



## Kaizen Method Implementation in Industries: Literature Review and Research Issues

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### A B S T R A C T

A business philosophy in a corporate organization that involves all elements from the leadership level to workers to contribute to the processes that support an organizational system, such as work and time efficiency, work environment and safety, waste management, production processes and other processes. Kaizen has been widely accepted by various types of industries, both manufacturing and services, in response to these requirements, because kaizen itself can eliminate waste without additional resource requirements. This research aims to find out and provide information about Kaizen implementation from various types of industries. This paper uses the literature review method of research papers that generally apply kaizen. A total of 52 research papers have been reviewed as research contributions, type of research methodology adopted, techniques and tools used, type of industry, and year of publication. The results obtained were published in many research about kaizen at 2012-2019, Kaizen approach can solve kind of problems such as quality, energy, lead time, performance, defect, safety system, preventive maintenance, efficiency & effectiveness. Improve the work system, widely applied in various industries such as: manufacturing, logistics, construction, SME, service, healthcare, pharmaceutical and processes for continuous improvement.

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### 1. INTRODUCTION

The rapid development of the manufacturing industry and the manufacturing of various corporate organizations are increasingly stringent in global competition. This is a challenge for each company to exist, increase growth, and increase productivity in accordance with each. So that requires

companies to find methods and implement an effective strategy in order to maintain and even improve their business in increase movement in a dynamic market scenario. To overcome and be profitable, one type of methods and strategies that are effective and must be implemented by a company organization is to

improve the quality, systems and management of the company's organization. The company needs quality human resources as a supporting means for the success of a company organization. The ability of human resources or so-called employee productivity can be optimized if the employee has the ability and good quality in carrying out the company's operational system activities, and especially company leaders who are able to provide direction and apply work culture with a continuous improvement approach or often called kaizen culture.

The work culture of kaizen comes from Japanese work culture. Hence, it can be defined as being very simple namely doing something better or continuous improvement. Focus on results is not a key feature of kaizen management, but rather tends to pay attention

to the process and use quality circles to support continuous improvement. This paper is organized as: Section 2 presents various definitions of kaizen. Section 3 presents an overview of 52 research papers on Kaizen. Section 4 presents descriptive analysis of each paper's review. And the last in section 6 presents conclusions and the future research issues.

## 2. RESEARCH METHODS

The method used to review literature papers, namely by collecting papers based on KAIZEN implementation in various types of industries. 52 papers were selected for review that consistently applied the stages in the KAIZEN method, which more than 50 papers are sufficient to represent the object of research. The Method Framework for this research is illustrated in Fig. 1.

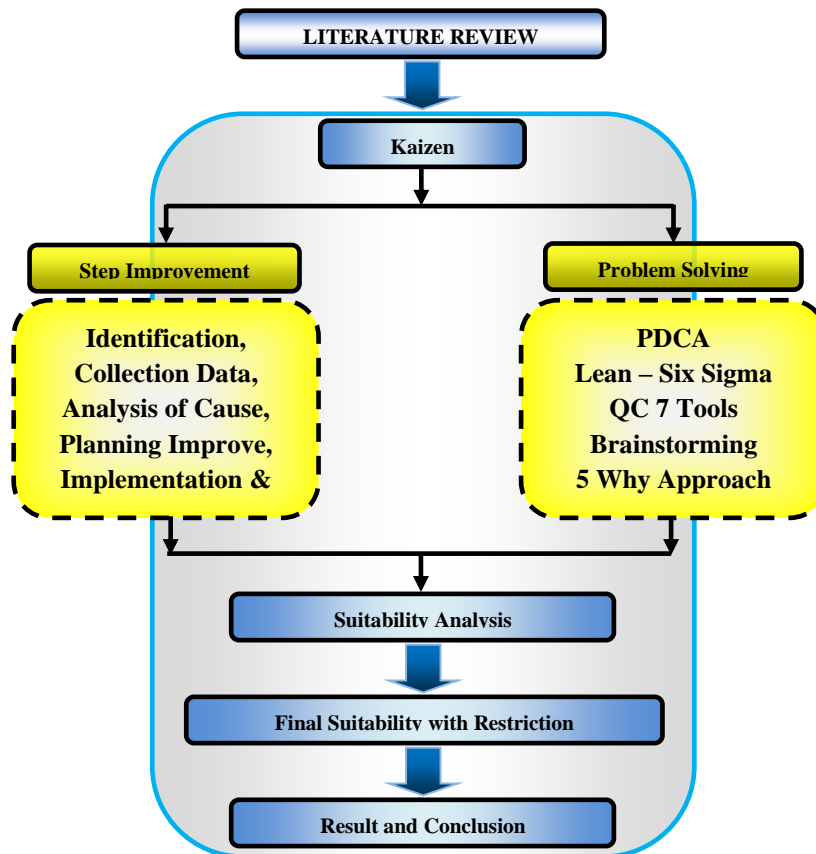


Fig. 1. Study framework

## 3. RESULT AND DISCUSSION

There are many limitations in the search for methods and tools used, limitation is the

availability of papers for writers. The author would like to explain that there are several papers reviewed that may not have anything in

common for this type of industry. Many papers are reviewed from cross references because they contain information needed.

For research on SME research objects, As a result of Kaizen implementation, there are 7 important factors have been identified as determinants of mindset, namely: support from senior management, training, environment, evaluation, motivation, mindset and involvement of all members in the organization (Nguyen, 2019). Lean-Kaizen implementation can provide better understanding and opportunities for individual industry players, especially SMEs in reducing rework, grace levels of inventory, increasing productivity and quality (Kumar, Dhingra, & Singh, 2018). From the results of the study, that improved decision models and provided a systematic approach which can evaluate functionality, technical requirements and enhancing implications as an integral process of decision making to improve performance, and understanding the interactions between stakeholders that can influence the update decision process (Feldman, Shah, Chapman, Pärn, & Edwards, 2017). From the results of the study showed that the implementation of kaizen was successful intervention and depends on the determination of the KPI.

Support from top management, availability of resources and time available for the process of implementing continuous improvement (McGovern, Small, & Hicks, 2017). The results of the study have a positive effect on reducing the cost of claims against guarantees, delivery duration, productivity and quality costs. an average of over 3 is obtained low standard deviation. Ranking differences were tested using the Mann-non-parametric method Whitney test method. There are significant differences  $\geq 0.3$  in rate of 95% (Timans, Antony, Ahaus, & Van Solingen, 2012). By implementing a program of continuous improvement, through PDCA steps, is an action to build system in a reflective manner against to learn methods management to achieve the objectives of the management strategy, as well as a balance between flexibility and attractive formalities especially for the SME sector (Melander, Löfving, Andersson, Elgh, & Thulin, 2016). The results

of this study, found that there is a strong relationship between organizational culture and readiness to implement LSS (with a significance value  $<0.05$  and a 95% confidence level) in SMEs engaged in manufacturing (Shokri, Waring, & Nabhani, 2016).

For research on the object of research are types of industries providing Financial services, The results show that after the implementation of the kaizen program in this case study, there was a significant increase in empowerment for 12 months, which has a positive relationship (Hirzel, Leyer, & Moormann, 2017). As results of Kaizen implementation, revealed that H1 could be accepted, that is, if the level of the hierarchy was higher, the higher it would be perceived lean level ( $F(4, 3619) = 52,419, p < 0.001$ ). If an organization engaged in financial services wants to implement lean in addition to specific tools and techniques for implementing lean systems, lean culture must be created for each employee (Leyer & Moormann, 2014).

For research on manufacturing industry objects, as a result of Kaizen implementation, that the characteristics of RFID have a significant impact in overcoming obstacles that are detected in operational, managerial and financial aspects. And these obstacles can affect lean implementation, such as commitment from top management, company culture, poor administration, lack of finances, uncontrolled inventory, unstable customer handling and high lead time (Rafique, Ab Rahman, Saibani, Arsad, & Saadat, 2016). Analysis results show, the implementation of kaizen is an important contribution to improving the work system and to measure the effectiveness of continuous improvement in a wood products company (Erdogan, 2017). from the results of a study of 16 organizations, which in some organizations reported the kaizen event program that was successfully implemented, in various problems faced by each organization to be carried out to improve management and operational systems (Glover, Liu, Farris, & van Aken, 2013). The results showed, there is a strategic alignment of the combination of methods between lean manufacturing methods with environmental and social sustainability. effective to obtain

and determine the ideal organizational profile indicators in implementing continuous improvement (Longoni, 2015). From the research results, through lean methods and modularization concepts to improve maintenance systems that are smarter in terms of planning, make operational processes systematic, reduce waste in the form of maintenance processes by 25%, and increase availability by 2% (Petersen, Madsen, & Bilberg, 2016).

As a result of research by creating a framework, namely improving employee performance in terms of machine operations a range of 80% to 90%, guaranteeing defect control in products that are handled by customers at 2 to 3% with 3 quality control stations, and turnover rates in the range of 5 to 10% (Burawat, 2016). The results of lean implementation show that the production system (process flow) has improved, by removing obstacles that cause operational losses, including: breakdown, loss of speed, small stops, start up reject, rework, and one significance value (4.677) in set up reject is higher than 1.96, H1 Path coefficient is 35% (Dadashnejad & Valmohammadi, 2018). Then a result of analysis and classification of 7 cases based on 3 research dimensions illustrated that, the effectiveness and efficiency of the lean-roll process (principle-based knowledge replication strategy) is obtained: negatively varies with the level of codification of lean knowledge, and positively differs from the level of contextual ambidexterity (Secchi & Camuffo, 2016).

For research from the type of higher education industry objects, Based on the results and evaluation of the adoption of the Plan-Do-Study-Act cycle for continuous improvement, this process identifies opportunities, growth, challenges, and innovation steps for continuous quality improvement in the curriculum (Ward, 2018). The result of this study, by improving the management system at university. Namely a significant cost savings of around 60,000 USD per year, increased efficiency, effectiveness and students and

faculty satisfaction (Duncan et al., 2015). The results revealed that, using a combination of methods namely ABC analysis of fuzzy weighting and U-control diagrams, was very effective to assist in the assessment system in the quality of learning processes at the university level for the long term (Carlucci, Renna, Izzo, & Schiuma, 2019).

As a result of science implementation and quality improvement, that the implementation of a program is largely responsible for the failure of the current program, to achieve the objectives, interventions are needed, and an approach by designing procedures for routines to ensure loyalty in the process of implementing quality improvement (Nordstrum, LeMahieu, & Berrena, 2017). Based on 22 assessment criteria, the linguistic scale was identified from interviews (semi-structured) by the staff committee, obtained types of wastage: repetitive work, communication errors, unnecessary bureaucracy, excessive number of academic units and information disclosures (Kazancoglu & Ozkan-Ozen, 2019).

For research on automotive industry research objects, as a result show that based on the application of individual e-business as well as the development stage of BPCM, there are implications and changes to resources in the case study "redefinition process", and "kaizen" as a transformation of an organization's management system (Bak, 2016). The results of research using VSM tools namely, an estimated 33% reduction in WIP and 45% reduction of defects and saves about 60,000 USD per year, and there is an increase in productivity for the workforce (Vinodh, 2012).

From the results of comparison, then each zone method requires less time to take ie reducing 55.85 seconds (22.38% = 193.712 seconds - 249.559 seconds), with VSM tools can be reduced to travel time, meaning that the total distance traveled is smaller than the current method (Purba, Mukhlisin, & Aisyah, 2018)

**Table 1.** Existing literature review of KAIZEN

Paper Identity	Research Object	Result
(Nguyen, 2019)	SMEs (Small & Medium-sized Enterprises)	There are 7 important factors of mindset: support from senior management, training, environment, evaluation, motivation
(Hirzel et al., 2017)	Financial Services Provider	There was a significant increase in empowerment for 12 months, which has a positive relationship
(Rafique et al., 2016)	Manufacturing Companies	A significant impact in overcoming obstacles that are detected in operational, managerial and financial aspects. And these obstacles can affect lean implementation.
(Kumar et al., 2018)	A Small & Medium-sized Enterprises (SME)	Provide better understanding and opportunities for individual industry players in reducing rework, grace levels of inventory, increasing productivity and quality
(Latour, 2017)	Department of a Healthcare Institution.	Reaps results in the form of: reduced cycle time of 19.04%; the number of actions also decreased by 49.82%; and substantially increased leadership routines.
(Bak, 2016)	European automotive multinational corporation.	There are implications and changes to resources in the case study "redefinition process", and "kaizen" as a transformation of an organization's management system.
(Ward, 2018)	Curriculum evaluation on Medical Education	Identifies opportunities, growth, challenges, and innovation steps for continuous quality improvement in the curriculum.
(Ahbabi & Alshawi, 2015)	Construction Industry	There are significant challenges and opportunities, namely in the Engineering, Architecture and Construction (AEC) sector, which helps to gradually improve performance.
(Maalouf & Gammelgaard, 2016)	Transport Logistic Public	That understanding the complexity lean management skills can be developed by lean managers on the condition that a concept of continuous improvement.
(Azhar & Choudhry, 2016)	Building project on construction	Made into a culture as national safety and discipline in daily application, which in turn can help improve the macro and micro safety climate.
(Feldman et al., 2017)	Small & Medium-sized (SME)systems Enterprises	That improved decision models and a systematic approach which can evaluate functionality, and understanding the interactions between stakeholders that can influence the update decision process.
(Shurrab & Hussain, 2018)	Construction Industry	Implementation of lean processes in eliminating waste, with a focus on the process of reducing waste 0.376 and Cronbach's 0.789
(Erdogan, 2017)	A wood products company	Improving the work system and to measure the effectiveness of continuous improvement in a wood products company.

Paper Identity	Research Object	Result
(Duncan et al., 2015)	Pharmacy Education	A significant cost savings of around \$ 60K per year, increased efficiency, effectiveness and students and faculty satisfaction.
(Sweis, Hiyassat, & Al-Hroub, 2016)	Construction Companies	Improving the construction management system and optimizing national development, with a focus on the process of reducing waste 6.86
(Carlucci et al., 2019)	Higher education (Italian public university)	Very effective to assist in the assessment system in the quality of learning processes at the university level for the long term.
(Glover et al., 2013)	Manufacturing companies	From the results of a study of 16 organizations, in various problems faced by each organization to be carried out to improve management and operational systems.
(Longoni, 2015)	Manufacturing companies	Effective to obtain and determine the ideal organizational profile indicators in implementing continuous improvement
(Vinodh, 2012)	Automotive components manufacturing	An estimated 33% reduction in WIP and 45% reduction of defects and saves about \$ 60,000 per year.
(McGovern et al., 2017)	Medium-sized Enterprises (SME) within six European countries	Depends on the determination of the KPI, support from top management, availability of resources and time available for the process of implementing kaizen.
(Petersen et al., 2016)	Wind turbine generators in operation.	Make operational processes systematic, reduce waste in the form of maintenance processes by 25%, and increase availability by 2%.
(Burawat, 2016)	Manufacturing Industry	In terms of machine operation a range of 80% to 90%, guaranteeing defect control in products that are handled by customers at 2 to 3% with 3 quality control stations, and turnover rates in the range of 5 to 10%.
(Leyer & Moormann, 2014)	Financial Service Providers	That H1 could be accepted, that is, if the level of the hierarchy was higher, the higher level of lean (F (4. 3619) = 52,419, p<0.001) it would be accepted.
(Kanamori, 2016)	Healthcare service	There was a significant effect of 5S, representing a 0.19 point increase in customer satisfaction scores, estimated 6 to 8 months after the intervention (p <0.014).
(Szymanska-bralkowska & Jankow, 2012)	Electronics Manufacturing	Research that began in 2010, eliminating waste as a tool for identifying, analyzing and measuring green waste.
(Timans et al., 2012)	Dutch Manufacturing/Medium-sized Enterprises (SME)	Reducing the cost of claims against guarantees, an average of over 3 is obtained low standard deviation. There are significant differences $\geq 0.3$ in rate of 95%.
(Nordstrum et al., 2017)	Higher education	Achieve the objectives, interventions are needed, and an approach by designing procedures for process of implementing quality improvement.

Paper Identity	Research Object	Result
(Aziz, 2017)	Construction Companies	Increase productivity and achieve optimum processes, the results obtained are up to 75% efficiency in the use of contractor paving machines
(Melander et al., 2016)	Medium-sized Enterprises (SME)	An action to build system in a reflective manner against learning methods management to achieve the objectives of the management strategy, as well as a balance between flexibility and attractive formalities.
(Dadashnejad & Valmohammadi, 2018)	Manufacturing company	Removing obstacles that cause operational losses: breakdown, loss of speed, small stops, start up reject, rework, and one significance value (4.677) in set up reject is higher than 1.96, H1 Path coefficient is 35 %.
(Shokri et al., 2016)	Manufacturing Enterprises (SME)	Medium-sized There is a strong relationship between organizational culture and readiness to implement LSS (with a significance value <0.05 and a 95% confidence level)
(Tetteh, 2012)	Healthcare service	Improve performance in the health service process, which includes 5 steps: the goal of continuous improvement, discipline, quality circle, teamwork, and moral improvement.
(Zhang, Luo, Shi, Chia, & Sim, 2016)	Logistics companies	Reduction in process cycle time of 66.7%, identification and reduction of waste by 58.3%, 41.7% increase in inventory turnover
(Kazancoglu & Ozkan-Ozen, 2019)	Higher Education	Based on 22 assessment criteria obtained types of wastage: repetitive work, communication errors, unnecessary bureaucracy, excessive number of academic units and information disclosures.
(Freitas, Freitas, Gomes de Menezes, & Odorczyk, 2018)	Service Companies	That the spread of Lean Office in services, public civil administration, industry and construction sector. Which really gives value to a learn lean method.
(Russell et al., 2014)	Healthcare service	An increase in the monthly APC costs from \$ 388 to \$ 30,800, while for the average service provider satisfaction score by Press Ganey: 96% for APC and 95.8% for experts surgical.
(Secchi & Camuffo, 2016)	Manufacturing Company	From 7 cases based on 3 research dimensions illustrated that, the effectiveness and efficiency of the lean-roll process (principle-based knowledge replication strategy)
(Gavriluta, 2018)	Laboratory System	Achievement results are minimizing activities with added value (waste especially on movement and handling), for press the target "NVA = 0".
(Purba et al., 2018)	Automotive Company	Reducing 55.85 seconds (22.38% = 193.712 seconds -249.559 seconds), meaning that the total distance traveled is smaller than the current method.
(Ikatinasari, Hasibuan, & Kosasih, 2018)	Electronic Company	Reduction in lead time stamping time achieved is 15% = 1742.5 - 1477.5 minutes with the required energy of 43695.3 Kw/h

Paper Identity	Research Object	Result
(Bevilacqua, Ciarapica, De Sanctis, Mazzuto, & Paciarotti, 2015)	Pharmaceutical Company	Reduces the time of media change (61.5%). In the improvement phase and 5S Technique it slightly reduced the average time (2.6% = 64.1 - 61.5%)
(Qassim, Reyes, & Kumar, 2018)	Pharmaceutical Company	Through the VSM tools will ensure that continuous improvement will be carried out with the PDCA step
(Khairunnas, Ceha, & Muhammad, 2016)	Pharmaceutical Company	The percentage current state is 55.88% delay, 42.37% storage, 1.60% operation, 0.12% transportation, and 0.03% inspection.
(Khairi, Rahman, & Rushidi, 2016)	Pharmaceutical Company	To improve the cycle time efficiency has shown that GMP guidelines are not endangered, the Kaizen improvement project resulted in a 46.3% reduction in lead time.
(Arief & Ikatrinasari, 2018)	Pharmaceutical Company	Total reduction in setup time achieved is 16 minutes (26.23%) and a small stop reduction of 60%.
(Karam, Liviu, Cristina, & Radu, 2018)	Pharmaceutical Company	In the control phase a further improvement is expected and the main scope is the reduction of Change Over Time to the initial target of 16 hours.
(Sieckmann, Ngoc, Helm, & Kohl, 2018)	Pharmaceutical Company	On this basis an integrated process for lean implementation was developed, which consisted of four phases namely planning, developing a support system.
(Bellgran, Kurdve, & Hanna, 2019)	Pharmaceutical Company	Increase the speed of change when in improving the production environment.
(Petrusch, Sieckmann, Menn, & Kohl, 2019)	Pharmaceutical Company	As well as additional relevant Lean tools, to increase employee availability in training and implementing them.
(Zahra, 2015)	Healthcare Service	In terms of total value activities that have VA (value added) are 17 activities (58.62%), NVA. 12 activities (41.37%) with Value Added 59.44% & Non-Value Added 40.56%.
(Nenni, Giustiniano, & Pirolo, 2014)	Pharmaceutical Company	Reduction in WIP increased by 7% and a 16 minutes walkthrough.

For research of construction industry objects, There are significant challenges and opportunities in the process of implementing BIM (Building Information Modeling), namely in the Engineering, Architecture and Construction (AEC) sector, which helps to gradually improve performance (Ahbabi & Alshawi, 2015). As a result that, by combining each procedure, namely the formulation, implementation, monitoring of regulations related to the work safety system in construction companies. Which in this case is made into a culture as national safety and discipline in daily application, in turn can help improve the macro and micro safety climate in the construction company sector in Pakistan (Azhar & Choudhry, 2016). Based on a survey of 6 lean processes and reliability analysis on

the implementation of lean processes in eliminating waste, with a focus on the process of reducing waste 0.376 and Cronbach's 0.789 (Shurrab & Hussain, 2018). From the analysis and survey revealed that, the construction industry in Jordan strives to have a mental "continuous improvement", in improving the construction management system and optimizing national development, with a focus on the process of reducing waste 6.86 (Sweis et al., 2016). Based on the combination of the DES (Discrete Event Simulation) method with VSM (Value Stream Mapping) in order to increase productivity and achieve optimum process, the results obtained are up to 75% efficiency in the use of contractor paving machines (Aziz, 2017).



For research on logistics industry object, From the results of this study, that understanding the complexity of the implementation process and lean management skills can be developed by lean managers on the condition that they must understand a concept of continuous improvement and various traits of lean paradoxes, by knowing how to manage effectively, so as to help uncover various ins and outs from lean transformation (Maalouf & Gammelgaard, 2016). The results obtained by a reduction in process cycle time of 66.7%, identification and reduction of waste by 58.3%, 41.7% increase in inventory turnover which improves performance when shipping (Zhang et al., 2016).

For research on electronic industry object, Research that began in 2010 focused on the Green Value Stream (GVS) method and Worksheet for eliminating waste as a tool for identifying, analyzing and measuring green waste. Results of from research focus on the object of energy elimination (Szymanska-bralkowska & Jankow, 2012). Based on SVSM the total reduction in lead time stamping time achieved is 15% = 1742.5 - 1477.5 minutes with the required energy of 43695.3 Kwh with improvements to the changeover dies process (Ikatrinasari et al., 2018).

For research on service industry object, as a result the corpus analysis: 11 Brazilian research projects conducted between 2007 and 2016, that the spread of Lean Office in services, public civil administration, industry and construction sector. which really gives value to a learning process with work cell methods, VSM, and kaizen (Freitas et al., 2018). Research on health services objects, That the application of kaizen with CAESMS (Computer Assisted Employee Management System) reaps results in the form of: reduced cycle time of 19.04%; the number of actions also decreased by 49.82%; and substantially increased leadership routine (Latour, 2017). The results of the study, there was a significant effect of 5S intervention statistical data, representing a 0.19 point increase in customer satisfaction scores, estimated 6 to 8 months after the intervention ( $p < 0.014$ ) (Kanamori, 2016). From the results of research with the kaizen model obtained a framework as an

improvement in the health service system process to improve performance in the health service process, which includes 5 steps: the goal of continuous improvement, discipline, quality circle, teamwork, and moral improvement (Tetteh, 2012). The results of this selection were obtained in the form of significant satisfaction with the improvement of the operational system at the clinic, an increase in the monthly APC costs from 388 USD to 30,800 USD, while for the average service provider satisfaction score by Press Ganey: 96% for APC and 95.8% for experts surgical (Russell et al., 2014). Achievement results are minimizing activities with added value (waste especially on movement and handling), for press the target "NVA = 0". by improving the work system on flexible-modular assembly equipped with an initial kit based on digital equipment, supply and move activities section to the work station, as well the addition of a blackboard as a support for analyzing and designing the making layout (Gavrilita, 2018). There was a decrease in activities and time spent in non-payer prescription drug service, from 39 activities to 29 activities and from 1463 seconds to 392 seconds. In terms of total value activities that have added value (value added activity) are 17 activities (58.62%), NVA, 12 activities (41.37%) with value added 59.44% & non value added time 40.56% (Zahra, 2015).

For research on pharmaceutical industry objects, the application of SMED significantly reduces the time of media change (61.5%). In the improvement phase and 5S Technique it slightly reduced the average time (2.6% = 64.1 - 61.5%) Consistently reduced standard processing time lapses (29.1 = 51.4 - 22.3%) (Bevilacqua et al., 2015). Lean concept can benefit pharmaceutical companies. Through the VSM tools will ensure that continuous improvement will be carried out with the PDCA step. Percentage of activity on Process Activity Mapping (PAM) and current state is 55.88% delay, 42.37% storage, 1.60% operation, 0.12% transportation, and 0.03% inspection (Qassim et al., 2018). Application of lean concept, at IKOP Sdn Bhd. To improve the cycle time efficiency of hand sanitizer production, i-Hand 4.0, has shown that GMP guidelines are not endangered, the Kaizen

improvement project resulted in a 46.3% reduction in lead time (Khairi et al., 2016).

Application of the 5 S and Standardization Procedure also greatly helps in reducing setup time and decreasing the number of small stops during the process. So that the total reduction in setup time achieved is 16 minutes (26.23%) and a small stop reduction of 60% (Arief & Ikatrinasari, 2018). Guided by the SMED methodology, the desired results are almost achieved within a six-month implementation period. In the control phase a further improvement is expected and the main scope is the reduction of Change over time to the initial target of 16 hours (Karam et al., 2018). Increase the efficiency of pharmaceutical production through lean concepts through literature analysis, critical success factors and barriers to implementation as well as critical implementation steps are identified. On this basis an integrated process for lean implementation was developed, which consisted of four phases namely planning, developing a support system, implementing and supporting (Sieckmann et al., 2018). Use cost efficiency as a controller on the production floor when prioritizing improvements, which are identified at the management level to get their commitment. To increase the speed of change when in improve

the production environment (Bellgran et al., 2019).

Learning for well-established Lean topics in the pharmaceutical industry is expanded by a learning module. By displaying examples and specific exercises as well as additional relevant Lean tools, to increase employee availability in training and implementing them (Petrusch et al., 2019). The results showed that the reduction in WIP increased by 7% and a 16 minute walkthrough, an Opportunity to control production flow continuously (Nenni et al., 2014). The results show the relationship between the application of lean and the effectiveness and productivity of the company in the opinion of team members while managers do not believe that this relationship is very tight. This is related to the fact that current good manufacturing requirements organize all processes and they spend a lot of time (Khlat et al., 2014).

The kaizen method is very general and broad, applied by various types of industries and services. Based on the description of the journal and paper objects that have been presented previously in Table 1, there are many other research that use qualitative and quantitative variables data.

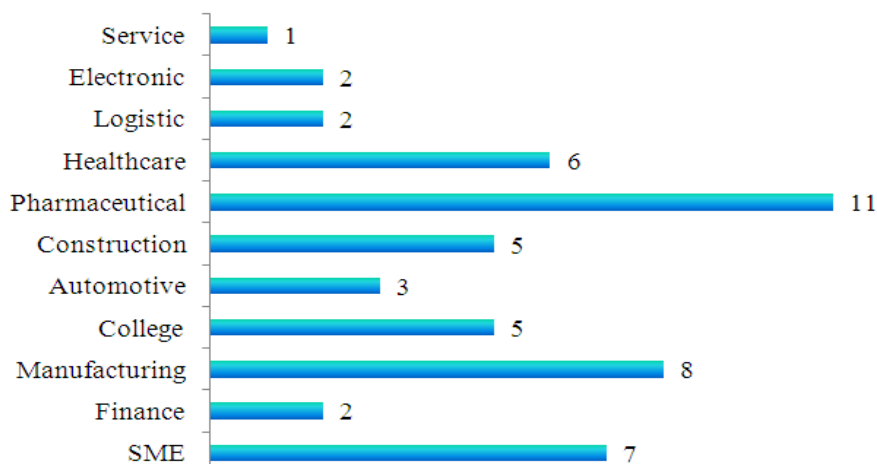


Fig. 2. Object of research

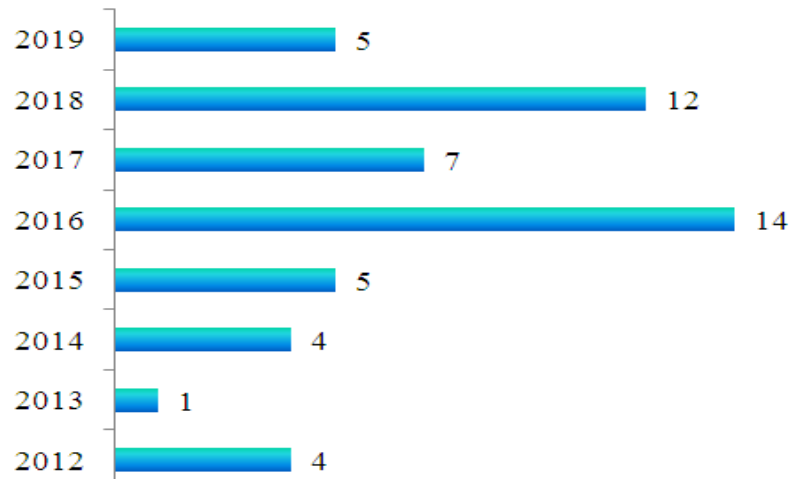


Fig. 3. Year of published

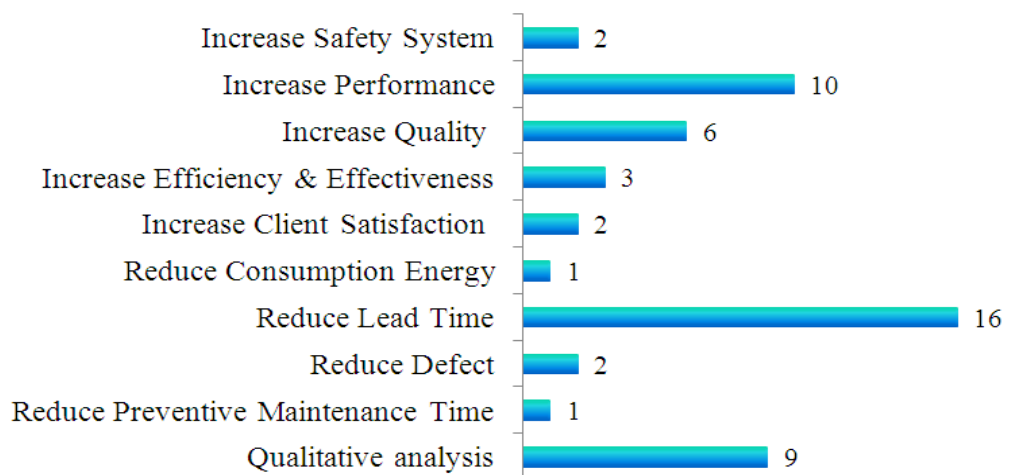


Fig. 4. Variable of paper

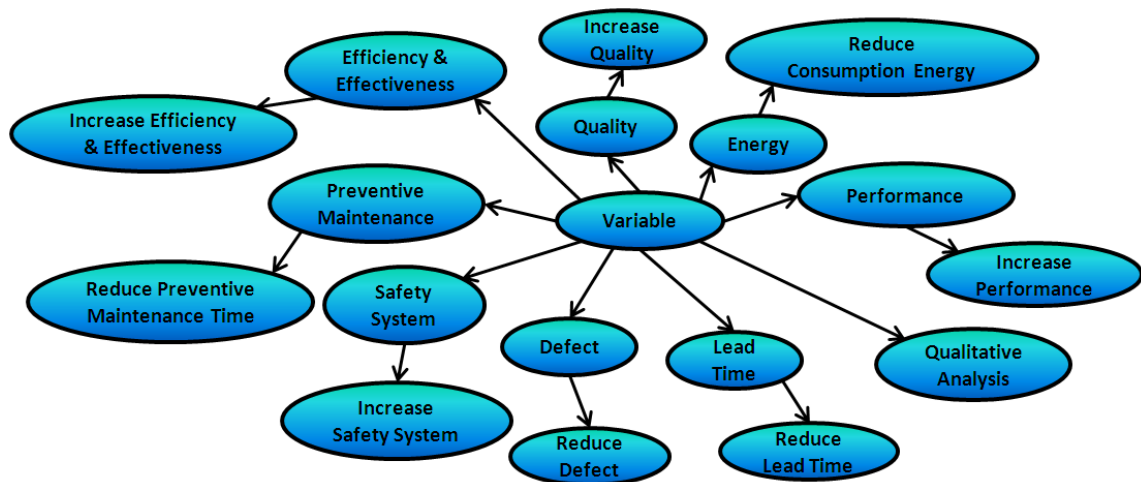


Fig. 5. Paper result and variables of problem solve through kaizen

From the mapping paper that the most research variable is reduce lead time. For the year of paper, the most in 2016 and 2018, than the most object of research in pharmaceutical industry.

#### 4. CONCLUSION

Based on literature review, it can be concluded that, from 52 paper were selected for review that consistently applied the stages in the kaizen method. Kaizen method can be used as tools for solve problems with kind of qualitative and quantitative data. Kaizen approach can solve kind of problems such as quality, consumption energy, lead time, performance problem, etc. to improve the work system. Kaizen methods have been widely applied in various industries such as: manufacturing, logistics, construction, SME, service, healthcare, pharmaceutical and processes for continuous improvement. Overall, the kaizen method seems to have significant value in improving systems in all types of organizational institutions and still being used as an effective tool of choice. This literature is expected to give insight into the kaizen method, and it hoped that there will be a combination and novelty for future research.

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