

A literature review on the implementation of continuous improvement in the Indonesian manufacturing and service industries

Aina Nindiani^{1*}, Fitri Sulastri², Ade Suhara³

^{1,2,3} Department of Industrial Engineering, Universitas Buana Perjuangan, Karawang, West Java, Indonesia

* Corresponding author: aina.nindiani@ubpkarawang.ac.id

ARTICLE INFO

Article history

Submission: 21st January, 2024

Revised: 7th January, 2025

Accepted: 21st January, 2025

Keywords

Continuous Improvement

Kaizen

Manufacturing Industry

Objective Value

Service Industry



<https://doi.org/10.22219/oe.2025.v17.i1.127>

ABSTRACT

Organizations worldwide, including in Indonesia, must be adaptive by continuously making improvements or continuous improvements so that their business continues to run forever. This research aims to analyze the implementation of continuous improvement in Indonesia in the manufacturing and service industry sectors. The literature review was carried out using the keywords implementation of continuous improvement, application of kaizen, and the like in the Google Scholar database. This literature review intends to determine how the continuous improvement (CI) process is carried out in Indonesia and what results are achieved. CI implementation is carried out using various tools that improve the work system. The objective value of implementing continuous improvement is then synthesized in manufacturing and service industry studies. In the manufacturing industry, the objective values that can be drawn based on the study's results are increasing production efficiency, optimizing product quality, reducing production costs, increasing time-to-market speed, a culture of innovation, increasing employee involvement, and sustainability and competitiveness. Meanwhile, in the service industry, it is improving service quality, operational efficiency, service innovation, quality management system effectiveness, and competitive advantage.



This is an open access article under the [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.

1. Introduction

Amid the disruption looming over the business world, organizations face various conditions that require strategies to maintain their business. Rapid changes that impact business, uncertainty, the complexity of problems, and ambiguity often characterize the business world at various scales. From MSMEs (Agustina et al. 2017; Nindiani et al., 2022) to large industries (Du & Chen, 2018; Naqvi & Naqvi, 2023), they are impacted by VUCA. The acronym of VUCA is Volatility, Uncertainty, Complexity, and Ambiguity (Erer, 2024). Organizations worldwide, including Indonesia, must be adaptive by continuously making improvements so that their business can sustain operations.

The origin of the term "Continuous Improvement" can be traced back to Japan specifically to "Kaizen", introduced and popularized by Masaaki Imai, acknowledged as the Father of Continuous Improvement. Kaizen is a combination of "Kai," meaning change, and "Zen," signifying improvement (Sanchez & Blanco, 2014). Bhuiyan & Baghel (2005) connect the expression "Continuous Improvement" with various aspects of organizational progress, including the adoption of "lean manufacturing", employee engagement initiatives in Total Quality Management (TQM), improvements in customer service, and efforts to minimize waste. It involves a focused and ongoing process of gradual innovation throughout the entire organization.

"Continuous Improvement" employs a proactive and forward-thinking approach to enhance methodologies, relying on the knowledge and collaboration of operators, equipment vendors,

technicians, and support personnel. This collaborative effort aims to optimize equipment performance, eliminate breakdowns, reduce both planned and unplanned downtime, increase throughput, and enhance product quality. Successful implementation of “Continuous Improvement” initiatives within an organization is associated with benefits such as reduced operating costs, prolonged equipment lifespan, and overall cost reduction (Singh & Singh, 2015; Kusuma & Hasibuan, 2022). According to Patel & Desai (2020), continuous improvement is fundamental principle within organizational design and innovation rooted in the Total Quality Management (TQM) paradigm.

Continuous improvement (CI) has undergone an evolution from the past to the present. CI programs and quality management are interrelated because both aim to achieve excellence through improvement. Historically, the initiation of CI involved actions taken by various companies in the 19th century. During this period, management actively promoted improvements driven by employees, and incentive programs were established to recognize and reward those employees who contributed positively to organizational change. However, CI implementation today has evolved into a more sophisticated methodology and involves a variety of tools and techniques to achieve continuous performance improvements (Bhuiyan & Baghel, 2005).

CI implementation has been carried out by authors in various parts of the world in multiple sectors, such as the public sector. Fryer et al. (2007) performed a literature review encompassing diverse countries, including Qatar, England, India, Australia, and Iran. The review identified key factors contributing to the success of CI implementation in the public sector. These factors comprised the engagement of top-level management, effective data systems, suitable training, and proficient project team management. A practical, specific model for the public sector, necessary culture change, clear customer definition, employee engagement, improved performance/quality, reduced waste, reduced costs, and increased customer satisfaction.

In a three-decade study of CI in various countries worldwide, including the USA, Spain, England, Australia, Canada, Germany, France, Italy, China, India, Japan, Brazil, Mexico, and Korea, CI is often associated with introducing a deeper system, such as Lean Management or Total Quality Management. Comparative studies across countries can facilitate understanding of the CI phenomenon and help establish routes to assist a business in implementing CI. The concept of CI, derived from the Japanese term ‘Kaizen,’ signifying both change and improvement, entails an ongoing and cyclical process that necessitates constant engagement. Everyone in the organization should participate in the CI cycle (Sanchez & Blanco, 2014).

According to Aleu and Van Aken (2016), the factors most frequently identified in the literature related to CI project success have yet to be comprehensively synthesized. Studies from several literature from various countries such as the USA, England, Canada, India, Sweden, Australia, Singapore, Taiwan, and Mexico need to explicitly mention the critical factors for success in CI in their research. This research provides insight into trends in CI research.

Iwao (2017) reviewed the literature to examine the implementation of CI at Toyota Japan. Critical factors for the success of CI or kaizen implementation include the role of engineers on the factory floor in managing various levels of coordination and effective coordination between parties at various levels of the organization in resolving problems. The findings of this research reveal that kaizen does not only consist of small and independent process innovations but also involves interrelated innovations at various scales, so there is a need for a comprehensive understanding of kaizen as a complex form of innovation.

Prashar & Antony (2018) investigated the integration of CI within the professional services sector, encompassing domains like health services, IT services, accounting and financial services, legal services, and engineering and management consulting services. Factors contributing to the success of CI implementation include consideration of cultural aspects, a CI program grounded in the operational alignment with customer and employee needs, incorporation of theories from well-established fields like Supply Chain Management (SCM), and attention to managerial and project-related factors.

Numerous prior investigations have focused on the execution of CI practices in Indonesia include research conducted by Debby et al. (2010) in the construction sector, Indrawati & Ridwansyah (2015) in iron ores companies, and Arief et al. (2020) in the agricultural industry, oil, and gas manufacturing sector. Other industries in the manufacturing and service sectors will be identified as they have implemented CI activities. Even though CI was initiated from the Japanese philosophy of ‘Kaizen,’ many other organizations that are not Japanese companies have implemented the best practices of

CI.

From the various literature studies regarding CI described previously, there has yet to be much analysis of literature studies regarding implementing CI in studies in the Indonesian industry. Therefore, this research elaborates on implementing CI in Indonesia's manufacturing and service sectors. A review of literature was undertaken to examine the process and outcomes associated with the implementation of CI in Indonesia. The research concludes by deriving the objective value of implementing CI in this context.

2. Methods

The study employed a systematic literature review to explore the application of Continuous Improvement (CI) in Indonesia's manufacturing and service sectors. Fig. 1 outlines the literature review steps. The research began by compiling 104 articles from the Google Scholar database using keywords such as "implementation of continuous improvement in Indonesia," "kaizen implementation in Indonesia," and similar terms. Publish or Perish software was utilized as a tool for article searching. Duplicate screening identified and removed eight articles. Further eligibility screening excluded 48 articles deemed less relevant, including those lacking empirical focus (three articles), related to community service (nine articles), insufficiency specific about CI implementation in manufacturing or services (14 articles), or proposing CI performance without reporting actual implementation (22 articles). Many articles with the keyword implementation of CI in Indonesia were still often characterized by recommendations for CI activities, which still need to be implemented. So we got 48 articles, 35 implementation articles in the manufacturing industry, and 13 implementation articles in the service industry. The articles accommodated in this CI implementation study were articles selected for the content of the literature survey, which discuss cases of CI in Indonesia. Data tabulations were then made to detail the type of industry, study objects, CI activities (tools), variables monitored, and the results achieved. The type of industry in the tabulation was a detailed breakdown of each category in the manufacturing and service industries. Industry types were then summarized in a pie chart to show the percentage of various industries identified in the study. The results of CI studies in the manufacturing and service industries were then visualized with a bar chart of the number of cases in the study that can be identified. Next, the objective value of implementing CI in Indonesia's manufacturing and service industries was analyzed.

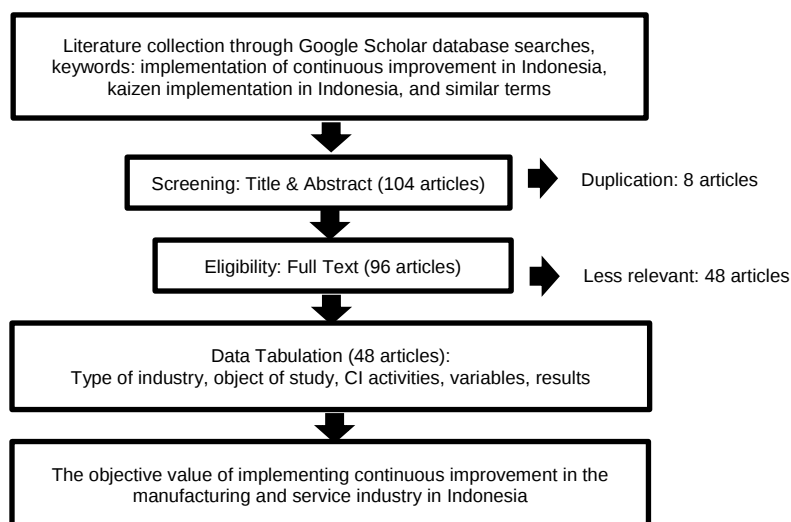


Fig. 1 Research framework.

3. Results and Discussion

The results of the literature collection related to empirical studies on the implementation of CI showed that 48 empirical studies were on the topic of discussion, 35 articles related to the implementation of CI in the manufacturing industry, and 13 articles related to the implementation of CI in the service industry.

A total of 35 articles were identified regarding implementing CI in Indonesia, which are displayed in Table 1.

Table 1 Implementation of CI in the manufacturing industry

No	Author (Year)	Type of industry	Object of study	CI Activities (Tools)	Variables	Results
1	Fatkhurrohmah & Subawa (2016)	Automotive	Shaft Loader Machine in the Banbury Department of PT Bridgestone Tire Indonesia	Adding a stopper to the problematic part of the machine. (Kaizen team, jig)	Delivery, quality, cost, environment, safety	Reduce production costs by 180 million/month
2	Abdullah (2013)	Automotive	Mori Seiki and Topper 920 CNC machines in the machining center line	Improving work standards step by step, continuously, involving all parties, namely leaders and employees (DMAIC)	Machine efficiency	The efficiency of the Mori Seiki machine increased from 66% to 83%, and the Topper machine increased from 74% to 83%
3	Rinto (2012)	Automotive	Machining Line Body Caliper PT TDW	Improving the machining process to make it faster (Fishbone diagram, Kaizen project to increase production capacity)	Production capacity, Processing Time, Cost	Processing time was successfully reduced, capacity increased by 13.86%, and cost reduction amounted to IDR 8,485,181,549
4	Ayuningtyas et al. (2014)	Medical aids	Hansaplast Production Manual Packing Area PT Beiersdorf Indonesia PC Malang	Standardization of work elements through improving production layouts (Kaizen, PDCA Cycle, Stopping Clock Method, Line Balancing, Left Hand & Right Hand Maps)	Productivity, Work Efficiency, Standardization of Work Methods, Production Layout, Standard Time	Increased efficiency with a reduced standard time of 15.86 seconds. Improved line efficiency of 80%, a smoothness index value of 6.45, increased production output by 40 shipping cartons
5	Ngadono (2018)	Automotive	Coated safety glass on Trimming Process Line, Production Department	The glass loading method, which was initially manual, was changed to using felting tools.	Production result	Increased production output from 1,588 to 1,791 glasses per shift (increased 12.8%)
6	Setiawan & Yosana (2017)	Mobile phone	Warehouse Division of PT Sarana Kencana Mulya in Tangerang Banten	Execution of SOPs for product custody, incorporating VSM, 5S and EOQ	Standard time, inventory	Decreased standard time from 345,786 to 1478 seconds, inventory increased from 230 pcs to 377 pcs
7	Zahra & Purwanggono (2018)	Automotive	PT TMMIN logistics planning division report format	Application of new standards to reports (PDCA)	Lead time, productivity	Lead time was reduced from 13-14 days to 8 days, and productivity increased by 38.64%
8	Soesilo (2017)	Automotive	Product drying in the PT NGK Busi Indonesia plating area	Replacing box coasters with perforated plastic and making shelves for drying products (Kaizen, 5S)	Drying area working conditions	Eliminate box waste, reduce production areas, increase productivity
9	Hudori (2016)	Automotive	Warehouse finished good	Reducing the size of FIFO tags, changing the hanging rope from thread to wire (Fishbone diagram, PDCA)	Goods retrieval system, people, methods, materials, environment	Reduced error rate to zero defects in FIFO tag position and bin retrieval
10	Balol (2022)	Bottled drinking water	Spare Parts (cutter) for Cup Sealer machines in the packaging process area	Making two blade designs and selecting and installing cutter project 2 (Fishbone diagram)	Efficiency, productivity	The blade can be used up to 4 times, cutter purchasing efficiency increased by 72.92%, and cutter replacement productivity increased by 57.20%/month.

No	Author (Year)	Type of industry	Object of study	CI Activities (Tools)	Variables	Results
11	Arif et al. (2018)	Garment	Sarongs at Air Jet Lom Department (AJL)	Process monitoring, 5S implementation (PDCA, Pareto diagram, fishbone diagram)	Product defects & causes, work efficiency, man, method, material, environment, equipment	Increased grade (decreased filling defects by 0.40%, abnormal defects by 0.13%), improved work efficiency from 765 to 82.62%
12	Kurnianingtyas et al. (2021)	Garment	The process of sewing long pants in the Sewing Department	Replacing the SNL machine to an over deck, adding sewing aids, replacing the device to an MCB (Kaizen)	Cycle time	Cycle time is 33% faster, from 91 seconds to 30 seconds.
13	Sofyan (2018)	Glasses	Employee of PT Supravis Rama Optik, Mfg Karawang	SPSS	Kaizen Work Culture, Employee Productivity Levels	The incorporation of a Kaizen work culture contributes to approximately 17.90% of employee productivity.
14	Tama et al. (2023)	Animal feed	Extruder machine	Routine & periodic improvements to machine setup, waiting, downtime, lubricants, pressure, temperature, water, & raw material quality (OEE)	Availability, performance, and quality	OEE value increased by 3.2% from 52% to 55.4%.
15	Sulistyo & Sofiyulloh (2022)	Energy	PT Merak Energi Indonesia Jetty Area.	Tightened guidance & supervision, system calibration on load cells & speed sensor (CED, PDCA, 5S, 5W1H, 3M)	Coal weight	Discrepancies in coal weight measurements are identified in belt weighers 01 and 02.
16	Tri et al. (2019)	Automotive	Company performance Operational area of manufacturing companies in Tangerang	Doc. preparation, comfortable waiting room, use of engine stand for 60 min., oil filling, apps of work systems, protective jackets & helmets, plastic wrapped on boxes, pedestrian lines (Kaizen)	Changes and improvements in company operations, such as doc. preparation, work efficiency, security, & goods storage	Improvements to document files, guest reception, tools & equipment, work control and safety
17	Adawia & Azizah (2020)	Automotive	Material importation	Kaizen	Process time for importing production materials	Kaizen influences the time frame for importing production materials. Processing time is reduced from 3.53 days to 1.33 days per shipment
18	Rinaldi et al. (2021)	Pharmacy	Inventory of goods in the spare parts warehouse	Creating work order forms, implementing SOP activities, and activating communication (PDCA)	Inventory stock	Reducing the difference (difference) between system and physical goods
19	Avief & Nursanti (2016)	Aviation	Overhaul maintenance of the Hawk Mk-209 fighter aircraft at the Indonesian Air Force	Continuous improvement, PDCA, CPM/PERT	Overhaul time	Hawk Mk-209 aircraft overhaul time savings from 14 months to 4.57 months (60%)
20	Sabella & Harindahyani (2019)	Cigarette	Operational finance division of PT Philip Morris Indonesia	Lean accounting, Six Sigma, 5S, QCC, training & coaching, flexible working hour	Working time, leaving work time, work-life balance	Decreased average working time and average return time from work

No	Author (Year)	Type of industry	Object of study	CI Activities (Tools)	Variables	Results
21	Rizqilah et al. (2019)	Cigarette	Dryer device on the RTC line of PT HM Sampoerna Tbk	Modification to remove steam heater and replace steam coil (Kaizen, PDCA)	Energy	Reducing energy use without negative impacts on machines, the environment, or product quality
22	Rahadian et al. (2015)	Sugar	NBH sugar factory boiler workstation	Provision of PPE by management and control CI (PDCA)	Work accident	Reducing the number of work accidents
23	Hidayat et al. (2015)	Cigarette	Production process	Visual Quality Index/VQI, FMEA, 5 Why, tree diagram	Quality ownership	Change in VQI value from above 200 to 193, indicates QC in the production process or an increase in quality ownership in employee work behavior
24	Kurniawan (2019)	Cigarette	PT Cakra Guna Cipta	Addition of tools to spread the tobacco on the mori cloth, increasing operator training time (DMAIC, PDCA)	Product defect	DPMO decreased from 9823.7 (sigma level 3.84) to 4403.2 (sigma level 4.12)
25	Hartono & Fatkhurozi (2021)	Automotive	The manufacture of LED winker lamp at PT Mitsuba Indonesia	Include a set of regulators to address the drop error issue & adjust the locking mechanism on both the lower and upper heater jigs, focusing on the six big losses.	Loss time, productivity	Loss time decreased in July to 4.86%, accompanied by a productivity increase of 7.50%. Decrease in loss time in August 4.70%, coupled with a productivity increase of 7.90%
26	Manual & Palit (2022)	Cigarette	Divisi HRD	Preparation of new training module 7 QC Tools & PM	Module subject matter	Score for the old module 2.08, for the new module 3.50
27	Hassan et al. (2021)	Oil & Gas	Employees of PT Pertamina (Persero) Integrated Terminal Bitung	Multiple linear regression analysis	Continuous improvement, training, employee productivity	The concurrent implementation of CI and training exhibits a notable and positive impact on the productivity of employees.
28	Auritz & Rachmarwi (2020)	Waste water treatment equipment	PT Daiki Axis Indonesia	Multiple linear regression analysis	SCM, kaizen, production process	SCM and kaizen have a positive and significant effect on the production process. SCM and kaizen contributed 53%
29	Rakhmawati & Akbar (2022)	Automotive	PT Namicoh Indonesia Component	Descriptive statistics analysis	Kaizen culture, employee engagement, employee performance	Kaizen culture exerts a positive & significant impact on employee performance. Employee engagement demonstrates a positive & significant influence on employee performance.
30	Pelani et al. (2023)	Piston	PT NT Piston Ring Indonesia	Kaizen, 5R	Kaizen, 5R	Kaizen and 5S influence employee performance, making it easier for employees in the production process.
31	Sejati et al. (2019)	Elektronik	Manual Insert Departement PT VS Technology Indonesia	Moderated Regression Analysis (MRA)	Kaizen culture, rewards, employee performance	Kaizen culture influences employee performance. The reward moderating variable significantly strengthens the impact of a kaizen culture on employee performance.
32	Adyatama & Handayani (2018)	Automotive	The painting facility at plant 1 in Karawang operated by PT TMMIN	Determination of work standards (Kaizen, PDCA, seven tools quality, five whys)	Dust seed reject results, 2 K touch-up repair process	The instances of dust seed reject in the front door opening area decreased by 35.29%, and there was a 53,6% reduction in the 2K touch-up repair process.

No	Author (Year)	Type of industry	Object of study	CI Activities (Tools)	Variables	Results
33	Handayani & Sukardi (2020)	Musical instrument	Production department of PT Yamaha Music Manufacturing Indonesia	Linear regression	Kaizen culture, Horenso/communication culture, employee productivity	The presence of a Kaizen culture and Horenso culture positively and significantly influences employee productivity.
34	Yahya et al. (2020)	Agro-industry, oil & gas	Managers and employees in the agricultural, oil, and gas industries	SEM	Competitiveness level, alliances intensity, CI effort, financial performance	A positive and significant correlation exists between the degree of forming alliances and financial performance.
35	Indrawati & Ridwansyah (2015)	Mining	Iron ore manufacturing process	Dust collector chute redesign, weighing SOP, BC 05 erection, vibrometer & installation, nitrogen plant installation (Lean Six Sigma)	Process capability, waste, efficiency, product quality	Increased production efficiency, reduced waste, increased product quality, increased process capability 2.97 sigma

Thirteen articles related to implementing CI in the service industry were identified and displayed in Table 2.

Table 2 Implementation of CI in the service industry

No	Author (Year)	Type of industry	Object of study	CI Activities (Tools)	Variables	Results
1	Sahri & Novita (2019)	e-commerce	Employees, drivers and customers of Go-Jek Indonesia (PT Aplikasi Karya Anak Bangsa)	Implementation of Kaizen costing (PLS)	Muda, Mura, Muri, Seiri, Seiton, Seiso, Sheiketsu, Shitsuke, competitive advantage	Variables such as Muri, Seiso, and Shitsuke play a crucial role in influencing competitive advantage.
2	Nurfikri et al. (2020)	Automotive Dealer	The express maintenance work system at PT Setiajaya Mobilindo Cibubur	Improvement of periodic service process SOP (Kaizen, fishbone diagram, check sheet, PDCA, 5W1H, PROMODEL)	Service process time at Express Maintenance, standard time	Improved standard service time from 40 minutes to 30.5 minutes (increased by 33%), and capacity increased by five units per day.
3	Permana et al. (2021)	Automotive Dealer	Auto 2000 Sutoyo Malang after-sales department employee	Employing the Smart PLS software to utilize SEM based on components in Partial Least Squares (PLS)	Kaizen Culture, Internal Motivation, Work Discipline, Performance	Kaizen culture positively & significantly affects performance, discipline, & internal motivation, which is reinforced by the effects of internal motivation & work discipline.
4	Soelton & Rahmi (2016)	Banking	PT BCA Finance Customer Service Department	SPSS	Kaizen, work discipline, performance	Kaizen does not exert a substantial influence on employee performance, whereas work discipline significantly impacts employee performance.
5	Jimantoro (2016)	Automotive Dealer	PT. Istana Mobil Surabaya Indah (HSC).	3M concept, 5S, PDCA concept, and four Kaizen Standards.	Work culture	Kaizen culture has been implemented since the company was established.
6	Chairunnisa (2019)	Hospitality	Budget Hotel, Makasar city	Kaizen 5S, Multiple linear regression	Kaizen, Customer satisfaction, 5S	The variables Seiri, Seiton, Seiso, and Seiketsu significantly affect customer satisfaction.
7	Sulistiyani (2023)	Banking	BCA head office employees	Kaizen PDCA	Employee performance	Improving employee performance, including increasing the quality and quantity of work.

No	Author (Year)	Type of industry	Object of study	CI Activities (Tools)	Variables	Results
8	Ramadhan et al. (2021)	Automotive Dealer	AHASS 9648 maintenance & repair division PT Cahaya Sakti Motor Surakarta.	Kaizen (SPSS)	Stagnation time, process time, layout, SOP, kaizen, employee loyalty	Kaizen reduces the lead time of external periodic service units (SBE)
9	Widodo & Fardiansyah (2019)	Transportation	Handover activities at PT ABC Warehouse	Creating new workflow work instructions, monitoring weekly transport planning, PDCA	Leadtime, inventory amount	Reducing handover process lead time from 1,161 minutes to 265 minutes (77%), reducing the amount of inventory in the staging area
10	Putri (2020)	Construction	Building and road construction projects	PDCA	Project planning, project implementation, standardization of work, evaluation of results	PDCA sharpened in specific planning aspects, detailed standardization, better documentation, and evaluation that improve the production process to increase productivity.
11	Yulianti & Andriani (2021)	Health	BPJS patient of Hospital pharmacy installations	Layout reconfiguration, monitoring & evaluation systems, enhancing services through IT-based solutions (Lean Kaizen).	Lead time	Lead time reduction from 135.31 to 9.11 minutes in scenario 1 & 7.49 minutes in scenario 2. Concoction lead time decreased from 185.17 to 31.09 minutes in scenario 1 & 29.15 minutes in scenario 2.
12	Theresia et al. (2022)	Health	Fatmawati Hospital and Premier Bintaro Hospital	PLS-SEM	Kaizen, employee performance, service quality	The application of kaizen has an impact on enhancing overall work and the quality of hospital services, mediated by the employee performance.
13	Debby et al (2010)	Construction	Quality & project manager, field engineer in Manado & JKT	Descriptive statistics	Effectiveness, efficiency	Continuous improvement refers to construction companies' efforts to improve the effectiveness & efficiency of their Quality Management System

Comparison of CI studies in the Indonesian manufacturing and service industry

Based on Table 1 and Table 2, the types of industry in the empirical research in the Indonesian manufacturing and service industry are shown in Fig. 2.

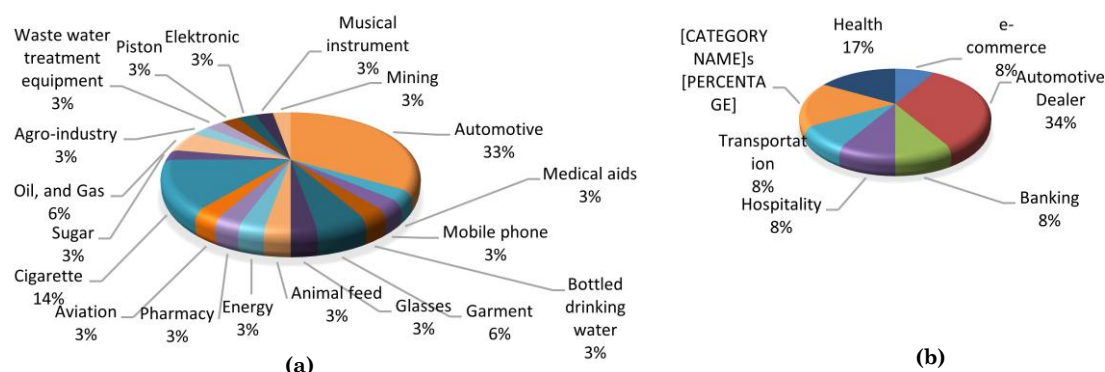


Fig. 2 Types of manufacturing industry (a) and service industry (b) in the literature

Most of the literature implementing CI in the Indonesian manufacturing industry are studies on the automotive industry (33%), especially vehicle spare part manufacturers, followed by the cigarette

(14%) and oil and gas industries (6%). While the majority of literature pertaining to the implementation of continuous improvement within the service sector in Indonesia focuses on automotive dealers (34%), constructions (17%), and health industries (17%) following as the next prominent areas of study.

The results of the studies in the CI implementation in manufacturing and service industry are displayed in Fig. 3.

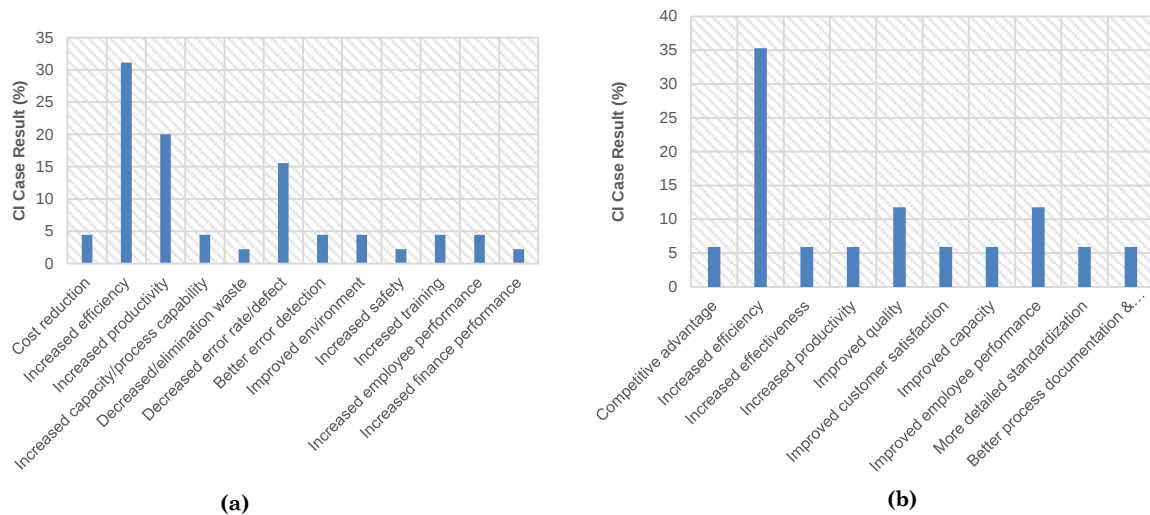


Fig. 3 Results of CI implementation in the studies of manufacturing industry (a) and service industry (b)

The highest case amount in the research on manufacturing industries show result in increased efficiency (31%), followed by an increase in productivity (9%) and a reduction in error or defect rates (7%). On the other hand, most of the literature studies on service industries show increased efficiency (35%), improved quality (12%), and employee performance (12%).

CI is carried out through an ongoing process and provides improvement results in the work system. CI is critical in the manufacturing industry because it is central to optimizing production processes, improving product quality, and ensuring company sustainability and competitiveness.

The objective values that can be taken from executing CI in the manufacturing industry are:

1. Increased Production Efficiency

CI allows identification and CI of production processes. By streamlining workflows and reducing waste, manufacturing companies can increase operational efficiency, producing more product units in less time.

2. Product Quality Optimization

The essence of continuous improvement is seen in its ability to improve product quality consistently. By identifying and addressing defects or nonconformities in the production process, companies can produce better products and meet higher quality standards.

3. Reduction of Production Costs

Companies can identify ways to reduce production costs by focusing on CI. This involves efficient use of raw materials, labor, and other resources, reducing operational costs and increasing profitability.

4. Improved Time-to-Market Speed

CI allows manufacturing companies to respond to the market more quickly. By minimizing production or cycle time and optimizing the product development process, a company can bring new products or product changes to market faster than its competitors.

5. Innovation Culture

Improvements made require innovation that involves employees. Therefore, CI creates a culture of innovation within the company. Employees will be accustomed to providing innovative ideas for products, processes, and technology in the process of carrying out improvement processes.

6. Increased Employee Engagement

Involving employees in CI helps increase their contribution with innovative ideas and commitment

to achieving company goals.

7. Sustainability and Competitiveness

Sustaining competitiveness in the global market requires manufacturing companies to prioritize CI. Companies that continually improve can stay relevant, competitive, and thrive amidst market and technological changes.

Implementing CI in the manufacturing sector enhances operational efficiency and establishes a robust basis for long-term growth and corporate sustainability. CI initiatives are not just a strategy but have become necessary to remain competitive in the dynamic manufacturing world. The objective values obtained in the research more or less agree with Singh & Singh (2015). Singh & Singh (2015) carried out a worldwide investigation of manufacturing organizations, highlighting essential elements for the long-term viability of CI programs. They emphasized the significance of managerial dedication, the encouragement of teamwork, and acknowledgment of employee contributions as pivotal factors in ensuring the sustainability of CI initiatives. McLean et al. (2015) stated that to increase success in implementing CI initiatives in manufacturing environments, it is essential to pay attention to factors such as organizational culture and environment, senior management commitment, and better implementation guidelines. The current CI implementation guidelines are still not complete and user-friendly enough in a practical setting, and one of the factors that often cause the implementation of CI initiatives to fail is a lack of senior management commitment, such as management attention shifting away from the initiative, strategic priorities that focus on other things, poor management support, and insufficient engagement.

In the service sector, CI has an important role. Several things can be observed as to why CI is so crucial in the service industry. The objective values that can be drawn are essentially:

1. Improved Service Quality

CI allows service providers to improve the quality of their services continuously. Service companies can identify and address weaknesses by continually evaluating business processes and practices, increasing customer satisfaction. The service industry is also often closely related to changing customer needs and preferences. By implementing CI, service companies can become more responsive to changing customer needs, providing services that better meet their expectations and gain customer satisfaction.

2. Operational Efficiency

Implementing CI can help service companies improve their operational efficiency. By identifying and continuously improving business processes, companies can reduce waste of time and resources, increase productivity, and optimize operating costs.

3. Service Innovation

CI encourages a culture of innovation in service provision. Service companies that continuously implement improvements can create innovations in new services or significant enhancements to existing services.

4. Effectiveness of quality management system

CI will bring the effectiveness of a quality management system that engages employees and the environment. Better standardization, documentation, and evaluation of the system will have a good impact on employee performance.

5. Competitive Advantage

In a competitive business environment, service companies that can adapt and improve themselves continuously will have a competitive advantage. CI allows companies to manage capacity and remain relevant and competitive. Customers tend to choose service providers who offer quality and innovative services. CI helps build a company's reputation as a service provider that strives to be the best and increases its attractiveness in the market. Overall, CI is a necessary strategy for service companies. Service companies can continually seek to improve quality, efficiency, and innovation to build strong customer relationships, create competitive advantages, and achieve long-term success in dynamic markets.

Obstacles and challenges in implementing CI in Indonesia

Implementing CI in Indonesia faces challenges covering culture, management, and business conditions. An organizational culture that is resistant to change can be a barrier. At the same time, a lack of understanding of CI and management support can hinder the implementation process. Economic factors, such as limited resources, can also affect a company's ability to adopt CI

effectively. A lack of CI education and low levels of employee engagement are also challenges that must be addressed. Uncertain regulations and pressure for quick results can also interfere with CI efforts. Therefore, companies need to focus efforts on education, building a culture that supports improvement, and ensuring full support from the leadership level to implement CI successfully and effectively.

4. Conclusion

The conclusion drawn from this research is the implementation of continuous improvement through a continuous process, which results in improved work systems in the industry. The objective value on implementing CI in the manufacturing industries are increased production efficiency, product quality optimization, reduction of production costs, improved time-to-market speed, innovation culture, increased employee engagement, and sustainability and competitiveness. Implementing CI in the service industry have objective value on improved service quality, operational efficiency, service innovation, effectiveness of quality management system, and competitive advantage. Studies on the CI practices across supply chain and the impact of CI implementation on financial performance are suggested for future research.

Acknowledgments

We would like to express our sincere gratitude to Universitas Buana Perjuangan Karawang for their support and resources provided for this research. Special thanks go to Aji Sukma Muhammad and Mochamad Rafli for the help in collecting data throughout the study.

References

- Abdullah, H. (2013). Penerapan metode Kaizen untuk peningkatan mutu produk komponen otomotif. *Jurnal Teknologi Bahan dan Barang Teknik*, 3(1), 31-40. <http://dx.doi.org/10.37209/jtbbt.v3i1.34>
- Adawia, P. R., & Azizah, A. (2020). Analisis penerapan metode Kaizen terhadap importasi material produksi pada perusahaan manufaktur. *Target: Jurnal Manajemen Bisnis*, 2(1), 56-70. <https://doi.org/10.30812/target.v2i1.700>
- Adyatama, A., & Handayani, N. U. (2018). Perbaikan kualitas menggunakan prinsip Kaizen dan 5 why analysis: studi kasus pada painting shop Karawang Plant 1, PT Toyota Motor Manufacturing Indonesia. *J@ ti Undip: Jurnal Teknik Industri*, 13(3), 169-176. <https://doi.org/10.14710/jati.13.3.169-176>
- Agustina, T., Candrarin, G., & Manan, A. (2017). MSMEs Challenges in Phenomena of Disruption Era. *Journal of Economics and Sustainable Development*, 8(21), 116-121. <https://www.iiste.org/Journals/index.php/JEDS/article/view/39774>
- Arief, M. Y., Berry, Y., Munawar, A., Usman, I., & Nugraha, N. A. (2020). Ensuring competitive and alliance formation intensity for Continuous Improvement in manufacturing sector of Indonesia: A better financial performance perspective. *International Journal of Innovation Creativity and Change*, 11(6), 553-571. <https://www.ijicc.net/index.php/ijicc-editions/2020/157-vol-11-iss-6>
- Arif, M. S., Putri, C. F., & Tjahjono, N. (2018). Peningkatan grade kain sarung dengan mengurangi cacat menggunakan metode Kaizen dan siklus PDCA pada PT. X. *Widya Teknika*, 26(2). <http://dx.doi.org/10.31328/jwt.v26i2.796>
- Auritz, A., & Rachmarwi, W. (2020). Pengaruh penerapan Supply Chain Management dan Kaizen terhadap proses produksi Di PT Daiki Axis Indonesia. *Jurnal Manajemen Bisnis Krisnadwipayana*, 8(3), 46-57. <http://dx.doi.org/10.35137/jmbk.v8i3.474>
- Avie, R. M. S., & Nursanti, E. (2016). Aplikasi Continuous Improvement terhadap pemeliharaan overhaul pesawat tempur Hawk Mk-209 TNI AU. *Prosiding SENIATI*, 2(1), C-108. <https://doi.org/10.36040/seniati.vi0.2123>
- Balol, W. A. (2022). Peningkatkan produktivitas dan efisiensi parts maintenance dengan metode Kaizen. *Jurnal ilmu-ilmu Teknik Sistem*, 18(3), 43-50. <https://doi.org/10.37303/sistem.v18i3.233>
- Bhuiyan, N., & Baghel, A. (2005). An overview of continuous improvement: from the past to the present. *Management decision*, 43(5), 761-771. <http://dx.doi.org/10.1108/00251740510597761>

- Chairunnissa, D. P. (2019). Pengaruh penerapan strategi Kaizen terhadap tingkat kepuasan tamu pada hotel budget di Kota Makassar (Doctoral dissertation). <https://e-jurnal.stienobel-indonesia.ac.id/index.php/akmen>
- Debby, W., Vaughan, C., & Bambang, T. (2010). *An examination of factors influencing effective and Continuous Improvement of Indonesia contractors' quality management systems*. Proceedings of 2010 International Conference on Construction & Real Estate Management, Queensland, 1, 318-322. <https://eprints.qut.edu.au/39693/>
- Du, J., & Chen, Z. (2018). Applying Organizational Ambidexterity in strategic management under a "VUCA" environment: Evidence from high tech companies in China. *International Journal of Innovation Studies*, 2(1), 42-52. <https://doi.org/10.1016/j.ijis.2018.03.003>
- Erer, B. (2024). A bibliometric analysis of the world of VUCA in business and management literature. *Business Economics and Management Research Journal*, 7(1), 1-13. <https://doi.org/10.58308/bemarej.1415889>
- Fatkhurrohman, A., & Subawa, S. (2016). Penerapan Kaizen dalam meningkatkan efisiensi dan kualitas produk pada bagian banbury PT Bridgestone Tire Indonesia. *Jurnal Administrasi Kantor*, 4(1), 14-31. <https://ejournal-binainsani.ac.id/index.php/JAK/article/view/12>
- Fryer, K. J., Antony, J., & Douglas, A. (2007). Critical success factors of Continuous Improvement in the public sector: a literature review and some key findings. *The TQM magazine*, 19(5), 497-517. <https://doi.org/10.1108/09544780710817900>
- Gonzalez Aleu, F., & Van Aken, E. M. (2016). Systematic literature review of critical success factors for Continuous Improvement projects. *International Journal of Lean Six Sigma*, 7(3), 214-232. <https://doi.org/10.1108/IJLSS-06-2015-0025>
- Handayani, W. & Sukardi. (2020). Pengaruh budaya Kaizen dan budaya Horenso terhadap produktivitas kerja karyawan Di PT Yamaha Music Indonesia Manufacturing Asia Cikarang Barat. *Mix: Jurnal Ilmiah Manajemen*, 10(2), 210-223. <https://dx.doi.org/10.22441/mix.2020.v10i2.005>
- Hartono, H., & Fatkhurozi, F. (2021). Penerapan Kaizen untuk mengurangi loss time dalam peningkatan produktivitas mesin infrared welding (studi kasus PT Mitsuba Indonesia). *Journal Industrial Manufacturing*, 6(1), 01-18. <http://dx.doi.org/10.31000/jim.v6i1.4114>
- Hassan, D. N., Kojo, C., & Trang, I. (2021). Pengaruh penerapan Continuous Improvement program (Cip) dan training terhadap produktivitas kerja karyawan pada PT Pertamina (Persero) Integrated Terminal Bitung. *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis dan Akuntansi*, 9(2), 211-219. <https://doi.org/10.35794/emba.v9i2.33370>
- Hidayat, S. S., Handoko, F., & Laksmana, D. I. (2017). Peningkatan quality ownership untuk menjaga kualitas produk di PT XYZ dengan metode Continuous Improvement. *Jurnal Teknologi Dan Manajemen Industri*, 3(2), 19-24. <https://doi.org/10.36040/jtmi.v3i2.179>
- Hudori, H. (2017). Penerapan Kaizen untuk mempermudah pengambilan barang pada gudang finished goods. *Industrial Engineering Journal*, 6(2), 4-9. <https://doi.org/10.53912/iejm.v6i2.159>
- Indrawati, S., & Ridwansyah, M. (2015). Manufacturing Continuous improvement using LeanSix Sigma: an iron ores industry case application. *Procedia Manufacturing*, 4, 528-534. <https://doi.org/10.1016/j.promfg.2015.11.072>
- Iwao, S. (2017). Revisiting the existing notion of continuous improvement (Kaizen): literature review and field research of Toyota from a perspective of innovation. *Evolutionary and Institutional Economics Review*, 14(1), 29-59. <https://doi.org/10.1007/s40844-017-0067-4>
- Jimantoro, R. (2016). Analisis penerapan budaya kerja Kaizen pada PT Istana Mobil Surabaya Indah. *Agora*, 4(2), 127-132. <https://media.neliti.com/media/publications/53944-ID-analisis-penerapan-budaya-kerja-kaizen-p.pdf>
- Kurnianingtias, M., Heryadi, A. R., Purwanningrum, D., Astrini, G. Y., Khairunnisa, H., & Sari, L. N. I. (2021). Analisis penyelesaian permasalahan bottleneck pada lini produksi di pabrik tekstil dengan metode Kaizen. *Jurnal Rekavasi*, 9(2), 23-30. <https://ejournal.akprind.ac.id/index.php/rekavasi/article/view/3683>

- Kusuma, R. D. P., & Hasibuan, S. (2022). Implementation of the Lean Service to Increase Productivity in The Procurement of Goods and Services of MRO Companies. In *Proceedings of the International Conference on Industrial Engineering and Operations Management Nsukka, Nigeria* (pp. 5-7).
- Manuel, Y., & Palit, H. C. (2022). Penyusunan modul training 7 QC Tools dan project management untuk mendukung program Continuous Improvement di PT. X. *Jurnal Titra*, 10(2), 329-336. <https://publication.petra.ac.id/index.php/teknik-industri/article/view/12887>
- McLean, R. S., Antony, J., & Dahlggaard, J. J. (2017). Failure of Continuous Improvement initiatives in manufacturing environments: a systematic review of the evidence. *Total Quality Management & Business Excellence*, 28(3-4), 219-237. <https://doi.org/10.1080/14783363.2015.1063414>
- Naqvi, F., & Naqvi, A. (2023). A Study of what makes Organizations Successful in a VUCA World. *Migration Letters*, 20(S4), 143-158. <https://doi.org/10.59670/ml.v20iS4.3840>
- Ngadono, T. S. (2018). Penerapan Kaizen pada line trimming untuk meningkatkan jumlah produksi kaca pengaman. *Jurnal Operations Excellence: Journal of Applied Industrial Engineering*, 10(2), 197-208. <https://publikasi.mercubuana.ac.id/index.php/oe/article/view/3917>
- Nindiani, A., Suparno, O., Machfud & Anggraeni, E. (2022, July). The challenge of bamboo craft industry in the VUCA era. In *IOP Conference Series: Earth and Environmental Science*, IOP Publishing, 1063(1), 1-13. <https://doi.org/10.1088/1755-1315/1063/1/012046>
- Nurfikri, L., Nurhidayat, A. E., & Suharmanto, P. (2020). Perbaikan sistem kerja express maintenance berdasarkan Kaizen dan simulasi Promodel pada PT Setiajaya Mobilindo Cibubur. *Operational Excellence*, 12(3), 364-375. <https://dx.doi.org/10.22441/oe.2020.v12.i3.009>
- Pelani, A. H., Suherman, E., & Anggela, F. P. (2023). Penerapan budaya Kaizen dan 5R terhadap perbaikan kinerja karyawan PT NT Piston Ring Indonesia. *Management Studies and Entrepreneurship Journal (MSEJ)*, 4(5), 5803-5810. <https://doi.org/10.37385/msej.v4i5.3092>
- Permana, H. R., Hadiyati, E., & Mulyono, S. (2021). Pengaruh budaya Kaizen terhadap kinerja karyawan melalui motivasi internal dan disiplin kerja. *Jurnal Sosial dan Teknologi*, 1(4), 234-253. <https://doi.org/10.59188/jurnalsostech.v1i4.44>
- Prashar, A., & Antony, J. (2018). Towards Continuous Improvement (CI) in professional service delivery: a systematic literature review. *Total Quality Management & Business Excellence*, 1-29. <https://doi.org/10.1080/14783363.2018.1438842>
- Putri, K. N. R. (2020). Kajian Pelaksanaan perbaikan berkelanjutan filosofi Kaizen pada proyek konstruksi di Indonesia. *Media Komunikasi Teknik Sipil*, 26(2), 128-139. <https://doi.org/10.14710/mkts.v26i2.23069>
- Rahadian, D., Nursanti, E., & Gustopo, D. (2015). Perencanaan kontrol kecelakaan kerja menuju zero accident pada industri pabrik gula NBH. *Jurnal Teknologi dan Manajemen Industri*, 1(2), 17-21. <https://ejournal.itn.ac.id/index.php/jtmi/article/view/150>
- Rakhmawati, E., and Akbar, M. (2022). Pengaruh budaya Kaizen dan employee engagement terhadap kinerja karyawan pada PT Namicoh Indonesia Component di Cikarang. *JAMBIS: Jurnal Administrasi Bisnis*, 2(2), 219-235. <https://doi.org/10.31334/jambis.v2i2.2498>
- Ramadhan, M., Purnomo, H., & Oktyajati, N. (2021). Analisis penerapan Kaizen pada Divisi Perawatan dan Perbaikan Kendaraan di AHASS 9648 PT. Cahaya Sakti Motor Surakarta untuk meningkatkan produktivitas karyawan. *Go-Integratif: Jurnal Teknik Sistem dan Industri*, 2(01), 60-69. <https://doi.org/10.35261/gijtsi.v2i01.5208>
- Rinaldi, D., Rismayanti, Z., Ramdani, W. R., & Fauzi, M. (2021). Analisis selisih persediaan barang menggunakan metode PDCA di PT XYZ. *Jurnal Taguchi: Jurnal Ilmiah Teknik dan Manajemen Industri*, 1(2), 145-153. <https://doi.org/10.46306/tgc.v1i2.13>
- Rinto, R. K. (2010). Analisis implementasi kaizen project untuk meningkatkan kapasitas produksi body caliper R2 di machining line body caliper di PT TDW. *Industrial and System Engineering Assessment Journal (INASEA)*, 11(2), 115-127. <https://garuda.kemdikbud.go.id/journal/view/5984?page=4>

- Rizqilah, C., Silviana, S., & Hardianto, A. (2019, November). Penerapan konsep Continuous Improvement untuk mengoptimalkan penggunaan energi pada mesin pengering (dryer device) DI RTC Line PT. HM Sampoerna TBK. In *Conference on Innovation and Application of Science and Technology (CIASTECH)*, 2(1), 225-230. <https://core.ac.uk/works/74135335/?t=302e328c28ba21cfc3b3dcf2163684b7-74135335>
- Sabella, F., & Harindahyani, S. (2019). Identifikasi penerapan Continuous Improvement untuk mendukung work life balance pada Divisi Keuangan Operasional PT HM Sampoerna TBK. *CALYPTRA*, 7(2), 910-922. <https://journal.ubaya.ac.id/index.php/jimus/article/view/3274>
- Sahri, N. A., & Novita, N. (2019). Kaizen costing sebagai perbaikan berkelanjutan untuk meningkatkan keunggulan bersaing pada e-commerce. *Jurnal Kajian Akuntansi*, 3(1), 18-43. <http://jurnal.unswagati.ac.id/index.php/jka>
- Sanchez, L., & Blanco, B. (2014). Three decades of continuous improvement. *Total Quality Management & Business Excellence*, 25(9-10), 986-1001. <https://doi.org/10.1080/14783363.2013.856547>
- Sejati, A. P., Kuswinarno, M., & Pranjoto, G. H. (2019). Pengaruh budaya Kaizen terhadap kinerja karyawan dengan reward sebagai variabel moderasi pada PT. VS Technology Indonesia. *Eco-Entrepreneur*, 5(1), 1-16. <https://doi.org/10.21107/ee.v5i1.5434>
- Setiawan, R., & Yosana, R. B. (2017). Perbaikan efisiensi gudang dengan metode lean dan Kaizen (studi: gudang PT Sarana Kencana Mulya Divisi Mobile Phone Tangerang Banten). *Penelitian dan Aplikasi Sistem dan Teknik Industri*, 11(3), 315-322. <https://publikasi.mercubuana.ac.id/index.php/pasti/>
- Singh, J., & Singh, H. (2015). Continuous improvement philosophy—literature review and directions. *Benchmarking: An International Journal*, 22(1), 75-119. <https://doi.org/10.1108/BIJ-06-2012-0038>
- Soesilo, R. (2017). Implementasi Kaizen dan 5S pada pengeringan produk di proses plating. *Jurnal Teknik Industri*, 18(2), 121-126. <https://doi.org/10.22219/JTIUMM.Vol18.No2.121-126>
- Sofyan, A. (2018). Analisis penerapan budaya kerja Kaizen terhadap tingkat produktivitas karyawan PT Supravis Rama Optik, Mfg. *Value: Journal of Management and Business*, 3(1), 409-425. <https://doi.org/10.35706/value.v3i1.1538>
- Sulistiyani, R. (2023). Analisis penerapan dan pengaruh Kaizen PDCA terhadap kinerja karyawan Bank Central Asia (Studi kasus pada kantor pusat PT BCA Tbk). *Jurnal Manajemen Bisnis dan Kewirausahaan*, 7(3), 676-685. <http://dx.doi.org/10.24912/jmbk.v7i3.23880>
- Sulistyo, A. B. S., & Sofiyullo, F. (2022). Analisis perbedaan pengukuran berat batubara pada sistem belt weigher di area jetty PT Merak Energi Indonesia dengan menggunakan metode Kaizen. *Jurnal Rekayasa Sistem Industri*, 8(1), 22-28.
- Soelton, M., & Rahmi, R. A. (2016). pengaruh penerapan Kaizen dan disiplin kerja terhadap kinerja karyawan di Departemen Customer Service PT BCA Finance. *Jurnal Ilmiah Manajemen Dan Bisnis*, 2(3), 864-881. <https://doi.org/10.33884/jrsi.v8i1.6387>
- Tama, M. I., Syafi'i, A. I., & Rosyidiin, A. F. (2023). Continuous Improvement mesin extruder dengan menerapkan metode (OEE) Overall Equipment Effectiveness pada industri pakan ternak. *Metrotech (Journal of Mechanical and Electrical Technology)*, 2(2), 50-55. <https://doi.org/10.33379/metrotech.v2i2.2532>
- Theresia, L., Sudri, N. M., Mauliddina, Y., & Rahmasari, B. (2022). *Relationship between kaizen, employees work, and quality of service A PLS-SEM approach*. In *Proceedings of the 3rd Asia Pacific International Conference on Industrial Engineering and Operations Management*, September 13-15, 707-718. <https://ieomsociety.org/proceedings/2022malaysia/143.pdf>
- Tri, D., Rakhmanita, A., & Anggarini. (2019). Implementasi Kaizen dalam meningkatkan kinerja (studi kasus perusahaan manufaktur di Tangerang). *Jurnal Ecodemica* 3(2). 198-206. <http://ejournal.bsi.ac.id/ejournal/index.php/ecodemica>
- Widodo, T., & Fardiansyah, I. (2019). Implementasi Continuous Improvement dengan menggunakan metode PDCA pada proses handover di warehouse PT. ABC. *Journal Industrial Manufacturing*, 4(1), 37-44. <http://dx.doi.org/10.31000/jim.v4i1.1243>

- Yohendry, Y., Hapsara, O., & Surono, Y. (2017). Implementasi Kaizen terhadap efisiensi biaya produksi PT. Dasa Anugerah Sejati Asian Agri Jambi. *J-MAS (Jurnal Manajemen Dan Sains)*, 2(2), 196-205. <http://dx.doi.org/10.33087/jmas.v2i2.30>
- Yuliati, V., & Andriani, H. (2021). Implementation of lean kaizen to reduce waiting time for the Indonesian health social security agency prescription services in hospital pharmacy installation. *Open Access Macedonian Journal of Medical Sciences*, 9(E), 1495-1503. <https://doi.org/10.3889/oamjms.2021.7610>
- Zahra, L., & Purwanggono, B. (2018). Meningkatkan produktivitas report dengan menetapkan standar untuk mengurangi lead time menggunakan konsep Kaizen (Studi Kasus: PT. Toyota Motor Manufacturing Indonesia). *Industrial Engineering Online Journal*, 7(3), 1-6. <https://ejournal3.undip.ac.id/index.php/ieoj/article/view/22439>