E-ISSN 2503 - 1430
ISSN 2541 - 3090

Journal of Industrial Engineering Management
(JIEM Volume 7. No 2 Tahun 2022)

PROPOSED IMPROVEMENT OF FAJAR DAILY NEWSPAPER PRODUCTS WITH A SIX SIGMA APPROACH

Nadzirah Ikasari Syamsul[1], Kifayah Amar[2], Syamsul Bahri[3], Mario Alif Mansur[4]
Hasanuddin University[1],

E-mail: nadzirah.ikasari@unhas.ac.id[1]

Article history:
Submitted 13 May 2022
Revised 12 June 2022
Accepted 14 July 2022
Available online 9 August 2022

ABSTRACT

In Indonesia, many manufacturing industry companies large and small are trying to make products of good quality for the market. This is because only companies that have good product quality can compete and survive. Company Fajar Makassar Grafika is a subsidiary of Fajar Group that specifically handles newspaper printing production, in carrying out the process of newspaper production there are still many problems with product defects that are not by the standards of the company.

The method used in this study is the Six sigma method using DMAIC stages (define, measure, analyze, improve and control). Six Sigma is one of the tools commonly used in product quality control. This method has the concept of setting quality standards until it reaches 3.4 rejects per one million possibilities.

Based on the results of the analysis with the Six Sigma method it has been known that in the production process there are 5 types of defects, namely blurred mold defects, dirty prints, not registers, folded and torn newspapers with sigma levels obtained at 3.92 with an average damage rate of 7760 for one million productions (DPMO). From the analysis of fishbone diagrams can be known the causal factors of defective products derived from machine, material and human factors. The proposed improvement is done using Failure Mode and Effect Analysis (FMEA) analysis, so that the company can take precautions and improvements to reduce defective products and improve product quality.

Keywords: Quality Control, Six Sigma, Newspaper, DPMO, FMEA

Published By:
Fakultas Teknologi Industri
Universitas Muslim Indonesia
Address:
Jl. Urip Sumoharjo Km. 5 (Kampus II UMI)
Makassar Sulawesi Selatan.
Email :
Jiem@umi.ac.id
Phone :
+6281341717729
+6281247526640

DOI : http://dx.doi.org/10.33536/jiem.v7i2.1139

1. INTRODUCTION

Newspaper is one of the products in the form of print media that use paper as one of its main raw materials (Thahira, 2018). In today's digital era, newspaper print media is still able to retain its readers during a shift in reading interest from print to digital. The reason readers still choose newspapers is because of their trustworthy news value (Nielsen, 2017). In addition, readers still survive on newspapers because newspapers are print media that do not require electricity or batteries, and do not require an internet network to read the news. The news presented in print media is diverse, ranging from political news, economics, sports, social, legal, business, and even advertising (Ardiyanti, 2018).

One of the print media companies that still survives to this day is Company Fajar Makassar Grafika is a subsidiary of Fajar Group that specifically handles the production of newspaper printing. In the process of producing newspapers in PT. Fajar Makassar Grafika noted that there are still many defect problems of newspaper products that do not comply with the standards set by the company such as blurred print defects, dirty prints, not registers, folded and torn newspapers, so that this defective product has an impact on the increasing use of quality costs incurred by the company. The number of defective products, the causes of product defects, and the dominant factors that have a disability will be known after conducting research.

2. LITERATUR REVIEW

2.1. Definition of Quality

According to Singgih (2015), quality is one of the guarantees given and must be fulfilled by the company to customers, because the quality of a product is one of the important criteria that customers consider in choosing products. Another opinion is also expressed by Tannady (2015) that quality can be interpreted as an effort from the manufacturer to meet customer satisfaction by providing what is the needs, expectations, and even expectations of the customer, where the effort is visible and measurable from the results of the product produced.

2.2. Quality Control

According to Assauri (2004), quality control is activities to ascertain whether wisdom in terms of quality or standards can be reflected in the final result. In other words, quality control is an effort to maintain the quality/quality of the goods produced, to be by product specifications that have been determined at the discretion of the company leadership. Quality control is the part of quality management that ensures products and services comply with requirements. It is a work method that facilities the measurement of the quality characteristics of a unit, compares the established standards, and analysis the difference between the results obtained the desired results to make decisions that will correct any differences (Prathapchandran & Palson, 2019).

2.3. Six Sigma

Six Sigma is a rigorous, focused, and highly effective implementation of proven quality principles and techniques. Incorporating elements from the work of many quality pioneers, Six Sigma aims for virtually error-free business performance. Six Sigma method focuses on improving quality/reducing waste by helping organizations produce products and services that are better, faster, and cheaper. (Pyzdek & Keller, 2010)

The Six Sigma method is one of the tools commonly used in product quality control. This method has the concept of setting quality standards until it reaches 3.4 rejects per one million possibilities. The Six Sigma method is divided into several stages to achieve product quality improvement. The use Six Sigma method can be used to determine the causes and factors that affect reject to reduce the production of defects (Salomon et al., 2017).

In Six Sigma the most important stage is DMAIC, the DMAIC (Define-Measure-Analyze-Improve-Control) concept is the most commonly used method to measure the implementation of Six Sigma within an organization (Yulius, 2019).

DMAIC (Define, Measure, Analyse, Improve and Control) is the most familiar model of Six Sigma to the Industries in general, which is applicable to both product and process industries (Ali, 2021)

Six-sigma DMAIC is a benchmark to check the process or product quality, also having the ability for improving the efficiency and quality of a product (Bhargava and Gaur, 2021)

3. RESEARCH METHOD

3.1. Object of research

This research was conducted at PT Fajar Makassar Grafika located at Jl. Pattene Raya no. 1 Makassar was held from November 2020 to January 2021.

3.2. Data Type

The data collected in the form of primary data is data collected directly from the results of

observations in the company and secondary data in the form of company documents, literature, previous research, and other information that can support this research.

3.3. Method of collecting data

The data is collected by observation, documentation, and interviews.

3.4. Data analysis method

1. Define stage is to identify the type of defect in the products of Daily Fajar Newspaper.
2. The Measure stage is determining the characteristics of quality (Critical to quality), then taking a measurement of process stability and measurement of process capabilities and calculating the value of DPMO.
3. Analyze stage is to analyze the cause of each type of defect that is a priority by using the Fishbone Diagram tool.
4. The Improve Stage is to provide proposed improvements using Failure Mode and Effect Analysis (FMEA) analysis.

4. RESEARCH RESULT

4.1. Define

Define is the defining stage of quality problems in the Daily Fajar product, at this stage that makes the product defective defined the cause. The results of observations conducted found many defects, where the defect is a thin color defect, dirty defect, the defect does not register, imperfect crease defect and ripped defect. Below is the production data and the number of defects collected from the company.

Table 1. Production and Defects Data

No	Observation	Amount of Production	Number of Defects
1	1-Nov	25348	1940
2	2-Nov	25878	1736
3	3-Nov	25150	1254
4	4-Nov	25360	1588
5	5-Nov	25635	1073
6	6-Nov	24512	794
7	7-Nov	25733	727
8	8-Nov	24488	990
9	9-Nov	26170	1068
10	10-Nov	26735	1581
11	11-Nov	25736	600
12	12-Nov	24430	510
13	13-Nov	25493	959
14	14-Nov	25753	825
15	15-Nov	25689	2055
16	16-Nov	25468	1346
17	17-Nov	26000	886
18	18-Nov	24323	373
19	19-Nov	26007	1495
20	20-Nov	24654	854
21	21-Nov	25479	475
22	22-Nov	25600	1750
23	23-Nov	24392	588
24	24-Nov	24815	805
25	25-Nov	27051	679
26	26-Nov	25138	1072
27	27-Nov	25019	739
28	28-Nov	25726	640
29	29-Nov	25136	900
30	30-Nov	25744	1668
Total		762662	31970
Total		762662	31970

4.2. Measure

1. Determining the characteristics of quality (Critical to quality).
   Determining quality characteristics (CTQ) is an important stage because it relates directly to the specific needs of the customer. Below are the quality characteristics (CTQ) of PT. Fajar Makassar Grafika.

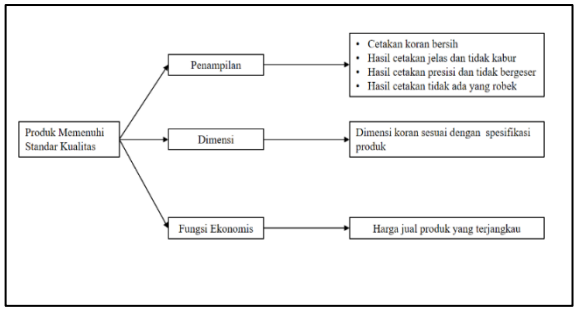

Figure 1. Characteristics of Quality (CTQ)

2. Measurement of process stability
   This measurement of the stability of the process serves to find out if a production process has been stable. The following is a calculation of the stabilization measurement of the process:
   a. Calculating the Percentage of Disability

$$p = \frac{np}{n} \qquad (1)$$

p = proportion
np = number of defects
n = amount of production

1 November 2020:

$$p = \frac{1940}{25248} = 0.07653$$

b. Calculating The Central Line (CL)

$$CL = \frac{\sum np}{\sum n} \quad (2)$$

CL = *Central Line*
∑np = total number of defects
∑n = total amount of production

$$CL = \frac{31970}{762662} = 0.04192$$

c. Calculating Upper Control Limit (UCL)

$$UCL = \underline{p} + 3\sqrt{\frac{\underline{p}(1-\underline{p})}{n}} \quad (3)$$

p = CL
n = amount of production

1 November 2020:

$$UCL = 0.04192 + 3\sqrt{\frac{0.04192\ (1-0.04192)}{25348}} = 0.04570$$

d. Calculating Lower Control Limit (LCL)

$$LCL = \underline{p} - 3\sqrt{\frac{\underline{p}(1-\underline{p})}{n}} \quad (4)$$

p = CL
n = amount of production

1 November 2020:

$$LCL = 0.04192 - 3\sqrt{\frac{0.04192\ (1-0.04192)}{25348}} = 0.03814$$

More results can be seen in Table 1 of the appendix section:

From the results of the calculation, then it can then be made a map of control p as in Figure 2.

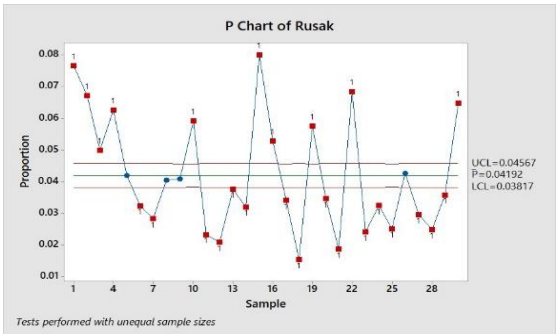

Figure 2. Control Chart p

Based on the map image of the control above it can be seen that the data obtained is more outside the boundaries of control. This states that there need to be improvements to reduce the level of disability during the production process.

3. Measurement of process capabilities
Measurement of process capability can be done by measuring the Six Sigma level. To measure the level of Six Sigma from newspaper production can be done in the following ways:

a. Calculating Defect Per Unit (DPU)

$$DPU = \frac{Total\ defect}{Total\ Production} \quad (5)$$

1 November 2020:

$$DPU = \frac{1940}{25348} = 0.07653$$

b. Calculation Defect Per Opportunity (DPO)

$$DPO = \frac{DPU}{Possible\ Many\ types\ of\ defects} \quad (6)$$

1 November 2020:

$$DPO = \frac{0.07653}{5} = 0.015307$$

c. Calculation Value Defect Per Milion Opportunities (DPMO)

$$DPMO = DPO\ x\ 1.000.000 \quad (7)$$

1 November 2020:

$$DPMO = 0.015307\ x\ 1.000.00 = 15307$$

d. Convert DPMO Calculation Results with Six Sigma Tables to obtain Sigma results. Based on the results of sigma level calculations in Table 2, it is known that the production process of Fajar Daily newspaper on PT. Fajar Makassar Grafika has a sigma level of 3.92 with a possible defect of 7760 per one million productions.

4.3. Analyze

This study used Fishbone Diagram or causal diagram to find out the cause of the disability. It is known that the most dominant defects occur namely blurring, not registering, and imperfect folds. The use of Fishbone diagrams to identify defects that occur is as follows:

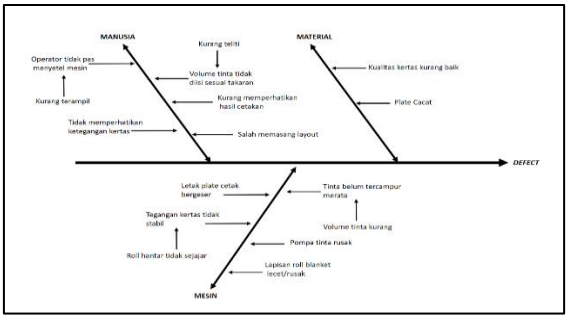

Figure 3. Fishbone Diagram

Based on the fishbone diagram above, it can be known that several factors that cause defects in newspaper production are:

1. The Human Factor (Man)
   a. The operator is less careful so that the volume of ink is not filled according to the dose.
   b. The operator is less skilled so it does not fit in adjusting the pressure and speed of the engine before the production process.
   c. Pay less attention to the prints at the time of the production process.
   d. The operator incorrectly installed the layout so that it affects the printout.
   e. The operators do not pay attention to paper tension during the production process.
2. Machine Factor (Machine)
   a. Less even mixing of ink on the printing press color tank due to the volume of ink on the color tank being less.
   b. The ink pump is damaged so that the ink supply at the time of the process is disrupted.
   c. The roll blanket layer is damaged/scratched causing poor print results.
   d. The location of the plate shifts due to the rapid rotation of the engine so that the layout of the newspaper is also shifted.
   e. The misaligned delivery roll is affected by vibrations in the machine that result in the delivery roll becoming less parallel so that the paper voltage is unstable.
3. Raw Material Factor (Material)
   a. Plate defects result in poor mold because it can not work perfectly when the machine is already working.
   b. The quality of the paper is not good so the result of the product is not good.

4.4. Improve

The Improved Stage is the 4th stage in Six Sigma. After knowing the cause of disability in the fajar daily newspaper products, failure mode and effect analysis (FMEA) is used to analyze the root cause of the problem and provide appropriate improvement proposals.

Proposed Repair Solution

1. Proposed fix for Blurred defects
   The highest RPN value for blurred defects is caused by the operator not fitting to set the machine with a value of RPN 504, if the operator does not fit to set the machine then the print will look blurry. Proposed improvement solutions proposed for the company are:
   a. Conduct supervision and re-check of employee performance to reduce errors caused by operator errors.
   b. Improve training for new and old employees so that employees are more skilled in carrying out tasks.
2. Proposed fixes for defects do not register
   The highest RPN value for non-register defects is caused by the operator paying less attention to the print and also because the location of the print plate shifts. Proposed improvement solutions proposed for the company are:
   a. Conduct supervision and re-check of employee performance to reduce errors caused by operator errors.
   b. The production party always ensures the plate set is by standards.
3. Proposed fix for imperfect crease defects
   The highest RPN value for imperfect fold defects is due to unstable paper tension due to the delivery roll not being parallel to the RPN 343 value. If the delivery roll is not parallel, the paper tension becomes unstable, which affects the printout. The proposed improvement solutions for the company are:
   a. Always check the condition of the delivery roll periodically before and after use to minimize the risk of a delivery roll of is not aligned.
   b. The production party always ensures the setting of the delivery roll according to standards.

Proposed improvement solutions for each factor are:

1. Man
   The human factor becomes the priority in improvement because it has the highest RPN value. The suggestion for improvement is to provide tighter supervision as the production process progresses and always supervise employee performance and conduct regular training to new and old employees on skills in

the production process so that employees have better performance.

2. Machine
   In the engine factor, the proposed repair in the form of checking and routine maintenance of each unit of machine spare parts and immediately replacing spare parts when found to have been damaged and the production always ensures the condition of the machine periodically before and after use and ensures the engine settings are by standards.
3. Material
   For material factors, the company's proposed improvement needs to re-examine the raw materials received from suppliers more thoroughly so that the raw materials received are maintained in quality and improve accuracy at the time of material inspection and check whether the raw materials have met the specifications set by the company.

5. CONCLUSION

1. The results of identification of the types of defects that occur in the production process of Daily Fajar newspaper at PT. Fajar Makassar Grafika in November 2020 is a blurred defect / thin color, dirty defect, the defect does not register, imperfect crease defect and lastly torn defect in the newspaper.
2. Defect value per million opportunities (DPMO) in Daily Fajar newspaper products at PT. Fajar Makassar Grafika in November 2020 is 7760 defective products for a million productions. The sigma level obtained from the calculation has an average sigma value of 3.92.
3. Factors that affect and cause disability come from human factors such as operators not fitting to set the machine, on machines such as ink has not been evenly mixed, and the material that is plate used is defective and the quality of paper is not good.
4. Proposed improvements that can be made to reduce the level of disability in the human factor need to provide more stringent supervision when the production process takes place and always monitor the performance of employees. For machine factors more often do routine checks on each unit of machine spare parts and the production always ensures the condition of the machine periodically before and after use. And finally, on the material factor, the company needs to re-examine the raw materials received from suppliers more thoroughly so that the raw materials received are maintained quality.
5. Based on the results of research using the Six Sigma approach if the company can implement standard operating procedures and worker training and pay attention to the condition of machinery and materials it can improve product quality and productivity in the production of the Fajar Daily newspaper.

6. SUGGESTION

1. PT. Fajar Makassar Grafika can consider and implement the results of improvement recommendations that have been given based on Failure Mode and Effect Analysis, the company can focus on standard operating procedures supervision and worker training in the production area to reduce the occurrence of defective products in the next production process.
2. Further researchers who want to research product quality improvement with the Six Sigma method, can consider the addition of other methods, such as Lean, Kaizen, Quality Function Deployment (QFD) by the research objectives to be achieved.

REFERENCES

Ali, A. 2021. Implementing Six Sigma DMAIC methodology for increasing the competitiveness of SMEs in Ethiopia. International journal of research in industrial engineering, 10(1)

Ardiyanti, I. D. 2018. Journalist and off the Record: Phenomenological studies on print media journalists in Bandung. Diploma thesis, UIN Sunan Gunung Djati Bandung.

Bhargava, M. and Gaur, S. 2021. Process Improvement Using Six-Sigma (DMAIC Process) in Bearing Manufacturing Industry: A Case Study. IOP Conference Series: Materials Science and Engineering, 1017(1).

Nielsen, 2017. *Nielsen.* [Online] Available at: https://www.nielsen.com/id/en/press-releases/2017/media-cetak-mampu-mempertahankan-posisinya/, accessed September 23, 2020.

Prathapchandran, U., & Palson, M. P. 2019. Study on Quality Control of Project Management System. International Research Journal of Engineering and Technology, 6(4).

Salomon, L. L., Ahmad, A. and Limanjaya, N. D. 2017. Clear Part Quality Improvement Strategy Using the Six Sigma Method Approach (Case

Study: Department Injection at Pt. Kg). Scientific Journal of Industrial Engineering, 3(3).

Singgih, L. M., & Renanda. 2015. improving the Quality of Paper Products Using a Six Sigma Approach at Paper Factory Y. Alam Journal of Industrial Engineering, Surabaya: Institut Teknologi Sepuluh Nopember.

Sofyan, A. 2004. Production and Operations Management. Jakarta: publisher of the Faculty of Economics, University of Indonesia.

Tannady, H., 2015. Quality Control. Jakarta: Graha Ilmu.

Thahira. 2018. Print Media Amid the Development of Digital Media in Palopo City (Print newspaper case study).

Pyzdek, T. & Keller, P. A., 2010. The Six Sigma handbook: a complete guide for green belts, black belts, and managers at all levels. 3rd ed. New York: MacGraw-Hill.

Yulius, H. 2019. Quality Control Analysis in The Process of Processing Black Tea with Six Sigma Method. Journal of Technology, 9(2).

ATTACHMENT

Table 1. Recapitulation of Proportion Data, CL, UCL and LCL

No	Observation	Amount of Production	Number of Defects	Proportion of defects	CL	UCL	LCL
1	1-Nov	25348	1940	0.07653	0.04192	0.04570	0.03814
2	2-Nov	25878	1736	0.06708	0.04192	0.04566	0.03818
3	3-Nov	25150	1254	0.04986	0.04192	0.04571	0.03813
4	4-Nov	25360	1588	0.06262	0.04192	0.04569	0.03814
5	5-Nov	25635	1073	0.04186	0.04192	0.04567	0.03816
6	6-Nov	24512	794	0.03239	0.04192	0.04576	0.03808
7	7-Nov	25733	727	0.02825	0.04192	0.04567	0.03817
8	8-Nov	24488	990	0.04043	0.04192	0.04576	0.03808
9	9-Nov	26170	1068	0.04081	0.04192	0.04564	0.03820
10	10-Nov	26735	1581	0.05914	0.04192	0.04560	0.03824
11	11-Nov	25736	600	0.02331	0.04192	0.04567	0.03817
12	12-Nov	24430	510	0.02088	0.04192	0.04577	0.03807
13	13-Nov	25493	959	0.03762	0.04192	0.04568	0.03815
14	14-Nov	25753	825	0.03204	0.04192	0.04567	0.03817
15	15-Nov	25689	2055	0.08000	0.04192	0.04567	0.03817
16	16-Nov	25468	1346	0.05285	0.04192	0.04569	0.03815
17	17-Nov	26000	886	0.03408	0.04192	0.04565	0.0382
18	18-Nov	24323	373	0.01534	0.04192	0.04577	0.03806
19	19-Nov	26007	1495	0.05748	0.04192	0.04565	0.03819
20	20-Nov	24654	854	0.03464	0.04192	0.04575	0.0381
21	21-Nov	25479	475	0.01864	0.04192	0.04569	0.03815
22	22-Nov	25600	1750	0.06836	0.04192	0.04568	0.03816
23	23-Nov	24392	588	0.02411	0.04192	0.04577	0.03807
24	24-Nov	24815	805	0.03244	0.04192	0.04574	0.03810
25	25-Nov	27051	679	0.02510	0.04192	0.04557	0.03826
26	26-Nov	25138	1072	0.04264	0.04192	0.04571	0.03813
27	27-Nov	25019	739	0.02954	0.04192	0.04572	0.03812
28	28-Nov	25726	640	0.02488	0.04192	0.04567	0.03817
29	29-Nov	25136	900	0.03581	0.04192	0.04571	0.03813
30	30-Nov	25744	1668	0.06479	0.04192	0.04567	0.03817
	Total	762662	31970				

Table 2. measurement DPMO and Sigma Level

No	Observation	Amount of Production	Number of Defects	DPU	DPO	DPMO	Sigma Value
1	1-Nov	25348	1940	0.07653	0.015307	15307	3.66
2	2-Nov	25878	1736	0.06708	0.013417	13417	3.71
3	3-Nov	25150	1254	0.04986	0.009972	9972	3.83
4	4-Nov	25360	1588	0.06262	0.012524	12524	3.74
5	5-Nov	25635	1073	0.04186	0.008371	8371	3.89
6	6-Nov	24512	794	0.03239	0.006478	6478	3.99
7	7-Nov	25733	727	0.02825	0.005650	5650	4.04
8	8-Nov	24488	990	0.04043	0.008086	8086	3.90
9	9-Nov	26170	1068	0.04081	0.008162	8162	3.90
10	10-Nov	26735	1581	0.05914	0.011827	11827	3.76
11	11-Nov	25736	600	0.02331	0.004663	4663	4.10
12	12-Nov	24430	510	0.02088	0.004175	4175	4.14
13	13-Nov	25493	959	0.03762	0.007524	7524	3.93
14	14-Nov	25753	825	0.03204	0.006407	6407	3.99
15	15-Nov	25689	2055	0.08000	0.015999	15999	3.65
16	16-Nov	25468	1346	0.05285	0.010570	10570	3.81
17	17-Nov	26000	886	0.03408	0.006815	6815	3.97
18	18-Nov	24323	373	0.01534	0.003067	3067	4.24
19	19-Nov	26007	1495	0.05748	0.011497	11497	3.77
20	20-Nov	24654	854	0.03464	0.006928	6928	3.96
21	21-Nov	25479	475	0.01864	0.003729	3729	4.17
22	22-Nov	25600	1750	0.06836	0.013672	13672	3.71
23	23-Nov	24392	588	0.02411	0.004821	4821	4.09
24	24-Nov	24815	805	0.03244	0.006488	6488	3.98
25	25-Nov	27051	679	0.02510	0.005020	5020	4.07
26	26-Nov	25138	1072	0.04264	0.008529	8529	3.89
27	27-Nov	25019	739	0.02954	0.005908	5908	4.02
28	28-Nov	25726	640	0.02488	0.004976	4976	4.08
29	29-Nov	25136	900	0.03581	0.007161	7161	3.95
30	30-Nov	25744	1668	0.06479	0.012958	12958	3.73
Total		762662	31970				
Average				0.04178	0.00836	8357	3.92

Table 3. Failure Mode and Effect Analysis (FMEA) Blurred

Potential Failure Mode	Potential Consequences of Failure	S	Potential Causes of Failure	O	Company Control	D	RPN	Recommended Action
blurred	Less thick prints on paper so that it looks unclear	7	Man Ink volume is not filled up to standard	8	Ink must be filled according to the same amount/percentage	8	448	1. Pay attention to SOP and increase accuracy during the ink filling process 2. During the production process, there must be periodic ink checks
			Machine settings by the operator are not up to standard	9	Machine settings must be adjusted before printing	8	504	1. conduct supervision and recheck of employee performance to reduce errors 2. Improve training to make employees more skilled in carrying out tasks
			Machine Ink has not been evenly mixed	9	The ink must be mixed with the same amount for good results	6	378	Perform a careful checking of the readiness of the machine before use and also when finished using
			Broken ink pump	4	Make maintenance and repairs	3	84	Perform routine checks and maintenance on each spare part unit and replace it
			Material Plate Defect	4	Check the material before use	4	112	Improve accuracy at the time of material inspection, taking into account the specifications set by the company

Table 4. Failure Mode and Effect Analysis (FMEA) Not Registered

Potential Failure Mode	Potential Consequences of Failure	S	Potential Causes of Failure	O	Company Control	D	RPN	Recommended Action
Not Registered	Prints are not precise	7	Man Less attention to prints	8	Supervised the operator on duty	8	448	1. Pay attention to SOP, conduct supervision and recheck employee performance to reduce errors 2. Warning employees when they make a mistake
			Incorrect install	3	The layout settings should be attached exactly to the plate and should not be tilted	3	63	1. Guide operators to be more careful in installing layouts 2. Improve training to make employees more skilled in carrying out tasks
			Machine roll blanket is damaged/scratched	4	Checking and replacing	3	84	Intensively check the damage to the roll blanket and immediately replace it when it is found to have been damaged
			Print plate shifts	8	Check and fix the plate position setting	5	280	1. Perform a careful checking of the readiness of the machine at the time before and after use 2. The production party always ensures the plate set is by standards

Table 5. Failure Mode and Effect Analysis (FMEA) Imperfect Folds

Potential Failure Mode	Potential Consequences of Failure	S	Potential Causes of Failure	O	Company Control	D	RPN	Recommended Action
Imperfect Folds	There are paper folds that look very disturbing.	7	Man	8	Make improvements to paper tension settings	5	280	1. Provide tighter supervision during the production process 2. Pay more attention to the paper tension settings during the production process. 3. Warning employees when they make a mistake
			Not paying attention to paper tension					
			Machine	7	Check the alignment of the delivery roll before use	7	343	always check the condition of the delivery roll periodically before and after use to minimize the risk of the roll of delivery is not aligned
			Unstable paper tension					
			Material	7	set standard quality paper raw materials supplied by suppliers	6	294	Check the raw materials received from suppliers more thoroughly and check whether they meet the specifications set by the company
			Paper quality is not good					