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Six Sigma Benefit for Indonesian Pharmaceutical Industries Performance: A Quantitative Methods Approach

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ABSTRACT

The aim of this study is to explore the advantages of implementing six sigmas in the pharmaceutical industry. The purpose of this study was to analyze the effect of the application of six sigma through the phase of determine, measure, improve and control on the performance of the pharmaceutical industry in Indonesia. This study uses a quantitative methods approach with correlational analysis techniques, the sample used is 382 pharmaceutical factory managers. The sampling technique used by researchers is Probability Sampling, namely by using simple random sampling. The results of this study are that the Six Sigma method with stages to determine, measure, improve and control has a positive and significant effect on pharmaceutical industry performance. The novelty of this research is the first research on the exploitation of the benefits of Six Sigma in the pharmaceutical industry using quantitative methods. This research can serve as a reference for similar research, and further research can be carried out in other countries.

Keywords: DMIC, Six Sigma, Indonesian Pharmaceutical Industries, Industry Performance

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INTRODUCTION

The industrial era 4.0 demands that every industry player compete to provide quality products. The pharmaceutical industry must provide its best service to consumers. Industry players are also required to continue to make improvements and improve their company performance to respond quickly and accurately to changes that occur in the market. Quality control can be defined as a system used to maintain the quality of goods or services at the expected quality level. Most of the consumers consider quality as one of the basic factors for the product or service they will use. Quality is the main factor that should not be ignored, because it has become an important part in every production process. The use of the six sigma DMAIC method is a way to improve the process while reducing product defects so that it is expected to increase productivity and improve product quality. The development of the industrial world today demands competition between industries to get customers. To win this competition, creating better quality products than competitors is the main key, so that later customers will feel satisfied (satisfied) which then encourages to buy the product again so that customers will remain loyal. The six-sigma method is often used by companies in controlling product quality by minimizing the number of defects. The Six Sigma application focuses on defects and variations, starting with identifying critical to quality elements of a process to providing suggestions for improvements related to defects that arise. Steps to reduce defects and variations are carried out systematically by defining, measuring, analyzing, repairing, and controlling, which are known as the 5 phases of DMAIC (Kartika, 2018). Six sigmas, on the other hand, is the tool or tool for optimising processes through continuous customer attention and the participation of people inside the company and outside it (Pyzdek, 2000). Six sigmas is a method of ongoing change that prioritises the DMAIC step (defining, evaluating, assessing, enhancing, monitoring). The DMAIC is systematically applied on the basis of scientific know-how (Purwanto, 2020) towards the six-sigma goal, namely 3.4 defects per million chance (DPMO), and obviously to improve company profitability.

In an increasingly competitive global economy, every industry is challenged to produce good quality products. Besides that, only good quality products will always be in demand, because quality is the fulfillment of services to consumers. To achieve this goal, the company needs to make the production process optimal. The production system is one that plays a big role, related to how efficiently the production system is run, which greatly affects the company's performance. The approach that can be used to solve the problem of inefficiency or waste that occurs in a company's production system is lean manufacturing. Lean manufacturing is a method to increase responsiveness through waste reduction efforts. Waste in general is a waste, anything that has no benefit. Meanwhile, if it is related to production, waste is things that involve the use of materials or other resources that are not in accordance with procedures. In general, the waste production process that occurs includes overproduction, waiting, excessive transportation, inappropriate processing, inventory, and unnecessary movements. motion), and defective products (Hines & Taylor, 2000). To be able to win the competition in the free market era, every company is required to always make efforts to improve performance from one period to the next. This performance improvement can be

achieved, among others, by carrying out process improvements, which is an activity of the company to make process improvements that can increase added value continuously. By carrying out process improvement, it is hoped that the company will be able to fulfill customer desires. One step of the process improvement is to apply the Six Sigma method. Six sigmas is a structured methodology for improving processes that is focused on reducing process variances while reducing defects (products / services that are out of specification) by using statistics and problem-solving tools intensively. The Six Sigmaini method also emphasizes a very significant improvement where consumer desires are translated into quality improvement activities in the company. The target that the company wants to achieve is 3.4 defects for every one million possible disabilities. This method is able to gradually increase the quality towards zero failure rate (zero defect).

Informatics has become a reliable data collection platform. Turning data into business intelligence requires a clear and well-established strategy. Lean Six Sigma is the highest number you can pick from. Six Sigma focuses on reducing defects while Lean focuses on process waste reduction by growing end users' benefit. The company would be given more value by using big data than ever for the introduction of Lean Six Sigma. Lean Six Sigma is for example used on the supply chain. The Institute of Electrical and Electronics Engineers has noticed that today companies handle an extremely dynamic and challenging supply chain, while at the same time having a global reach and everybody needs to conquer competition, offering the best possible service. In the analysis, the researchers found that an approach to an industry 4.0 global supply chain using a Lean Six Sigma can create a highly optimised process stream, free of defects and residues. Lean Six Sigma will speed up the introduction of new technology in three separate areas: first, ensuring that customer experience is held in the forefront as companies transition into Industry 4.0. Secondly, use the lessons of previous technical advancements to optimise the use of ICT. Thirdly, IOT and Industry 4.0 risk management is used. Industry and IT 4.0 deliver business benefits through data and business intelligence potential. But managers and staff need knowledge of the continuous improvement of the process to achieve a quality process. Lean Six Sigma is involved in ensuring that emerging technology provides business added value. Recall, when processes are sound, technology can help organisations greatly.

According to the Indonesian Ministry of Health, currently over 210 drug makers, 70% of whom are domestic manufacturers. Limitations of ownership were simplified and suggested on the Negative Investment List. International companies now can gain 100 % ownership under the new government law, which was previously just 75%. Consequently, it could be projected to hit IDR 277.4 trillion (USD 19.8 trillion) for direct investments within the pharmaceutical industry between 2015 and 2025. Per capita pharmaceutical expenditure is rising quickly in Indonesia. Indonesia has traditionally had one of the lowest drug use rates in Asia. But now, in comparison with the total population, the income per person per pharmaceutical product alone has increased dramatically to IDR 183,250 (USD 13,08). The Indonesians will spend more on health care, as per capita incomes are projected to rise over the next decade. Chronic diseases and increased medium-sized income also lead to growing drug demand. Total health care expenses are projected to rise to IDR 277.4 trillion ($47.1 billion) by 2022 in Indonesia. Expansion of product types and increased demand for generic medicines are key factors that drive the growth in the Indonesian pharmaceutical market. Domestic firms fulfil almost 75 percent of Indonesia 's drug needs. The remaining 25 percent was covered by international firms. Kalbe Pharma, the largest domestic pharmaceutical firm in Indonesia, has a market share of 15 percent. Eight percent of the business size is in the pharmaceutical sector. However, according to the Indonesian Pharmaceutical Association, about 95 percent of the medicinal ingredients in Indonesia appear to be imported. To encourage more foreign investment in the pharmaceutical sector, as mentioned earlier. In the beginning of 2017, several multinational pharmaceutical manufacturers, particularly for raw materials, began building factories in this sector with enthusiasm. These businesses exploit major resources in Indonesia and have great prospects for Indonesia, home to about 30,000 of the world's 40,000 medicinal plants and herbs. The goal of this research is to examine the advantages of six sigmas in the pharmaceutical field. The uniqueness of this study is the first study into using quantitative approaches to leverage Six Sigma 's benefits in the pharmaceutical industry. This study may be used as a benchmark for similar research and further research in other countries can be conducted.

METHODS

Research design

This study uses a quantitative approach with correlational analysis techniques. Correlational research aims to determine whether there is a relationship between one variable and another, correlation does not show a functional relationship or correlation analysis does not differentiate between dependent and independent variables (Ghozali, 2011). In this study, researchers used the product moment correlation analysis technique where the product moment analysis technique was used to test the hypothesis of the relationship between one independent variable and one dependent variable (Sugiono, 2014). Researchers do this because researchers want to know or see the relationship between one variable and other variables, namely Variable six sigma determine, measure, improve and control. Analysis of data processing using SmartPLS software.

Research subject

The subject of this research is the pharmaceutical industry in Indonesia, the determination of the number of samples developed by Isaac and Michael (in Sugiono, 2014), it is known that for an error rate of 5% the sample used is 382 pharmaceutical factory managers. . The sampling technique used by researchers is Probability Sampling, namely by using Simple Random Sampling. Where according to Sugiono (2014) simple random sampling is a sampling technique that is carried out randomly without paying attention to the strata or levels contained in the population.

Research Variables and Instruments

In this study, there are two variables, namely the independent variable (X) and the dependent variable (Y). In this study, the independent variable (X) is to determine, measure, improve and control, while the dependent variable (Y) is the performance of the

pharmaceutical industry. The type of instrument or scale used in this study is the Likert scale where 1 is the lowest value per item and 5 is the highest value per item. The lowest value 1 indicates strongly disagree (STS), 2 indicates disagree (TS), 3 indicates (R), 4 indicates strongly agree (S), and 5 indicates strongly agree (SS).

Table 1. Respondents Profil Descriptive Information

Criteria		Total
Age	< 30 Years	128
	30 - 40 Years	122
	> 40 Years	132
Work Periode	< 5 Years	102
	5-10 Years	177
	> 10 Years	103
Gender	Male	280
	Female	102

The number of respondents is 382 managers of pharmaceutical industry with details for age under 30 years are 128 respondents, between 30 to 40 years of age are 122 respondents and those over 40 years of age are 132 respondents. For the work period under 5 years there are 102 respondents, between 5 to 10 years are 177 respondents and the above 10 years are 103 respondents. For male gender is 280 respondents and female are 102 respondents.

Fig 1. Research Model

Based on literature review and previous research, the hypothesis in this study is as follows

Hypothesis 1: Determine has a positive and significant effect on the pharmaceutical industry performance

Hypothesis 2: Measeure has a positive and significant effect on pharmaceutical industry performance

Hypothesis 3: Improve has a positive and significant effect on pharmaceutical industry performance

Hypothesis 4: Control has a positive and significant effect on pharmaceutical industry performance

RESULT AND DISCUSSION

The convergent validity checking process is done by looking for the loading factor of each indicator. A factor value of 0.5 or higher is considered sufficiently large to justify the use of latent buildings (Chin, 1998; Ghozali, 2014; Hair et al., 2010). The minimum limit for the agreed load factor in this study is: 0.5, given that each structure has an AVE value of 0.5 (Ghozali, 2014). **Fig 2.** Research Model Result. After evaluating SmartPL S 3.0, the loading factor value for all indicators is above 0.5 or the AVE value is above 0.5, there are some indicators or elements that need to be omitted from the models. This research model has a converging meaning that fulfils the demands. Table 2 below indicates the importance of the loadings, alpha cronbaches, composite reliability and AVE for all complete buildings:

Table 2. Loadings, Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE)

Variables	Items	Loadings	Cronbach's Alpha	Composite Reliability	AVE
Determine (D)	D1	0.624	0.812	0.876	0.611
	D2	0.524			
	D3	0.775			
Measure (M)	M1	0.523	0.801	0.901	0.615
	M2	0.675			
	M3	0.697			
Improve (I)	I1	0.619	0.709	0.871	0.616
	I2	0.523			
	I3	0.611			
Control (C)	C1	0.765	0.987	0.897	0.613
	C2	0.821			
	C3	0.531			
Performance (P)	P1	0.617	0.698	0.689	0.612
	P2	0.521			
	P3	0.786			

The reliability of buildings can be measured by the alpha value of the Cronbach and the composite reliability of each building. The suggested alpha value for cronbach and composite reliability is above 0.7 (Ghozali, 2014). Table 2 above shows that all constructs have a composite trust and alpha values of Cronbach are higher than 0.7 (< 0.7). Finally, all buildings have satisfied the durability needed.

Desriminant Validity Testing

Discriminatory validity ensures that each latent variable is different from the other latent. The AVE square value of any exogenous construction (the diagonal value) exceeds the association between this structure and other structures (values lower than the diagonal) (Ghozali, 2014). By using the Square AVE value, specifically by looking at the Fornell-Larcker Criterion value as seen in Table 3, discriminating testing results of valids are used.

Table 3. Discriminant Validity Testing

Variables	D	M	C	P
Determine	0.912			
Measure	0.542	0.910		
Improve	0.561	0.532	0.08	
Control	0.759	0.618	0.542	0.904
Performance	0.651	0.691	0.617	0.542

The results of Table 3 above indicate that all management systems have a root AVE value which is above the correlation value with other latent constructions (by the Fornell-Larcker criteria). The Similarly, the transversal value of all leader items from an indicator is greater than the other indicators in Table 4, which is why the model has faced prejudice in its validity (Fornell & Larcker , 1981).

Hypothesis test

PLS hypothesis tests are also called the internal leadership evaluation model. This test involves a test on the value of direct and indirect effects and a test on how often exogenous variables impact endogenous leadership variables. The impact test was performed by means of a t-statistical test using SmartPLS 3.0 software in the least squared partial (PLS) analysis model. Table 4 and Table 5 below were obtained with the standing method the R square value and the sense test value:

Table 4. R Square Value Result

	R Square	R Square Adjusted
Industry Performance (P)	0.710	0.723

Based on Table 4 above, the value of R Square teachers performance is 0.710, which means that the variable teacher performance can be explained by the leadership variable by 71.0%, while the remaining 21% is explained by other variables not discussed in this study. Meanwhile, Table 5 shows t-statistics and p-values that show the influence between endogenous and exogenous variables.

Table 5. Hypothesis Testing Result

Hypotheses	Relationship	Beta	SE	T Statistics	P-Values	Decision
H1	Determine -> P	0.512	0.031	6.341	0.002	*Supported*
H2	Measure -> P	0.614	0.054	7.541	0.001	*Supported*
H3	Improve-> P	0.516	0.024	6.871	0.003	*Supported*
H4	Control-> P	0.676	0.015	8.921	0.001	*Supported*

DISCUSSION

Relationship of Determine of Six Sigma and Pharmaceutical Industry Performance

On the basis of methodological empirical findings in Table 5 above, the inference was that a six-sigma decision has a positive and important impact on the output of the pharmaceutical industry. t-Statistics 6,341 are worth less than 0,002 and 1.96, and 0,05 is less than p-Statistics. In other words, the first statement (H1) is accepted. These findings are consistent with the results of previous trials (Asbari, 2019; BudiSantoso, et al., 2020; Prameswari, et al., 2020). Six sigmas have a positive and important impact on working performance. If the six sigmas are correctly applied, they promote improved performance of the pharmaceutical sector. According to Hardiansyah (2019), six sigma 's benefits are reduced in time control by 360 million to minimise wastewater operating costs, and Rimawan (2019) says that six sigma 's benefits are Sigma 3.6, or DPMO 15919.63613. Six sigmas has been decreased. The 59% defect form does not record at 29% and paper decreased by 12%. According to the study from Rimawan (2018), the six-sigma gain is the 3.393 Sigma level and 29.764 trays in a million racks can be defective. Capability has improved from 2.2 to 3.1 sigma with a monthly savings of $18,394.2. According to Aditama (2020), six sigmas are beneficial for showing an improvement from 2.30 to 4.69 in sigma stage. Ngatilah (2020) says that the gain from six Sigmas is an improvement in the importance of accessibility from 90.8% to 96.0% of the OEE from 87%, which is 92%. According to Hernadewita (2020) there are still flaws between 4.8 and 6 sigmas, which enable the benefits of 6 sigmas to achieve zero defects. Syahwiratama (2019) suggests that a new raw material store in compliance with a minimum standard of material handling Improved productivity by 47 percent be set up. Syanni (2010 notes that the advantages of Six Sigma reduce the non-compliant goods presence. The value of 54.330, with 3.103″ sigma.

Relationship of Measure of Six Sigma and Pharmaceutical Industry Performance

Based on the statistical analysis findings using SEMPLS presented above in Table 5, six sigma measurements were found to have a positive and important impact on the efficiency of the pharmacological industry. The t-statistics value is 7,541 and the P-value is less than 0,05 and greater than 1,96 .. In other words, the first hypothesis is accepted (H2). These findings reflect that six sigmas have a positive and important impact on the performance of the work when the six sigmas measurements are applied properly and will facilitate an increase in performance of the pharmaceutical industry if not correctly carried out, and if they are not implemented properly then they will promote decreases. The six sigmas gain, as defined in Purnama (2018), is 23,239 DPMO defects that generate 3,44 sigma levels while six sigmas are given at 3,4 or 3,6 sigma levels, respectively. In the six-month time control phase, the six sigma benefits according to RimantHo (2018) are reduced by 360 million in operating wastewater treatment costs. The six-sigma benefit is Sigma 3.6 or the DPMO from 15919.6361, according to Widyanesti (2016). The 59% defect form does not record at 29% and paper decreased by 12%. Six sigma benefits according to Ketrin (2011) range from 2.2 to 3.1 sigma and saves USD $1,8394.2 per month at a level of Sigma 3,393, with fault possibilities 29,764 ties for one million ties. According to Lukitaputri (2015), six sigmas display an increase in the sigma level from 2.30 to 4.69, an increase in the availability value from 87.0% of the OEE level to 96.0% of the OEE value increased from 97% to 92% and an increase to zero, as a difference of between 4.8 and 6 sigma still exists.

Relationship of Improve of Six Sigma and Pharmaceutical Industry Performance

On the basis of the review of statistics using SEMPLS in Table 5 above, improvement in the performance of six sigmas was found to have a positive and substantial effect on the pharmaceutical sector. The value of t is 6.871 above 1.96 and the p value is 0.003 below 0.05. The first statement (H3) is accepted. This means that these findings are consistent with previous studies (Asbari, 2019; Budi Santoso, et al, 2020) which demonstrate the positive and important impact on working efficiency of six signatures. Improving six signs correctly encourages an improvement in pharmaceutical industry 's efficiency and encourages a decline if not properly applied. Henny (2018) proposes that six sigmas be set up in accordance with the minimum materials standard to establish a new raw material warehouse. 47 percent improved productivity. It is 54.330 and the sigma is 3.103 microns. The quality costs of Rp have plummeted. Rp 120.812,023, 51 applicable. 5,004,510, 60, eighty. Average CSSR change from 98.44

percent to 99.43 percent, sigma level from 3.6 < 3.7 to < 3.7 to>4.0. Suharno (2019) states that solution prepare has led to the key method and methodology chosen for each stage. The value results are 3.62 above 3.56, thereby satisfying the customer

Relationship of Control of Six Sigma and Pharmaceutical Industry Performance

Based on the statistical analysis findings using SEMPLS, it was found in Table 5 above that the 6 SIMA control has a positive and important impact on the efficiency of the pharmaceutical industry. The t-statistics value 6.871 exceeds 1.96 and the p value is lower than 0.003. In other words, the first (H3) hypothesis is accepted. The findings of the past studies are consistent with that of six Sigmas (Asbari, 2019; Budi Santoso, et al., 2020; Prameswari, et al., 2020). The monitoring of six Sigma would have a positive and important impact on work performance, if six Sigma controls are properly implemented, this will promote an improved performance by pharmaceutical industries. According to Purwanto (2020) six indications have been shown in the "nice" results by Sigma-meter Six sigma to boost quality control to zero defect defects in healthcare Hematology analyzer Cell Dyne Ruby provides the best knowledge in healthcare. Six sigmas have also been successful. Six SIGMAS can be an effective approach in the field of education. Critical performance factors which have a positive effect Improvement shows an increase in the averages of six sigma, which substantially increases by 0,97 and 2,56

Benefit of Six Sigma

Vincent Gaspersz (2002) notes that quality means that improvements in product characteristics are gradually growing and decreasing so that they can satisfy specifications and needs to boost the internal and external satisfaction of consumers. Quality of the goods and services, including marketing, engineering, development and maintenance, is a global characteristic, in which goods and services in use are consistent with customers' requirements and expectations, according to Setia Bakti (2020). Quality in goods, services, people and processes and the environment, which meet or exceed what is expected, is the dynamic situation according to Rudyanto (2020). In order to achieve error-free business performances, 6 Sigma is an application of organised, oriented, efficient quality and techniques, which measures the performance of a business from the sigma level (Syahputra,2020). Six sigmas is a gradual change strategy Six Sigma 's execution blends the best elements of past quality programmes from the time of Eli Whitney to the Malcolm Baldrige National Quality Award / MBNQA (Setiawan,2020). Six Sigma is not only productive to incorporate it in big corporations, but even in small and medium-sized corporations, much quicker and more concrete results than are achieved in large companies (Budiyanto 2020). Six Sigma can be implemented efficiently.

Six Sigma is a custodial approach that minimises defective defects in goods design, manufacturing and administrative processes, and up to 3.4 defective per million opportunities (Noviantoro,2020). Six sigmas are different from others because this approach not only aims at enhancing results but is also a way to transform organisational culture from top to bottom (Sutia,2020). Six sigmas also require the use of statistical instruments with a standardised methodology to achieve a process that is enhanced, quicker and less costly (Breyfogle III, 2003). A systematic and sustainable Six Sigma approach should provide comfort in the assessment of quality improvements such that possible reasons for failure can be established whereas failure is minimised.

Many organisations, including services, development and other industries have successfully used Six Sigma and applied it in a number of contexts and processes. In its application, Six Sigma has five phases known as the DMAIC cycle (Decfining, Measuring, Evaluating, Enhancing, Control) that serve to direct Six Sigma in achieving its corporate goals. The DMAIC model refers to five interrelated stages that help an organisation systematically resolve issues and develop its processes. The aim of the DMAIC process is to recognise issues, examine the causes of the problems and attempt to resolve them. By applying Six Sigma, customer care and efficiency in pharmaceutical firms were enhanced directly. The secret to succesful implementation of Six Sigma is the leadership and emphasis on customer needs. Six Sigmas will result in profitability, cultural changes and consumer satisfaction in organisations. In order to enhance consumer quality, increase customer content, minimise operating cost and increase a market share, Six Sigma constantly shapes a community with a continual improvement mindset. Creating and preserving customer loyalty is a major challenge for companies, as management is conscious that replacing and keeping customers requires five to seven times more time and costs.

Lean Six Sigma is a systematic approach to process optimisation and consistency that has been used by many pharmacy industries to ensure market excellence. Lean 6 sigma, as it is called, is a mixture of lean and six sigma development. The pharmaceutical industry uses this approach to build a system that removes all forms of waste. The hope is that companies will increase productivity while simplifying processes. This technique consists of five stage named DMAIC (Design Measure Analysis Improve Control) This process consists of five stages. Lean Six Sigma is one of the most common methods in various pharmaceutical industries for quality enhancement by companies because it is beneficial to business decisions. Lean six sigmas is a technique, as we know, in which all decisions based on data are taken. Savings of Time. Experts can support and supervise the progress of the project during the project initiation. Furthermore, organised work practises (with the DMAIC method) and frequent gate reviews performed by experts at the end of each process can provide a fast solution that can save time and money. Lean six sigma focuses primarily on reducing waste and cost savings in the pharmaceutical sector, though all efforts will definitely save costs in the industry.

The six-sigma application in the pharmaceutical industry is a revolutionary strategy which enables businesses to improve exceptionally. Any of the six Sigma advantages for the pharmaceutical industry, namely, sustainable success Six Sigma builds skills and a working culture to continually evolve to dominate the market. Setting performance expectations for each employee Six sigma helps each employee to work in the same direction and concentrate on consistent mutual objectives. Increase consumer satisfaction the business discovers which satisfaction it offers consumers and plans how to make it available so that they can profit from the received product (goods or services). Six sigma helps businesses not only boost their results but boost their improvements, so they can win the competition. Increase their performance. Make it simple for coaching staff

Six sigma facilitates and accelerates the production of inventions and new ideas by each worker. Making it simple for businesses to adjust Six sigma strategies allows

companies launch new products to reach new markets through new strategies and procedures. The organisation may make minor improvements or significant changes to a company's performance. Rising profit. Raising income. Users would be able to slash the company's manufacturing costs by using the Six Sigma process.

CONCLUSION

The results of this study show that the method Six Sigma has a positive and essential effect on the efficiency of the pharmaceutical industry with measures for assessing, calculating, enhancing and controling. Tools of the Six Sigma method difficult to introduce a full DMAIC pattern in the pharmaceutical industry to boost efficiency. The key targets of the Six Sigma actions in the respective sectors are summarised. Approachability and time reduction are the performances of the service sector in particular. The instruments used in the service industry can vary from the tools used in the manufacturing sector. Efficiencies in the design of efficiency productivity innovation, quality management were previous research in the manufacturing sector. Some standard tools in the manufacturing industries have been observed. Six Sigma applications primarily concentrate on six Sigma applications using the DMAIC tool for the research development. The use of the DMAIC cycle was seen, as predicted from all the case studies examined. The target of the Six Sigma: 1). Reduce rework or recovery costs 2). Reduce efficiency enhancement costs 3). Market share rising 4). Cycle times reduction; 5). Retaining Customer 6). Reduce defects to minimum 7). Workplace Improvements 8). Design goods for operation. The case studies have highlighted the importance of leaders in the implementation of Six Sigma projects in discrepancies and similarities in the manufacturing and service sectors. The purpose of this analysis is to reduce the frequency of feed-back using the Six Sigma process. In manufacturing applications, it was noted in papers that Six Sigma enabled businesses to dramatically reduce their costs. The differences in the focus of Six Sigma on the applications to the service and production industry are that the first goal is to enhance its processes in order to ensure the highest satisfaction for customers; the second aims at improving the operation and ensuring the quality of the finished product at lower costs. In both industries, the results achieved with the introduction of Six Sigma showed that the process was enhanced, turnover reduced, reliability enhanced, service quality was delivered, customer satisfaction increased, cost reduced, and cost savings produced. In each manufacturing sector, the steps to implement the 6 Sigma method are the same, that is DMAIC. In the service sector, it is more important to calculate efficiency, such as speed and lead time. Often attitudes and abilities are linked to the essential characteristics and performance metrics for Six Sigma projects in the service sector. In manufacturing, workers with a more mathematical and statistical background, like engineers, are typically hired. In both industries basic methods such as parabolic analysis and analysis of cause and effect are undoubtedly used. The Six Sigma project performance metrics can vary from those of manufacturing. Practitioners and academics can also analyse which DMAIC pattern techniques for various types of service sectors can be used.

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