQ)

Identify the attributes of consumer desires. The distribution of the first stage of questionnaires produces qualitative data in the form of attributes necessary for evaluating business collaboration systems. The following are the attributes that are the mode of the results of the distribution of the first stage of the questionnaire and which are considered relevant to be applied to creating a business collaboration system.

Table 1. Atribut *Voice of Customer*

No.	Atribut
1.	Product trend
2.	Product idea
3.	Customer behavior
4.	Selling price information
5.	Return process
6.	Product quality advantages and disadvantages
7.	Product testing
8.	Customer requirement
9.	Idea development opportunities
10.	Raw material prices
11.	Delivery process
12.	Material availability
13.	Complaint Process
14.	Product specification requirements
15.	Production process

The Table 1 above shows the attributes SMEs want in designing a business collaboration system. The results of these attributes are used as the basis for making the second questionnaire. The second questionnaire was distributed to SMEs, and then data adequacy, validity, and reliability tests were conducted. The results of the validity test show that all attributes are valid. The value of Corrected Item - Total Correlation is also compared with the value of the r table. The item is declared valid if the value of Corrected Item - Total Correlation is the value of the r table. For the number of samples N = 103 and 0.05, the value of the r table is 0.194. While the reliability test, the results of the SPSS Software can be obtained that the overall Cronbach's Alpha value is 0.877. In contrast, Cronbach's Alpha, each question item has a Cronbach's Alpha value of 0.8. From this value, all the attributes of the importance level are reliable and have a high-reliability coefficient index. After testing the validity and reliability tests, these attributes will be used to determine the technical response.

5.2 Technical Characteristics

In this section, there is a translation process from the voice of the customer into the developer's language (voice of customer). The following are the technical characteristics that will be used to fulfill consumer desires. The technical characteristics will answer questions from the voice of the customer. (Table 2)

Table 2. Technical characteristics of business collaboration

No.	Technical Characteristics
1.	Customer characteristic information
2.	Delivery schedule information
3.	Information on raw material requirements
4.	Product quality information
5.	Customer needs information
6.	Product development frequency information

7.	Product testing schedule information
8.	Production flow information
9.	Processing time information

5.3 Raw Weight

The improvement ratio is the value obtained from the goal value compared to the company's performance value. Sales Point is information about the ability to increase sales of a product or service if consumer desires match customer needs. Calculating the raw weight value can determine the level of importance of each consumer's wishes without considering other important things such as improvement ratios and sales points. The following is the draw weight value of the business collaboration system. (Table 3)

Table 3. Raw Weight of A Business Collaboration System

No.	Atribut	*Importance to Customer*	*Improvement Ratio*	*Sales Point*	*Raw Weight*
1.	Product trend	4	1,25	1	5,00
2.	Product idea	4	1,25	1	5,00
3.	Customer behavior	4	1,25	1	5,00
4.	Selling price information	4	1,33	1	5,33
5.	Return process	4	1,33	1	5,33
6.	Product quality advantages and disadvantages	4	1,67	1	6,67
7.	Product testing	5	1,25	1	6,25
8.	Customer requirement	4	1,67	1	6,67
9.	Idea development opportunities	5	1,25	1	6,25
10.	Raw material prices	4	1,67	1	6,67
11.	Delivery process	3	1,33	1	4,00
12.	Material availability	4	1,67	1	6,67
13.	Complaint Process	4	1,33	1	5,33
14.	Product specification requirements	3	1,67	1	5,00
15.	Production process	3	1,33	1	4,00
Total					83.17

Normalized Raw Weight

The normalized raw weight column contains the values in the natural weight column that have been converted into percentages. (Table 4)

Table 4. Normalized Raw Weight of business collaboration system

No.	Atribut	*Raw Weight*	*Normalized Raw Weight* (%)
1.	Product trend	5,00	6,01
2.	Product idea	5,00	6,01
3.	Customer behavior	5,00	6,01
4.	Selling price information	5,33	6,41
5.	Return process	5,33	6,41
6.	Product quality advantages and disadvantages	6,67	8,02
7.	Product testing	6,25	7,51
8.	Customer requirement	6,67	8,02
9.	Idea development opportunities	6,25	7,51
10.	Raw material prices	6,67	8,02
11.	Delivery process	4,00	4,81
12.	Material availability	6,67	8,02

13.	Complaint Process	5,33	6,41
14.	Product specification requirements	5,00	6,01
15.	Production process	4,00	4,81
Total		83.17	1

5.4 Technical Matrix

This section contains technical response priorities containing the contribution values obtained from the product of the normalized raw weight values with the relationship values, which are then summed for each characteristic technical column. The most considerable value will be selected to be used as the basis for the priority process for improving technical characteristics.

Tabel 5. Relative Contributions

Technical Characteristics / **Atribut**	***Normalized Raw Weight* (%)**	Customer characteristic information	Delivery schedule information	Information on raw material requirements	Product quality information	Customer needs information	Product development frequency information	Production flow information	Production flow information	Processing time information
Product trend	6,01	△		●		●	●			
Product idea	6,01	△		○		△				
Customer behavior	6,01	●		○		○				
Selling price information	6,41	●		○	○	○				
Return process	6,41	●		△		○		○		
Product quality advantages and disadvantages	8,02		●	●	○				●	○
Product testing	7,51			●			●			
Customer requirement	8,02				●			○		
Idea development opportunities	7,51		●		●				●	○
Raw material prices	8,02				●			○		○
Delivery process	4,81					●		○		
Material availability	8,02			△			●			
Complaint Process	6,41					●		●		○
Product specification requirements	6,01		●	○		○		○	●	○
Production process	4,81		○					○	○	●
Contributions		1,81	2,08	2,82	2,55	2,36	1,94	1,72	2,08	1,51
***Relative Contributions* (%)**		9,61	11,04	14,92	13,52	12,48	10,27	9,11	11,04	8,01

Rangking Technical Response Priority		**7**	**4**	**1**	**2**	**3**	**6**	**8**	**5**	**9**

The contribution's relative value shows the priority of designing the SME's business collaboration system. The Table 5 above shows that the contribution's relative value starts from the most significant value of 14.92 and the smallest value of 8.01. Table 6 shows the priority order of business collaboration according to consumer desires.

Table 6. Priority of Technical Response

Attribute	Value	Rank
Information on raw material requirements	14,92	1
Product quality information	13,48	2
Customer needs information	12,48	3
Delivery schedule information	11,04	4
Production flow information	11,04	5
Product development frequency information	10,27	6
Customer characteristic information	9,61	7
Production flow information	9,11	8
Processing time information	8,01	9

A fast business collaboration system can make it easier for SMEs to carry out activities in business processes. The design of the collaboration system follows the wishes of SMEs, making it easier for SMEs to carry out business collaboration systems. Thus, the productivity of SMEs can increase and can be competitive. (Table 6)

6. Conclusion

The technical characteristics used are nine attributes. The attributes are Information on customer characteristics, delivery schedule information, raw material requirements, product quality information, customer needs Information, product development frequency information, product testing schedule information, production flow information, and process time information. In this study, there are 15 attributes of a business collaboration system desired by SMEs, namely product trends, product ideas, selling price information, return processes, product quality strengths and weaknesses, product testing, customer needs, idea development opportunities, raw material prices, delivery processes, availability of materials, complaint process, product specification requirements, production process.

The priority attribute level of consumer needs (the voice of customer) to the business collaboration system with a value of Normalized Raw Weight of 8.02% is n raw material prices, and attributes with a value of Normalized Raw Weight of 7.51% are product testing. The priority description of the technical characteristics of the target on the business collaboration system from the analysis of Quality Function Deployment (QFD) is Information on raw material requirements with a contribution of 14.92%, Information on product quality with a contribution of 13.52%, Information on customer needs with a contribution of 12.48%, Production flow information with a contribution of 11.04%, Information on the frequency of product development with millimeters (mm) with a contribution of 10.27 %.

Acknowledgments

The authors received financial support The research Grant Contract No. 2022 as part of Penelitian Terapan Kompetitif Nasional (PTKN) Directorate of Higher Education by the Indonesian Ministry of Education, Culture, Research, and Technology Contract Number 159/E5/P6.02.00.PT/2022 dated 10 May 2022.

References

Adhikara, M. F. A., Maslichah, Diana, N., & Basjir, M. Organizational Performance in Environmental Uncertainty on the Indonesian Healthcare Industry: A Path Analysis. Academic Journal of Interdisciplinary Studies, 11(2), 365–377. (2022). https://doi.org/10.36941/ajis-2022-0058

Ahmed, A., Bhatti, S. H., Gölgeci, I., & Arslan, A. Digital platform capability and organizational agility of emerging market manufacturing SMEs: The mediating role of intellectual capital and the moderating role of environmental

dynamism. Technological Forecasting and Social Change, 177(January). (2022). https://doi.org/10.1016/j.techfore.2022.121513

Behera, R. K., Bala, P. K., Rana, N. P., & Kizgin, H. Cognitive computing based ethical principles for improving organisational reputation: A B2B digital marketing perspective. Journal of Business Research, 141(November 2021), 685–701. (2022). https://doi.org/10.1016/j.jbusres.2021.11.070

Chuang, S. H. Co-creating social media agility to build strong customer-firm relationships. Industrial Marketing Management, 84(June 2019), 202–211. (2020). https://doi.org/10.1016/j.indmarman.2019.06.012

Dabić, M., Stojčić, N., Simić, M., Potocan, V., Slavković, M., & Nedelko, Z. Intellectual agility and innovation in micro and small businesses: The mediating role of entrepreneurial leadership. Journal of Business Research, 123(October 2020), 683–695. (2021). https://doi.org/10.1016/j.jbusres.2020.10.013

Ghezzi, A., & Cavallo, A. Agile Business Model Innovation in Digital Entrepreneurship: Lean Startup Approaches. Journal of Business Research, 110(June), 519–537(2020).. https://doi.org/10.1016/j.jbusres.2018.06.013

Hadjielias, E., Christofi, M., Christou, P., & Hadjielia Drotarova, M. Digitalization, agility, and customer value in tourism. Technological Forecasting and Social Change, 175(November 2021), 121334. https://doi.org/10.1016/j.techfore.2021.121334 (2022).

Kompas.com - 11/06/2021, https://money.kompas.com/read/2021/06/11/081553426/30-juta-pelaku-umkm-ditargetkan-masuk-digital-di-tahun-2030-ini-strategi

Moi, L., & Cabiddu, F. An agile marketing capability maturity framework. Tourism Management, 86(February 2020), 104347. https://doi.org/10.1016/j.tourman.2021.104347 (2021).

Saragih, L. R., Dachyar, M., & Zagloel, T. Y. M. Implementation of telecommunications cross-industry collaboration through agile project management. Heliyon, 7(5), e07013. 2021 https://doi.org/10.1016/j.heliyon.2021.e07013

Sarangee, K., Schmidt, J. B., Srinath, P. B., & Wallace, A. (2022). Agile transformation in dynamic, high-technology markets: Drivers, inhibitors, and execution. Industrial Marketing Management, 102(October 2020), 24–34. https://doi.org/10.1016/j.indmarman.2021.12.001

Saura, J. R., Ribeiro-Soriano, D., & Palacios-Marqués, D. Setting B2B digital marketing in artificial intelligence-based CRMs: A review and directions for future research. Industrial Marketing Management, 98(January), 161–178. (2021). https://doi.org/10.1016/j.indmarman.2021.08.006

Setkute, J., & Dibb, S. "Old boys'' club": Barriers to digital marketing in small B2B firms." Industrial Marketing Management, 102(November 2021), 266–279. (2022). https://doi.org/10.1016/j.indmarman.2022.01.022

Sjödin, D., Parida, V., Kohtamäki, M., & Wincent, J. An agile co-creation process for digital servitization: A micro-service innovation approach. Journal of Business Research, 112(June 2019), 478–491. (2020).https://doi.org/10.1016/j.jbusres.2020.01.009

Srinivasan, M., Srivastava, P., & Iyer, K. N. S. Response strategy to environment context factors using a lean and agile approach: Implications for firm performance. European Management Journal, 38(6), 900–913. (2020). https://doi.org/10.1016/j.emj.2020.04.003

Suhartini, S., Mahbubah, N. A., & Basjir, M. Marketing Strategy Design Based on Information Technology in Batik Small and Medium-Sized Enterprises in Indonesia. Eastern-European Journal of Enterprise Technologies, 6(13–114), 39–48. (2021). https://doi.org/10.15587/1729-4061.2021.244137

Sultana, S., Akter, S., & Kyriazis, E. How data-driven innovation capability is shaping the future of market agility and competitive performance? Technological Forecasting and Social Change, 174(October 2021), 121260. (2022).https://doi.org/10.1016/j.techfore.2021.121260

Biographies

Suhartini is a lecturer in the Department of Industrial Engineering at the Adhi Tama Institute of Technology Surabaya. Master's degree in Industrial Engineering at the Sepuluh Nopember Institute of Technology, Surabaya. Current research areas are product development planning, supply chain management, and logistics.

Nina Aini Mahbubah is a lecturer in the Department of Industrial Engineering at the University of Muhammadiyah Gresik. Doctoral education graduated from the University of Leeds in the UK. The field of research that has been carried out so far in the field of Industrial systems management.

Mochammad Basjir is a lecturer in the Mechanical Engineering department at the Islamic University of Malang. Master's degree in Industrial Engineering at the Sepuluh Nopember Institute of Technology, Surabaya. The field of research currently being carried out is manufacturing production processes.