Application Of Quality Control Of Carton Box In Quality Control Department At PT Purinusa Ekapersada

by Lina Gozali

Submission date: 28-Apr-2021 04:05PM (UTC+0700)
Submission ID: 1572228060
File name: 48._Final_Clara_ticate_2020.pdf (3.91M)
Word count: 256
Character count: 10683

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Program Book

Tarumanagara International Conference on the Applications of Technology and Engineering 2019

November 21st - 22nd, 2019

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(TICATE 2019)

UNTAR

JAKARTA – INDONESIA

WELCOME MESSAGE
BY CHAIRMAN OF TICATE 2019

On behalf of the organizing committee of TICATE 2018, I would like to welcome all delegates to Jakarta, Indonesia with great pleasure. Being held from November 21 to 22, 2019 at Campus I-Jl. Letjen. S. Parman No. 1, Jakarta, the international conference is organized by Universitas Tarumanagara (UNTAR) and technically sponsored by IOP Publisher.

TICATE 2019 has attracted many academicians, scientists, engineers, postgraduates and other professionals from many countries. This conference accepted 215 papers from 5 different countries, those are Australia, Taiwan, India, Malaysia, and Indonesia. The aim of the conference is to promote exchange of ideas among engineers, researchers, and scientists active in the related areas of TICATE.

Our special thank goes to our Rector, Prof. Dr. Agustinus Purna Irawan, who has initiate this international conference, to our Plenary Speakers, Dr.-Ing. Joewono Prasetijo from Universiti Tun Hussein Onn, Malaysia, Prof. Dr. Tjokorda Gde Tirta Nindhia from Udayana University, Indonesia, Prof. Dr. Srikantappa A.S. from Cauvery Institute of Technology, India, Prof. Dr. Mohd. Zulkifli Abdullah from Universiti Sains Malaysia, Malaysia and Prof. Yasuyuki Nemoto, Ph.D. from Ashikaga.

Our special thank also goes to Tarzan Photo and Morin as our patrons. Also to all individuals and organizations such as the members of international editorial board, the conference organizers, the reviewers and the authors, for their contribution in making TICATE 2018 as a successful international conference and a memorable gathering event. I am also grateful for the support of publication service of IOP Publisher. We hope that the conference could present you wonderful memories to bring home in addition to new insights and friendship congregated during the event.

We truly value your participation and support for the conference. We hope that you will enjoy TICATE 2019 and culture and tradition in Jakarta.

Dr. Hugeng, S.T., M.T. (SMIEEE)
CHAIRMAN OF TICATE 2019

FOREWORDS
BY UNTAR RECTOR

Dear our Distinguished guests, ladies and gentlemen,

It is such a great pleasure for me to welcome all the participants to the Tarumanagara International Conference on the Applications of Technology and Engineering (TICATE) 2019. It is the first international conference which is organized by Universitas Tarumanagara in the field of technology and engineering whose proceedings will be indexed by Scopus. With the success of this first TICATE, I hope this event would be held annually.

As we all know, the goal of this conference is to provide a forum that facilitates the exchange of knowledge and experience of both practitioners and academics in the fields of the applications of technology and engineering. Under these circumstances, they can mutually share their findings. Besides, the topic itself, which is about the Implementation of Research Results and Innovation for People's Prosperity, is extremely interesting. I can agree with the conference committee that a little thing has been done to provide comprehensive understanding of the importance of technology and engineering to support people's prosperity.

I would like to take this opportunity to extend my appreciation to the following institutions. Firstly, this year's conference becomes special due to the support from our Plenary Speakers: , Dr. Ing. Joewono Prasetijo from Universiti Tun Hussein Onn Malaysia, Malaysia, Prof. Dr. Tjokorda Gde Tirta Nindhia from Udayana University, Indonesia, Prof. Dr. Srikantappa A.S. from Cauvery Institute of Technology India, India, Prof. Dr. Mohd Zulkufli Abdullah from Universiti Seins Malaysia, Malaysia, and Prof. Yasuyuki Nemoto, Ph.D. from Ashikaga University. We are thankful for your wonderful cooperation. Secondly, our gratitude goes to our sponsors: Tarzan Photo, and Morin for the utmost support and kind contribution.
I would also sincerely say thanks to the organizing committee for their commitment, hard work and dedication, making this internationally reputable conference successfully realizable.

Finally, I would like to express my gratitude for the presence of distinguished speakers, authors, reviewers, and a number of active participants from several countries. I wish you all a wonderful and great conference. Thank you.

Prof. Dr. Ir. Agustinus Purna Irawan, Asean Eng.
RECTOR OF UNIVERSITAS TARUMANAGARA

TIME AND VENUE OF INTERNATIONAL CONFERENCE

The International Conference will be held with following details:

Venue	:	Auditorium Building "M", 8th Floor, Campus I Universitas Tarumanagara Jalan Letjen S. Parman No. 1, Grogol, Jakarta Barat, Indonesia, 11440
Date	:	21-22 November 2019
Time	:	08.00 – 17.00 WIB

2. SPEAKER

Plenary Session

Keynote Speaker:

1. Dr. Ing. Joewono Prasetijo

(Universiti Tun Hussein Onn Malaysia, Malaysia)

2. Prof. Dr. Tjokorda Gde Tirta Nindhia

(Udayana University, Indonesia)

Invited Speakers:

1. Prof. Dr. Srikantappa. A.S.

(Cauvry Institute of Technology India, India)

2. Prof. Dr. Mohd Zulkifli Abdullah

(Universiti Sains Malaysia, Malaysia)

3. Prof. Yasuyuki Nemoto, Ph.D

(Ashikaga University, Japan)

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4. TOPIC AREA

Scientific fields of the implementation of Tarumanagara International Conference on the Applications of Technology and Engineering 2019 (TICATE 2019) are as follows:

Track	Subtrack
Mechanical Engineering and Technology	Hydraulic and Pneumatics System; Fluids & Thermal Systems; Dynamics and Mechanical Vibrations; Mechanical Design and Manufacturing; Microsystems Integration; Cooperative Intelligent Systems; Advances for Process Industries; Power Generation – Conventional and Renewable; Computer Integrated Manufacturing; Design and Manufacturing Engineering; Industrial and Systems Engineering; Mechatronics and Automation; Operations Research; Production Planning and Control; Textile and Leather Technology
Electrical Engineering	Power Generation; Transmission and Distribution; Power Electronics, Systems and Applications; Electrical Machines and Adjustable Speed Drives; Electrical Power Systems; Circuits and Systems; Communication Systems; Analog and Digital Electronics; Electric Drives and Control; Instrumentation Engineering; Power System Engineering; Smart Grids Technologies & Applications; Computer Application Technology; Control Technology; Telecommunication Engineering; Network Engineering Communication; Signal and Image Processing; 4G/3G/LTE Mobile Networks Applications; Renewable Energy Sources, Smartgrids Technology & Application; High Voltage Engineering and Insulation Technology Controls

Track	Subtrack
Industrial Engineering	Quality Engineering & Management (QM), Supply Chain Management, operation research (OR), Decision Support System and Artificial Intelligence (DSS & AI), Production System (PS), Industrial Management (IM), Ergonomics (ER)
Civil and Environmental Technology	Bridge and Tunnel Engineering, Geotechnical Engineering, High-rise Structure and Large-span Structure, Modern Trends in Civil Eng., Structural Engineering, Surveying, Transportation Engineering, Water resource Engineering, Coastal Engineering, Computational Mechanics, Construction Technology, EngineeringManagement, Environmental Management, Environment-Friendly Construction and Development, Hydraulic Engineering, Safety Management
Food and Agriculture Technology	Agricultural Machinery, Biotechnology, Bio Fuel, Food Processing, Food Safety, Technologies in secure food packaging, Irrigation & water management, Forest and Natural Resource Management, New strategies in food packaging
Informatic Engineering and Technologies	Computer Application Technology, Software Engineering, Multimedia Technology, Mobile Computing, Artificial Intelligence, Computer Vision, Information Systems, Database Systems
Medical & Health Technology	Active Implantable Technology, Electromechanical Medical Technology, Hospital Hardware, Ophthalmic and Optical Technology, Dental Technology, Laboratory Equipment, Reusable Instruments, Technical Aids for Disabled

5. PROGRAM AT A GLANCE

Tarumanagara International Conference on the Applications of Technology and Engineering
Jakarta, 21-22 November 2019

Day 1 (Thursday, 21 November 2019)

TIME	ACTIVITY
08.30 – 09.00	Registration & Coffee Morning
09.00 – 09.15	**Opening Ceremony** • Singing "National Anthem" & " Mars Tarumanagara" • Traditional Dance • Report from Chairman: Dr. Hugeng (SMIEEE)
09.15 – 09.30	**Welcome Speech:** Rector of Universitas Tarumanagara Prof. Dr. Agustinus Purna Irawan (ASEAN Engineer) **Untar Video Profile**
09.30 – 11.45	**Keynote Speaker:** 1. Dr. Ing. Joewono Prasetijo (Universiti Tun Hussein Onn Malaysia, Malaysia) 2. Prof. Dr. Tjokorda Gde Tirta Nindhia (Udayana University, Indonesia) **Invited Speakers:** 1. Prof. Dr. Srikantappa A.S. (Cauvry Institute of Technology India, India) 2. Prof. Dr. Mohd Zulkifli Abdulleh (Universiti Sains Malaysia, Malaysia) 3. Prof. Yasuyuki Nemoto, Ph.D. (Ashikaga University)
11.45 - 12.00	Souvenir Presentation & Photo Session
12.00 - 13.00	Lunch Break
13.00 – 15.00	Paper Presentation Session I
15.00 – 15.15	Coffee & Tea break
15.15 – 17.15	Paper Presentation Session II

Day 2 (Friday, 22 November 2019)

TIME	Activity
08.30 – 08.30	Registration & Coffee Morning
08.30 – 11.30	Paper Presentation Session III
11.30 – 13.00	Lunch Break
13.00 – 16.00	Paper Presentation Session IV

PARALLEL SESSION SCHEDULE
Friday, 22 November, 2019

Room : Conference Room 6
Time : 08.30 – 11.45
Track : Industrial Engineering

NO	SCHEDULE	PAPER TITLE	AUTHORS	INSTITUTION
9	10.45 – 11.00	Application of quality control of carton box in quality control department at PT Purinusa Ekapersada	Clara Puspita Ningrum, Lina Gozali and Lamto Widodo	Universitas Tarumanagara
10	11.00 – 11.15	Redesign Layout Planning of Raw Material Area and Production Area Using Systematic Layout Planning (SLP) Methods (Case Study of CV Oto Boga Jaya)	Bintang Bagaskara Korda, Lina Gozali and Lamto Widodo	Universitas Tarumanagara
11	11.15 – 11.30	Understanding of Customer Services Based on Value Chain Strategy and Practical Instructions for Hospital Financial Management at Miriam Pratama Clinic, Kudus, Central Java	Roni Setyawan	Universitas Tarumanagara
12	11.30 – 11.45	Aggregate and Disaggregate Production Planning, Material Requirement, and Capacity Requirement in PT. XYZ	Fransiska Lefta, Lina Gozali and Iveline Anne Marie	Universitas Tarumanagara

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Application Of Quality Control Of Carton Box In Quality Control Department At PT Purinusa Ekapersada

IOP Conf. Series: Materials Science and Engineering **852** (2020) 012121 doi:10.1088/1757-899X/852/1/012121

Application Of Quality Control Of Carton Box In Quality Control Department At PT Purinusa Ekapersada

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Abstract. This study aims to identify the cause of defect produced at PT Purinusa Ekapersada. Quality control (QC) is a process to measure the quality of an item by comparing it according to the specifications and requirements asked by the customer, or it can be said also as an effort to maintain the quality of the goods produced in accordance with predetermined specifications based on the customer's request. The method used to reduce various types of defects produced by PT Purinusa Ekapersada was analyzed using the Pareto diagram to indicate the type of defect and the most of the control chart that produced defects were still within the control limits, a fishbone diagram describe various disabilities, and a 4M1E Why Analuysis to determine the causes and consequences of events.

1. Introduction

PT Purinusa Ekapersada is manufacturing company that produce carton box based on customer's order. This company has already had a number of loyal customers which always repeat the order of the products. To maintain the loyalty of the customer and to attract more customer, the quality of its products must be controlled.

PT Purinusa Ekapersada produces several kinds of carton box according to the specification that are given by each customer. There are 2 type of basic carton that are used in producing the carton box in this company, they are a single wall carton and double wall carton. A single wall carton consists of 3 layers of paper and a double wall carton 5 layers of paper.

In this report, the authors will discuss the topic of application of Quality Control in the production of carton boxes at PT Purinusa Ekapersada by analyzing the cause of the reject products and what action should be taken to overcome and prevent the defects. The tools used are Control Chart, to reduce the variation of the defects, Pareto diagram, to identify the various type of defects, Fishbone diagram, to describe various causes and disabilities, and 4M1E Why Analysis to determine the cause of the problem and how to overcome it.

2. Method and materials

2.1. Sample preparation

The sample was the production of carton box at PT Purinusa Ekapersada in July 2019. The daily production of carton box in July 2019 was noted and the percentage of the defect produced daily was calculated.

2.2. Method

Pareto diagram is used to identify the various type of defects of the carton box produced in PT Purinusa Ekapersada. Based on the type and number of defects obtained from the quality control process, the data on the number of defective products per type of defect in carton box products can be analyzed [1].

The control chart is a graph used to study how a process changes over time. Data are plotted in time order. A control chart always has a central line for the average, an upper line for the upper control limit and a lower line for the lower control limit. These lines are determined from historical data [2].

The fishbone show the root of the problem [2]. Based on the fishbone diagram of the, it can be seen the causes of defects in the defective products. The cause of the defect itself is divided into several categories, namely 4M (Man, Material, Machine, Method,) and Environment [3].

3. Results and discussion

3.1. Pareto diagram

In July 2019, PT Purinusa Ekapersada produced 2.758.491,15 kg of carton box. The data of the type and number of defect of carton box produced in July 2019 and the pareto diagram can be seen in Table 1 and Figure 2.

Table 1. Data of defective products in July 2019

Type of Defect	Total (kg)	Percentage
Krepek	5369,16	32,34%
Running Score	3426,06	20,64%
Convex Bond	2488,20	14,99%
Wrong Schedule	1455,58	8,77%
Miss Print	959,40	5,78%
Wrong Transfer Slip	812,83	4,90%
Unstandard Colour	635,40	3,83%
Torn, Broken	324,76	1,96%
Unstandard Amount per Bunch	218,40	1,32%
Box Compression Test below Standard	208,80	1,26%
Unconfirmed Driver	188,16	1,13%
Glue not Sticky	167,06	1,01%
Gap Joint not Standard	96,90	0,58%
Stripped Sheet	84,08	0,51%
Wrong Design	80,70	0,49%
Unstandard Sheet	55,52	0,33%
Broken Sheet	29,68	0,18%
Total	16600,69	100%

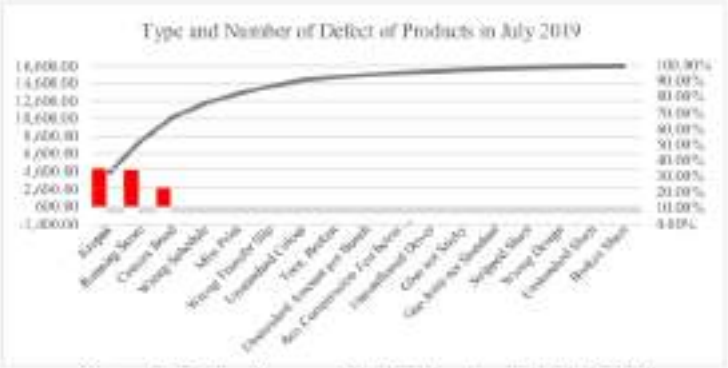

Figure 1. Pareto diagram of defect of products in July 2019

3.2. Control chart

Control charts for variable data are used in pairs. Top chart monitors the average, or the centering of the distribution of data from the process. Bottom chart monitors the range or the width of the distribution [2]. Calculation table of UCL, CL and LCL can be seen in Table 2.

Table 2. Calculation of UCL, CL and LCL of Carton Box Production in July 2019

Day	Defect (kg)	Products (kg)	Defect Proportion	UCL	CL	LCL
1	530,31	89332,31	0,006	0,19	0,06	-0,07
2	535,22	89423,98	0,006	0,19	0,06	-0,07
3	535,42	88567,09	0,006	0,19	0,06	-0,07
4	536,43	86564,34	0,006	0,19	0,06	-0,07
5	536,22	89734,54	0,006	0,19	0,06	-0,07
6	534,25	89145,54	0,006	0,19	0,06	-0,07
7	539,36	90332,21	0,006	0,19	0,06	-0,07
8	534,63	88121,34	0,006	0,19	0,06	-0,07
9	535,65	88562,98	0,006	0,19	0,06	-0,07
10	530,44	89653,53	0,006	0,19	0,06	-0,07
11	536,78	89453,55	0,006	0,19	0,06	-0,07
12	534,65	88856,66	0,006	0,19	0,06	-0,07
13	535,62	88211,31	0,006	0,19	0,06	-0,07
14	535,63	89543,33	0,006	0,19	0,06	-0,07
15	536,43	89892,43	0,006	0,19	0,06	-0,07
16	534,43	88544,65	0,006	0,19	0,06	-0,07
17	534,56	88367,44	0,006	0,19	0,06	-0,07
18	538,76	88665,76	0,006	0,19	0,06	-0,07
19	534,77	88543,67	0,006	0,19	0,06	-0,07
20	535,99	88989,54	0,006	0,19	0,06	-0,07
21	539,63	90889,55	0,006	0,19	0,06	-0,07
22	535,23	88652,40	0,006	0,19	0,06	-0,07
23	538,11	88819,43	0,006	0,19	0,06	-0,07
24	530,77	88365,32	0,006	0,19	0,06	-0,07
25	538,76	89564,32	0,006	0,19	0,06	-0,07
26	535,55	88566,98	0,006	0,19	0,06	-0,07
27	535,44	88790,43	0,006	0,19	0,06	-0,07
28	535,66	89823,54	0,006	0,19	0,06	-0,07
29	534,66	88432,11	0,006	0,19	0,06	-0,07
30	535,34	89342,32	0,006	0,19	0,06	-0,07
31	535,94	88432,44	0,006			
Total	16600,64	2758491,15	0,187			

Control chart of the defective products in July 2019 can be seen in Figure 2.

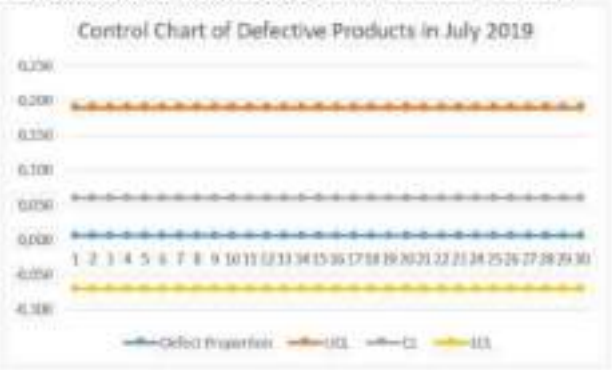

Figure 2. Control chart of the defective products in July 2019

3.3. Fishbone diagram

Of all types of defects found in carton box produced at PT Purinusa Ekapersada, the type of "krepek" and "score lari" are the most common types of defects that occurred in July 2019, as many as 32.34% and 20.64% of the total number of defects found . The fishbone diagram of the "krepek" defect can be seen in Figure 3 [4].

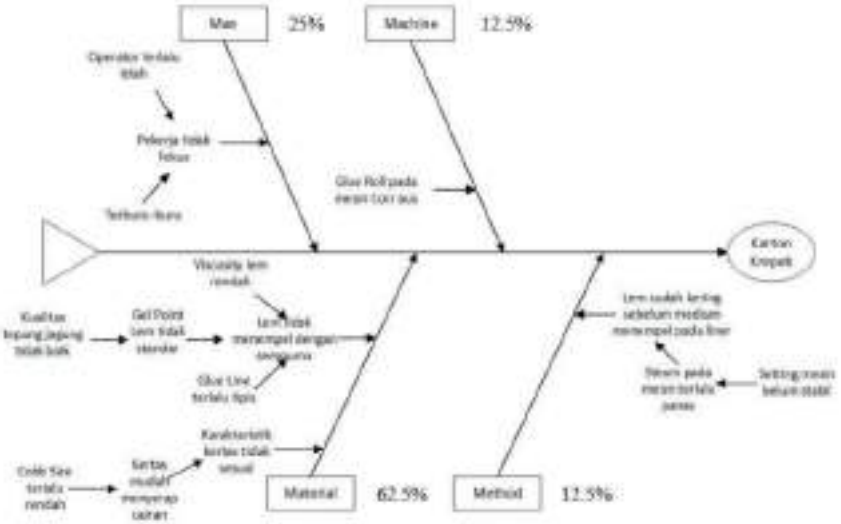

Figure 3. Fishbone diagram of "krepek" defect

3.4. 4M1E Why analysis

Based on the fishbone diagram of the "krepek" type defects above, it can be seen the causes of defects in the defective products. The cause of the defect itself is divided into several categories, namely 4M (Man, Material, Machine, Method,) and Environment. Why Analysis table of the types of "krepek" defects in the carton box production process at PT Purinusa Ekapersada can be seen in Table 3.

Table 3. 4M1E Why analysis of "krepek" defect

Analysis	Root Cause(s)	Action
Man	Operator didn't focus during the production process	Safety talk is given in every shift change
Material	The characteristics of the paper didn't match and each layer didn't stick properly	Conduct material inspection, namely paper, corn flour, glue and sheets produced
Machine	The Glue Roll on the Corrugator machine was worn	A skilled technician is required to carry out regular maintenance on the machines used
Method	The steam used to heat the paper on the Corrugator machine was too hot	Wait a few moments when the engine has just started so the temperature is stable

4. Conclusion

The method used to reduce various types of defects produced by PT Purinusa Ekapersada was analyzed using the Pareto diagram to identify the type of defect, control chart to show that the defects produced were still within the control limits, a fishbone diagram to describe various disabilities, causes and consequences of events, and a 4M1E Why Analysis to determine the cause as well as the action needed to overcome the defects. Most of the defect produced in July 2019 were "krepek", that is the condition when the layers of the paper do not stick properly. The main cause of that type of defect is the material, which are the paper itself and also the glue used in the production process. The action that can be taken to reduce this type of defect is inspection of the material.

5. References

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[2] Gozali, L., Liearda, K., Jap, L., & Daywin, F. J. (2019, April). Analysis of Mak Diesel Engine Services at Merawang Power Plant Using FMEA Method. In IOP Conference Series: Materials Science and Engineering (Vol. 508, No. 1, p. 012083). IOP Publishing

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