การวิเคราะห์การบริหารจัดการร้านค้าในห่วงโซ่การดำเนินการค้าปลีก กรณีของบริษัท ทรูคอร์ปอเรชั่น จำกัด (มหาชน)

ANALYSIS OF STORE MAINTENANCE MANAGEMENT IN RETAIL CHAIN OPERATION THE CASE OF TRUE CORPORATION PUBLIC COMPANY LIMITED

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บทคัดย่อ

งานวิจัยนี้ศึกษากระบวนการซ่อมแซมภายในแผนกซ่อมบำรุงของบริษัท ทรูคอร์ปอเรชั่น จำกัด (มหาชน) โดยใช้ระยะเวลาในการซ่อมแซมเป็นตัวแปร และการวัด ผู้วิจัยรวบรวมข้อมูลจากสาขารวม 236 สาขา และข้อมูลการแจ้งเตือนการซ่อมแซมทั้งหมดในปี 2560-2561 แบ่งออกเป็นกลุ่มงานซ่อมต่าง ๆ ของ 3 หมวดหลัก คือ หมวดสารสนเทศ หมวดที่ไม่ใช่ระบบสารสนเทศ และหมวดอาหารและเครื่องดื่ม แบบฟอร์มข้อมูลถูกจัดเป็นกลุ่มเล็ก ๆ เพื่อให้สามารถวิเคราะห์ข้อมูลทางสถิติโดยแบ่งข้อมูลออกเป็นกลุ่มดังนี้พื้นที่กลุ่มซ่อมย่อยเวลาซ่อมและค่าซ่อมจาก 3,103 รายการ กระบวนการที่ใช้ในการวิเคราะห์ข้อมูลสามารถนำไปใช้โดยใช้วิธีการของแผนภูมิควบคุมและแผนภูมิ เอ็กซ์บาร์ อาร์ ชาจ์ต สำหรับกลุ่มย่อย ผลลัพธ์คือการวิเคราะห์กลุ่มของการแจ้งซ่อมที่เกินมาตรฐานของข้อตกลงระดับการให้บริการและความเป็นไปได้ของการแจ้งเตือนการซ่อมแซมในแต่ละกลุ่มซ่อม การศึกษานี้จะใช้สำหรับการคาดการณ์และให้ความสำคัญกับการแจ้งเตือนการซ่อมแซมครั้งต่อไป จากผลการศึกษาครั้งนี้เป็นไปได้ที่จะจัดการกระบวนการซ่อมแซมหรือลำดับความสำคัญในการบำรุงรักษาในแต่ละกลุ่มซ่อม ผลลัพธ์ของการวิจัยนี้อาจใช้เป็นแนวทางสำหรับการพัฒนาที่สำคัญและประสิทธิภาพในร้านค้า นอกจากนี้ยังจะแนะนำว่า บริษัทและผู้ค้าปลีกรายอื่นควรทบทวนกลยุทธ์ของพวกเขาเกี่ยวกับการบำรุงรักษาร้านค้าอย่างไร การค้นพบอาจเป็นประโยชน์สำหรับเจ้าของร้านเพื่อค้นหากลยุทธ์ที่เหมาะสมในการจัดการกับการบำรุงรักษาที่เป็นไปได้และค่าใช้จ่าย

คำสำคัญ: การจัดการร้านค้า การดำเนินงานค้าปลีกในเครือ การยกระดับเครือข่ายค้าปลีก

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Abstract

This research studied the repair process within the maintenance department of True Corporation Public Company Limited, using the timing of the repair period as variables and measurement. The researcher collected the data from a total of 236 branches and all repair notification information in the year 2017-2018, divided into various repair workgroups of 3 main categories which are IT, Non-IT and Food and Beverage. The data form was organized into small groups in order to be able to analyze statistical data by dividing the data into groups as follows: area, sub-repair group, repair time, and repair costs from 3,103 records. The process was used to analyze data using the method of Control Chart and X-bar R chart for the subgroup. The result showed the analysis of groups of repair notifications exceed the standard of service level agreement and the possibility of repair notification in each repair group. This study showed forecasting and giving priority to the next repair notifications. From the results of this study, it was possible to manage the repair process or maintenance priority in each repair group. The results of this research might serve as a guideline for key developments and performance in stores. It would also guide how the company and other retailers should reconsider their strategies about store maintenance. The finding might be useful for store owners to find the appropriate strategies in dealing with the possible maintenance and its cost.

Keywords: Store Management, Retail Chain Operation, Enhancement of Retail Chain

Introduction

General business operations must admit that part of the business is to touch the point with the customer, no matter which way. Customer is a part of any business chain and end user. In other words, it is part of the corporate income. True Corporation Public Company Limited builds retail shops to serve customers and provide customer experience and access to the products and services. In the year 2018, There are 236 stores to serve customers all over Thailand. There are 6 styles of shop divided into:

1) True Coffee
2) True Shop
3) True Branding Shop
4) True Sphere
5) True Space
6) True Lab

Each style is unique to meet the needs of each customer's lifestyle. With this, the retail shops are the front end that directly affects the customer. Maintenance management, according to Boonyasopon, Yuphong and Atawinijtrakarn (2014) for the shop to remain in good condition and be able to use it perfectly at all time was very important because it would affect the customer experience and directly affect the brand of the organization.

In this research, the quality control of the maintenance within the department is to control the quality of each retail shops to be in good condition, always ready to use and perform quick repairs according to the service level agreement.

Objectives

1. To find factors of inferior quality problems in the repair process.
2. Find ways to improve to increase the efficiency of the repair process.

Research Process

1. Collect all repair notification information from 2017- 2018 log file from maintenance records (N=3,097 records.)
2. Study information and format data to be able to enter into the statistical process
3. Importing data into statistical processes of Control Chart, Control Chart X-bar R chart and to find probability of each work groups.

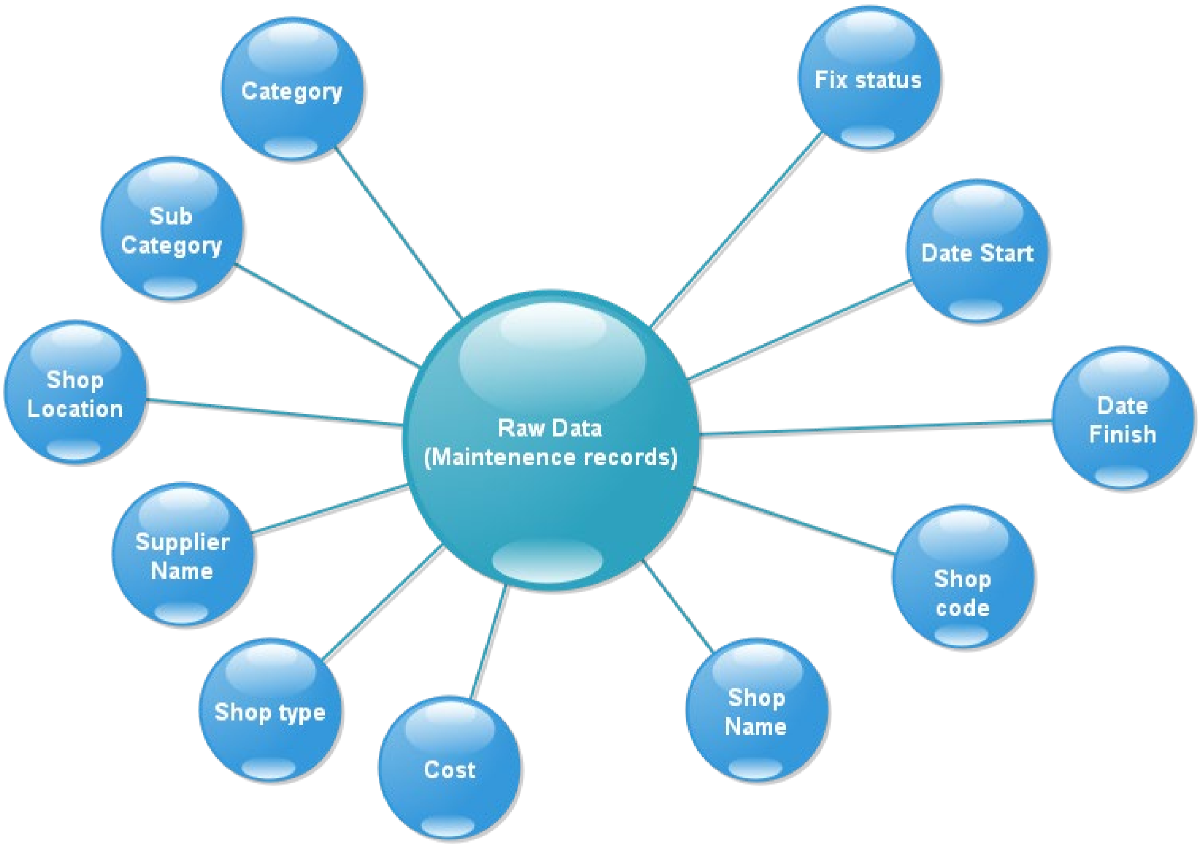

Figure 1 Attributes of raw data

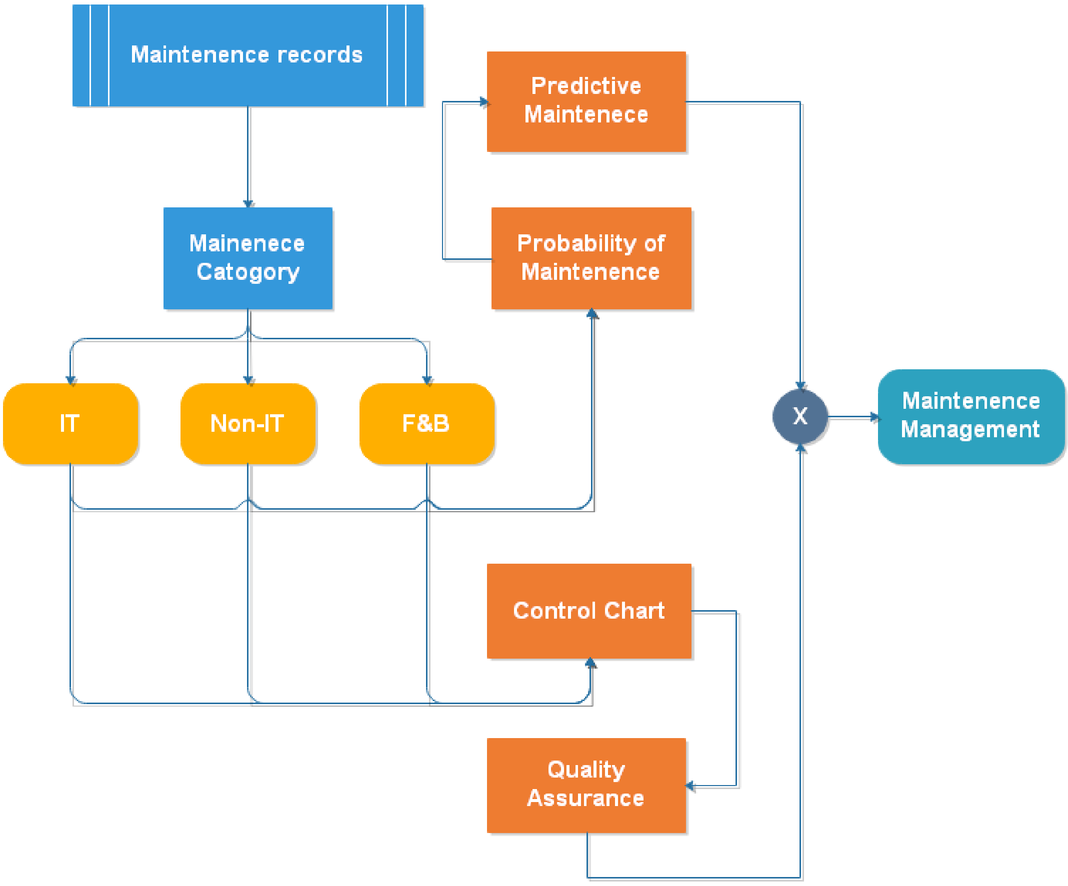

Figure 2 Data flow chart

Research methodology

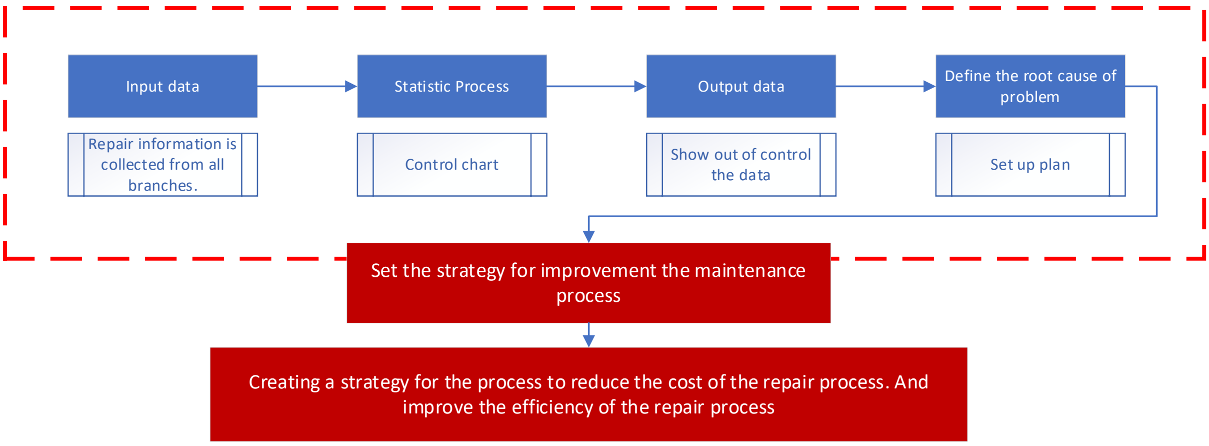

Figure 3 Conceptual Framework

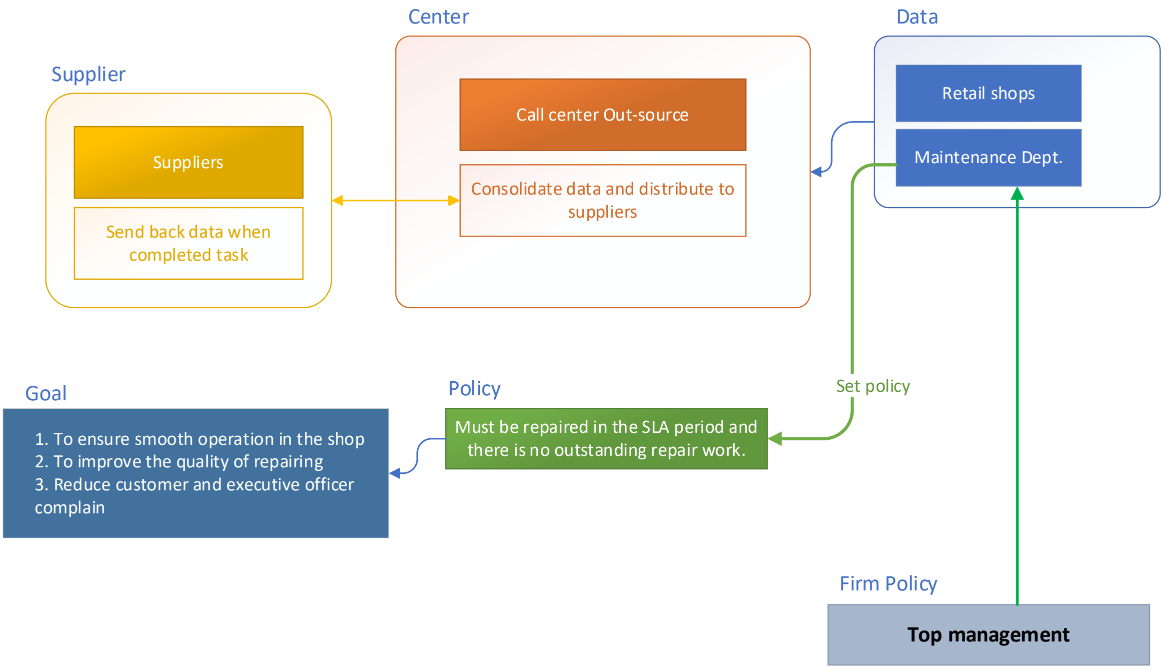

Figure 4 Linking policy making plans and data flow

From figures 3 and 4 the conceptual framework.

1. To find problems in the repair notification process, which key components cause repair notifications in the true retail shop to be of poor quality

2. Number of repair notifications from January 2017 to December 2018 in the amount of 3,097 records.

3. The repair period is the variable for making the Interval upper bound and lowers bound of data.

Literature review

From the collection of data that has been collected, the researcher plotted the Control chart (Jaemsopon, 2009) with content referenced from This literature explained one tool in the quality control process, which was 1 in 7 tools of Quality control, using tools called control charts in the monitoring process. A control chart was a tool for checking process changes to quickly fix inferior quality and not cause damage.

Principles of control charts

There are many control charts classified by usage, but the basic principles of different control plans are the same.

Types of control charts

Control charts can be categorized into two main categories: Attribute control charts and Variable control charts. The attribute control chart consists of the following components

- P-Chart

- NP-Chart
- C-Chart
- U-Chart

The Variable control chart consists of the following components

- X-bar Chart
- R-Chart
- S-Chart
- X-Chart
- Moving rang-Chart

From the process of creating a control plane of a reference document in the general P-Chart or Attribute control chart, it cannot be processed. The chart format according to figures 6,7 and 8, to find the upper bound and lower bound shows a 1.5 sigma shift within the graph. The graph cannot predict the data because the amount of data N is too large and the data fluctuations in each subgroup are large resulting in the upper bound and lower bound in the graph having a high interval. As a result, the plot of the normal control chart cannot read. The researcher was unable to know the suitable upper bound and lower bound. Resulting in reading errors. Therefore, the process of using General P-chart cannot be used in this research process, the researcher uses a re- group by using the subcategory in order to provide information in the form that can be calculated for Upper bound, Lower bound. As well as finding the frequency of the data and plot histogram and finding the probability of data and probability of occurrence in each subgroup by finding the probability of occurring according to table 1, 2, 3 and the cumulative probability according to probability graph.

$$P(A \mid B) = \frac{P(A \cap B)}{P(B)}$$

Cumulative Distribution function

$$F_X(x) = P(X \leq x)$$

$$P(a < X \leq b) = F_X(b) - F_X(a)$$

To find the necessary accumulation according to the table 1, 2 and 3.

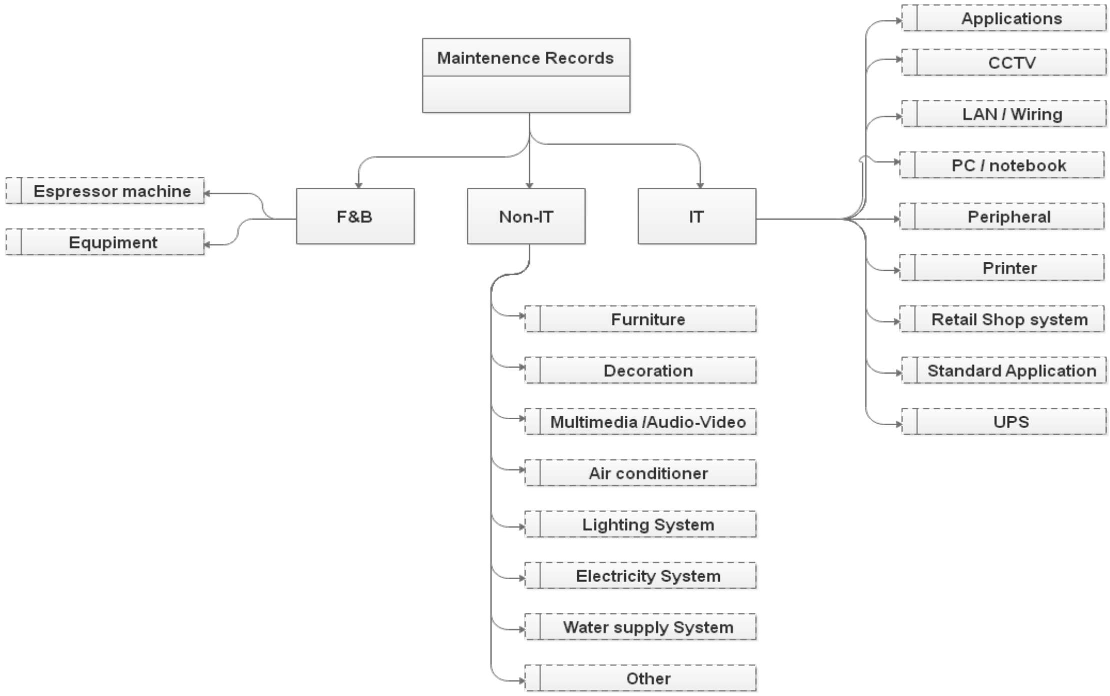

Figure 5 Grouping of research data, from raw data, there are 3 large groups divided into F&B, IT and Non-IT, with each of the big groups having small groups as in the Figure.

The researcher has tested data distribution by plotting normal distribution of data for 3 categories in order to find if they are normal distribution or normal curve. The data of 3 categories are in the normal curve that is tilted to the left. Because the frequency of the repair notification information is in the period of 0-1,000 minutes, by looking at the probability table, table 1, 2 and 3 and the graph in figure 9, 11 and 13.

In figures 9,11 and 13, it is a cumulative probability of repair periods. It is found that most of the principles of Pareto, which is 1 in quality control tools Found that the repair period is in the service level agreement. The duration is not longer than specified in the main policy as mentioned above in the conceptual framework, to deepen the process, a new plot graph method is needed and the X-bar R chart with subgroup to find the out of control.

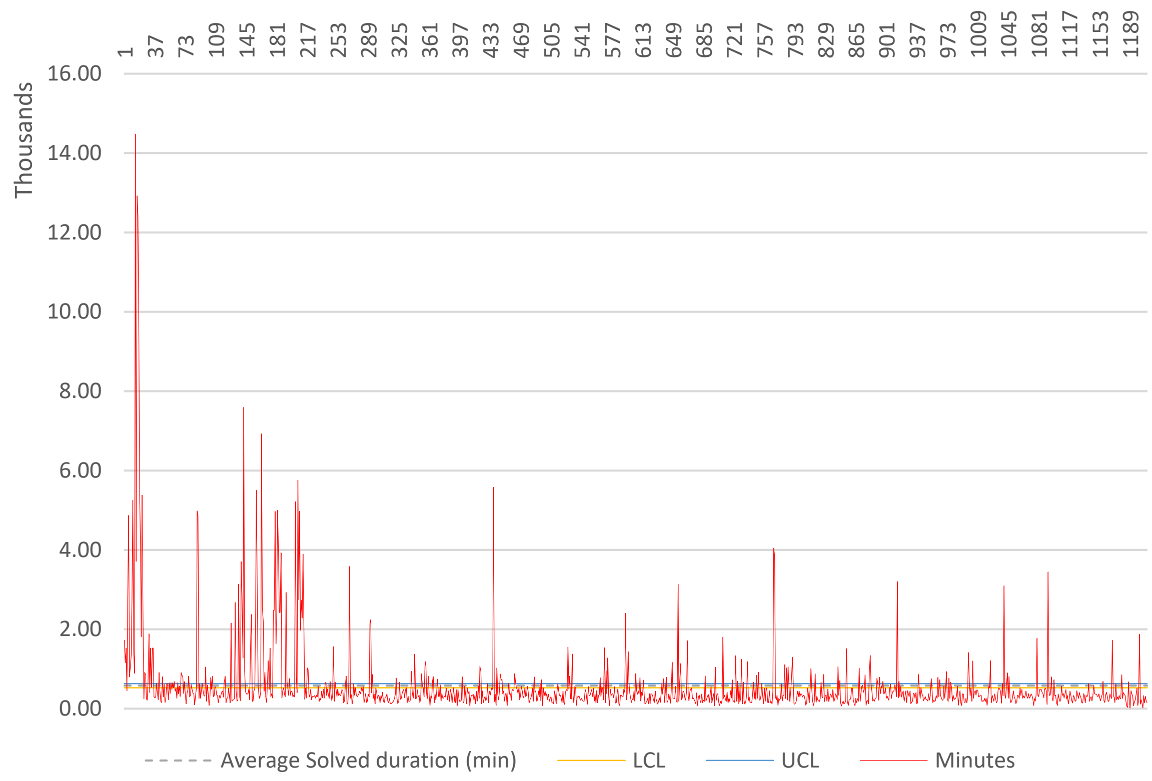

Figure 6 General P-chart control chart of the Non-IT group

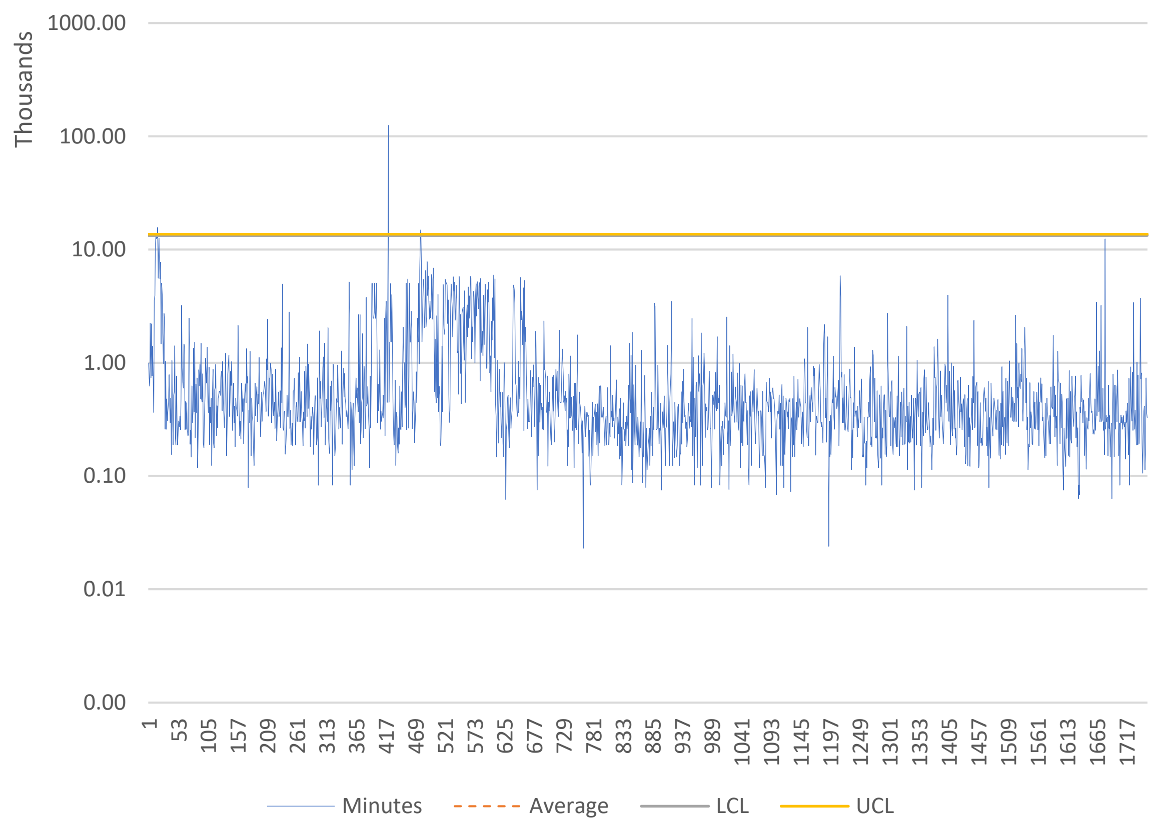

Figure 7 General P-chart control chart of the IT group

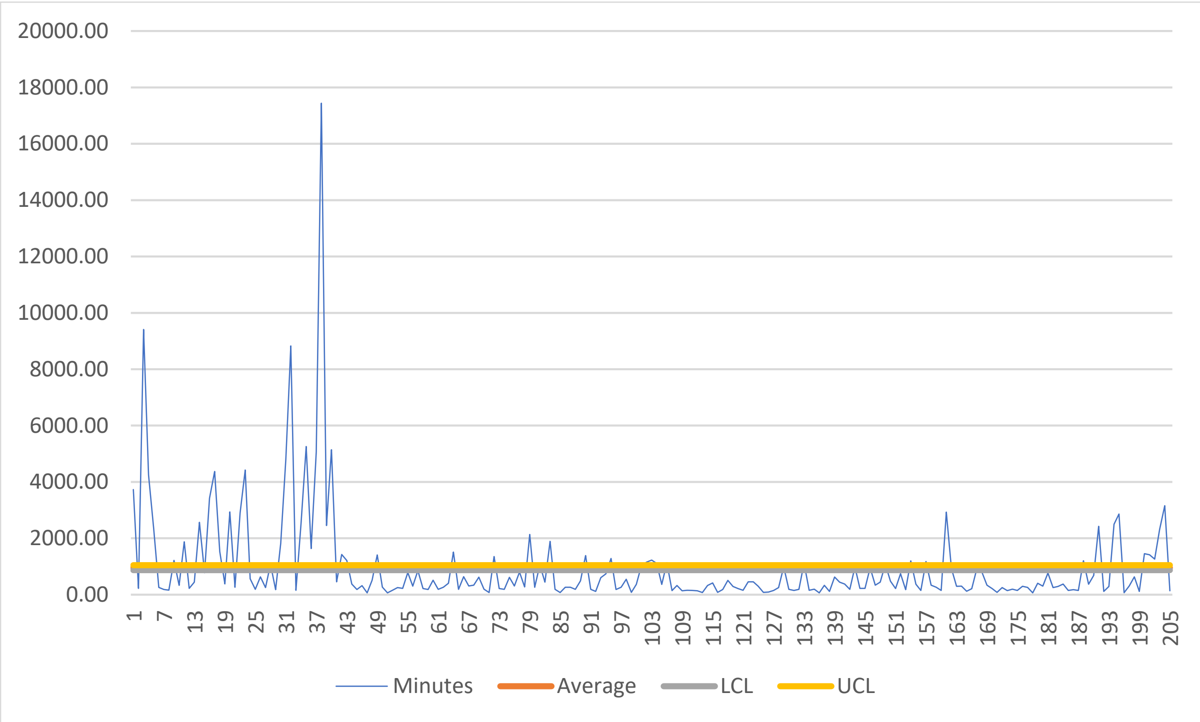

Figure 8 General P-chart control chart of the food & beverage group

Table 1 The probability density function of repair for Non-IT Group

Min	Freq	Cum freq	Cum%	%	Prop.
0-1000	1099	1099	90.902%	90.902%	90.902%
1001-2000	53	1152	95.285%	4.384%	4.384%
2001-3000	23	1175	97.188%	1.902%	1.902%
3001-4000	13	1188	98.263%	1.075%	1.075%
4001-5000	8	1196	98.925%	0.662%	0.662%
5001-6000	7	1203	99.504%	0.579%	0.579%
6001-7000	1	1204	99.586%	0.083%	0.331%
7001-8000	1	1205	99.669%	0.083%	0.331%
8001-9000	0	1205	99.669%	0.000%	0.000%
9001-10000	1	1206	99.752%	0.083%	0.331%
10001-11000	0	1206	99.752%	0.000%	0.000%
11001-12000	0	1206	99.752%	0.000%	0.000%
12001-13000	2	1208	99.917%	0.165%	0.165%
13001-14000	0	1208	99.917%	0.000%	0.000%
14001-15000	1	1209	100.000%	0.083%	0.331%

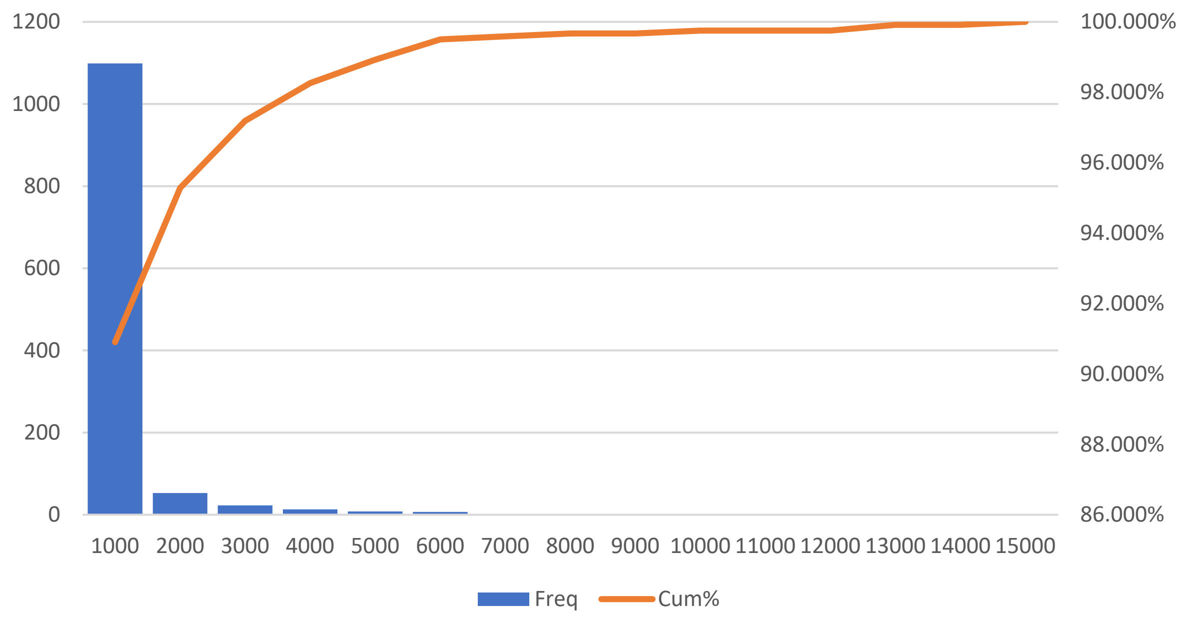

Figure 9 Graph of the probability density function of repair for Non-IT group

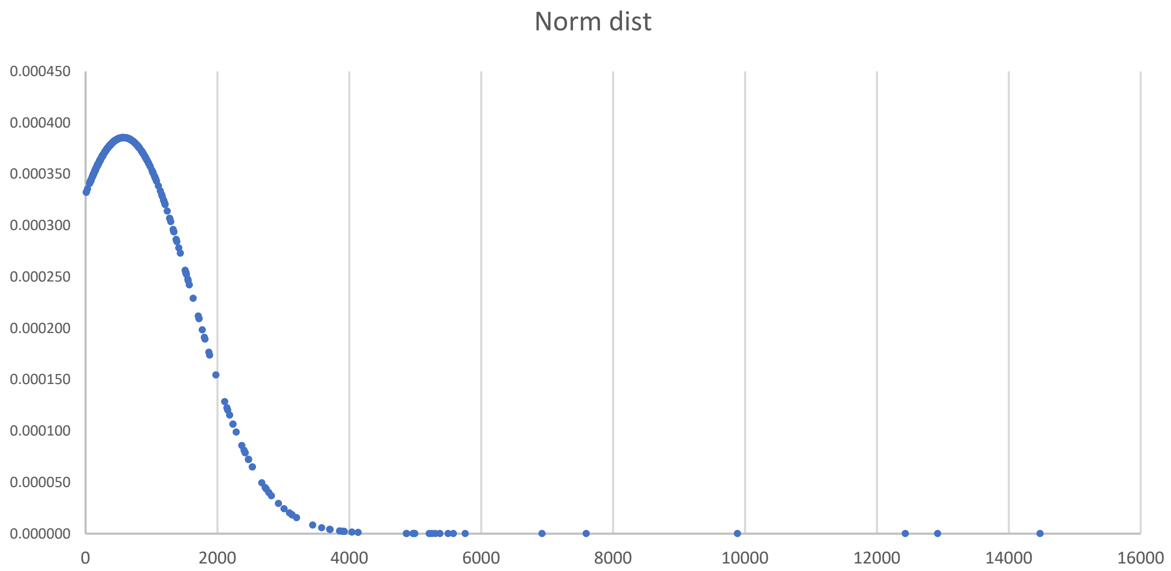

Figure 10 Data distribution for Non-IT group

Table 2 The probability density function of repair for IT group

Min interval	**Freq.**	**Freq Cum**	**Cum%**	**%**	**Prop**
0-5000	1702	1702	97.04%	97.04%	97.04%
5001-10000	42	1744	99.43%	2.39%	2.39%
10001-15000	8	1752	99.89%	0.46%	0.46%
15001-20000	1	1753	99.94%	0.06%	0.11%
20001-25000	0	1753	99.94%	0.00%	0.00%
25001-30000	0	1753	99.94%	0.00%	0.00%
30001-35000	0	1753	99.94%	0.00%	0.00%
35001-40000	0	1753	99.94%	0.00%	0.00%
40001-45000	0	1753	99.94%	0.00%	0.00%
45001-50000	0	1753	99.94%	0.00%	0.00%
50001-55000	0	1753	99.94%	0.00%	0.00%
55001-60000	0	1753	99.94%	0.00%	0.00%
60001-65000	0	1753	99.94%	0.00%	0.00%
65001-70000	0	1753	99.94%	0.00%	0.00%
70001-75000	0	1753	99.94%	0.00%	0.00%
75001-80000	0	1753	99.94%	0.00%	0.00%
80001-85000	0	1753	99.94%	0.00%	0.00%
85001-90000	0	1753	99.94%	0.00%	0.00%
90001-95000	0	1753	99.94%	0.00%	0.00%
95001-100000	0	1753	99.94%	0.00%	0.00%
100001-105000	0	1753	99.94%	0.00%	0.00%
105001-110000	0	1753	99.94%	0.00%	0.00%
110001-115000	0	1753	99.94%	0.00%	0.00%
115001-120000	0	1753	99.94%	0.00%	0.00%
120001-125000	0	1753	99.94%	0.00%	0.00%
125001-130000	1	1754	100.00%	0.06%	0.11%

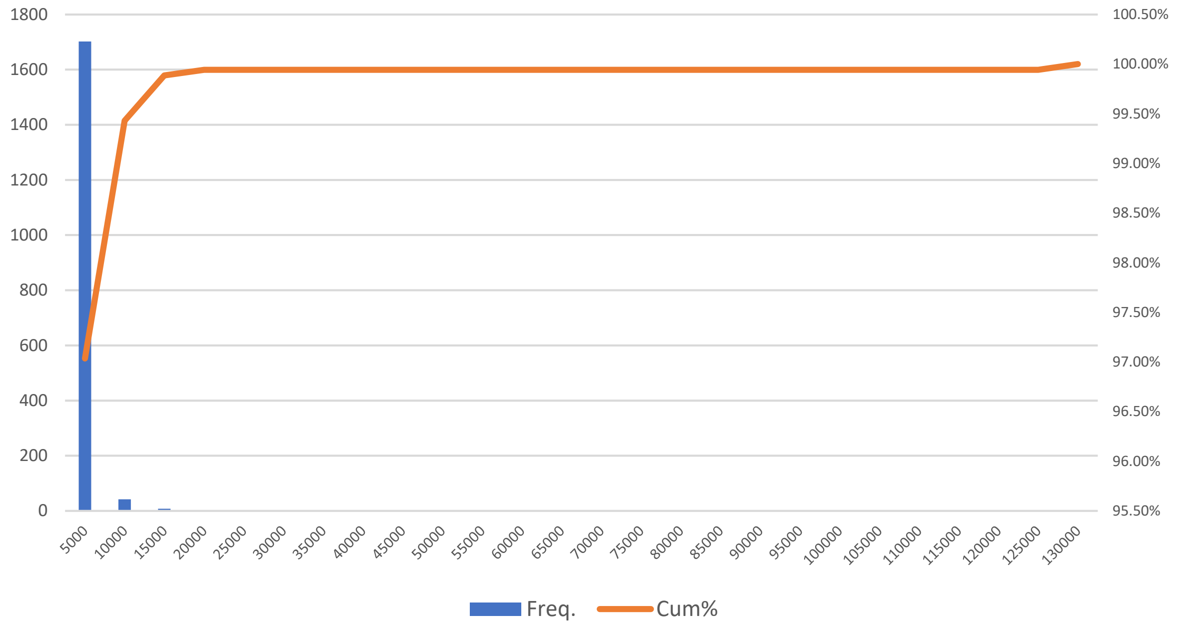

Figure 11 Graph of the probability density function of repair for IT group

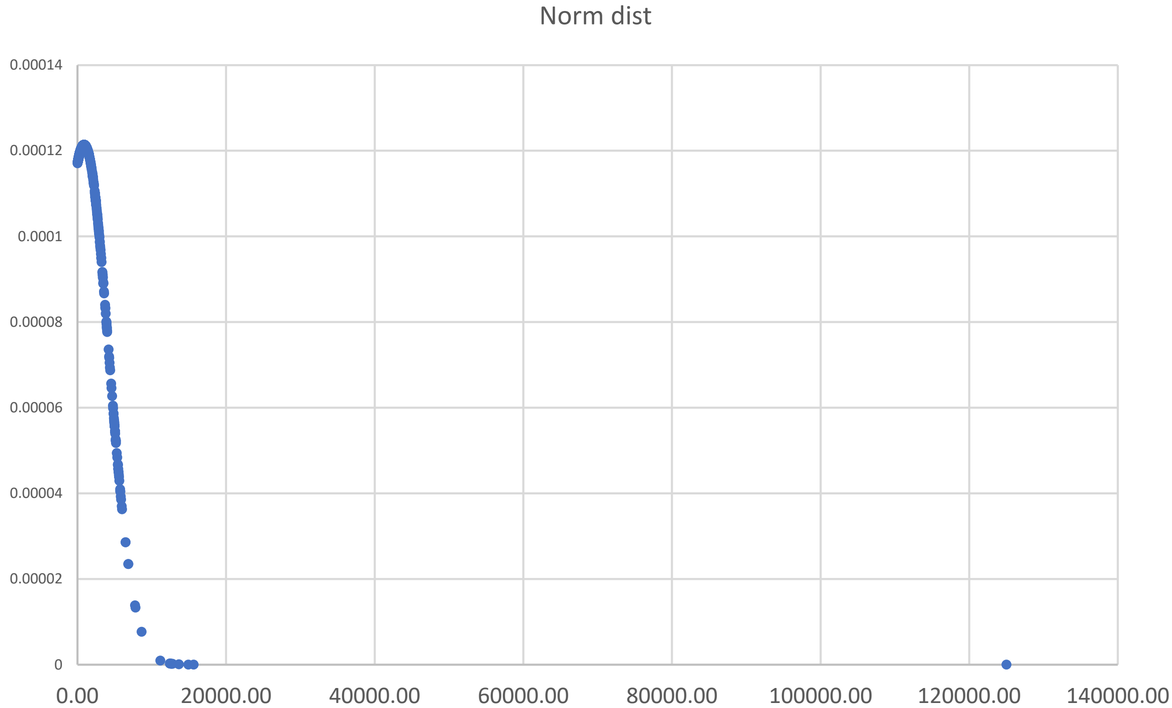

Figure 12 Data distribution for IT group

Table 3 The probability density function of repair for food & beverage group

Min interval	Freq.	Freq Cum	Cum%	%	Prop.
0-1000	152	152	74.15%	74.15%	74.15%
1001-2000	28	180	87.80%	13.66%	13.66%
2001-3000	12	192	93.66%	5.85%	5.85%
3001-4000	3	195	95.12%	1.46%	2.93%
4001-5000	4	199	97.07%	1.95%	1.95%
5001-6000	3	202	98.54%	1.46%	2.93%
6001-7000	0	202	98.54%	0.00%	0.00%
7001-8000	0	202	98.54%	0.00%	0.00%
8001-9000	1	203	99.02%	0.49%	1.46%
9001-10000	1	204	99.51%	0.49%	1.46%
10001-11000	0	204	99.51%	0.00%	0.00%
11001-12000	0	204	99.51%	0.00%	0.00%
12001-13000	0	204	99.51%	0.00%	0.00%
13001-14000	0	204	99.51%	0.00%	0.00%
14001-15000	0	204	99.51%	0.00%	0.00%
15001-16000	0	204	99.51%	0.00%	0.00%
16001-17000	0	204	99.51%	0.00%	0.00%
17001-18000	1	205	100.00%	0.49%	1.46%

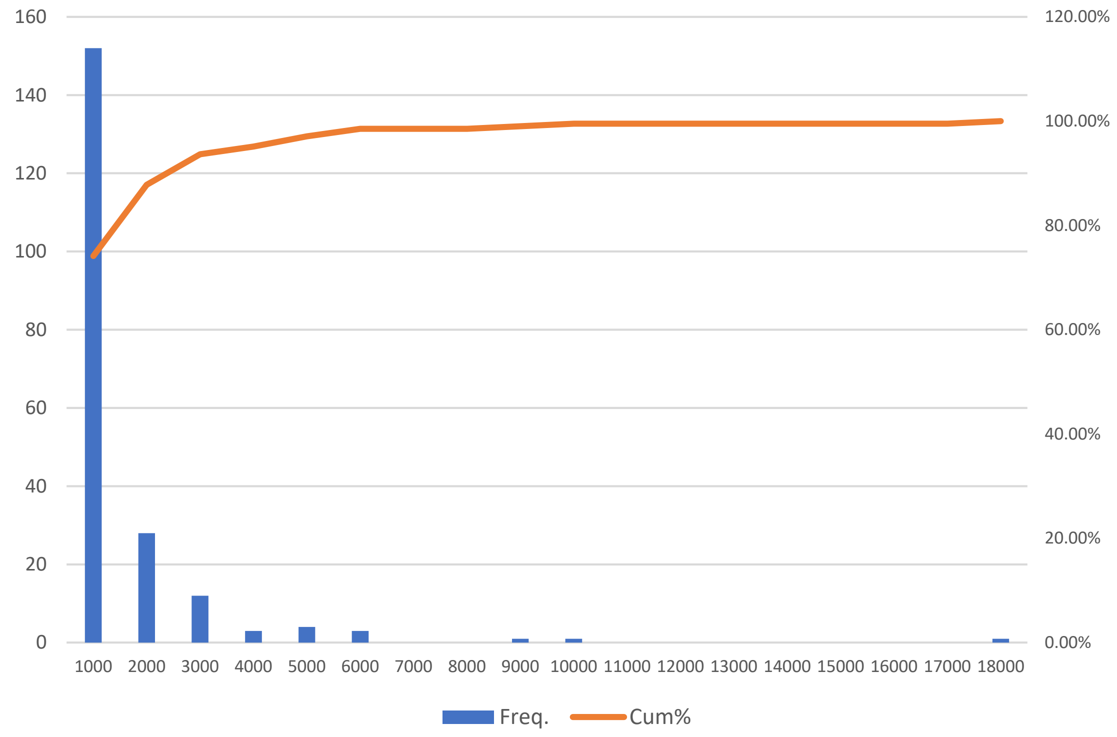

Figure 13 Graph of the probability density function of repair for food & beverage group

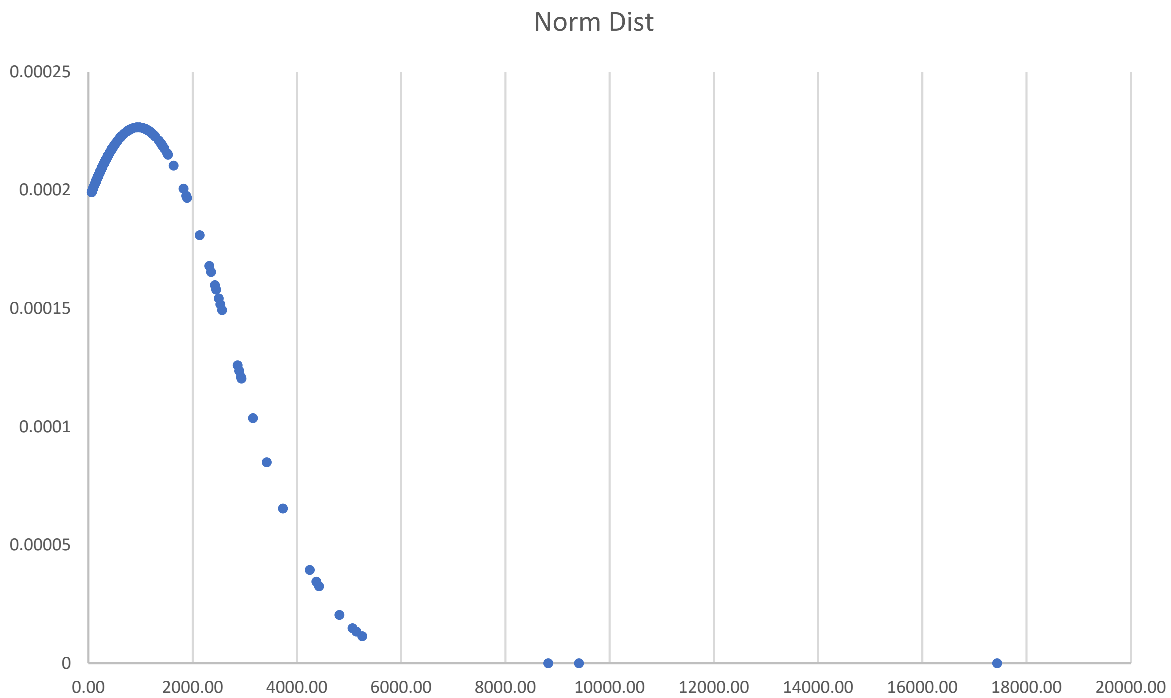

Figure 14 Data distribution for food & beverage group

As the control charts were not able to present quite accurate results since UCL and LCL lines are very close together. They did not tell which parts of the process are out of control. The researcher then changed to use control chart X-bar R chart with sub-group. From the principle of theory 1.5 sigma (Zasadzien, 2017, **Application of the Six Sigma Method for Improving Maintenance Processes – Case Study**) shift at 1δ and divided into sub groups of 19 sub-groups to make control chart X-Bar R chart for sub groups. The calculation theory according to the equation below;

$$x = \mu - \sigma$$

The above equation is the lower bound

$$D_1\overline{R}$$

$$x = \mu + \sigma$$

The above equation is the Upper bound $D_2\overline{R}$

$$\overline{x} \pm A\overline{R}$$

The parameters **μ** and **σ** for the random variable are the same for each unit and each unit is independent of its predecessors or successors

$$R = x_{\max} - x_{\min}$$

$$\overline{R} = \frac{\sum_{i=1}^{m}(R_{\max} - R_{\min})}{m}$$

plot

$$R = \max(x_i) - \min(x_i)$$

Process mean chart

Center line

$$\overline{x} = \frac{\sum_{i=1}^{m}\sum_{j=1}^{n} x_{ij}}{mn}$$

Control limit $\overline{x} \pm A_2\overline{R}$

Plot statistic $\overline{x}_i = \frac{\sum_{j=1}^{n} x_{ij}}{n}$

The control chart X-bar R chart is divided into 3 Categories 19 sub-groups as shown in the figure 15, 16 and 17.

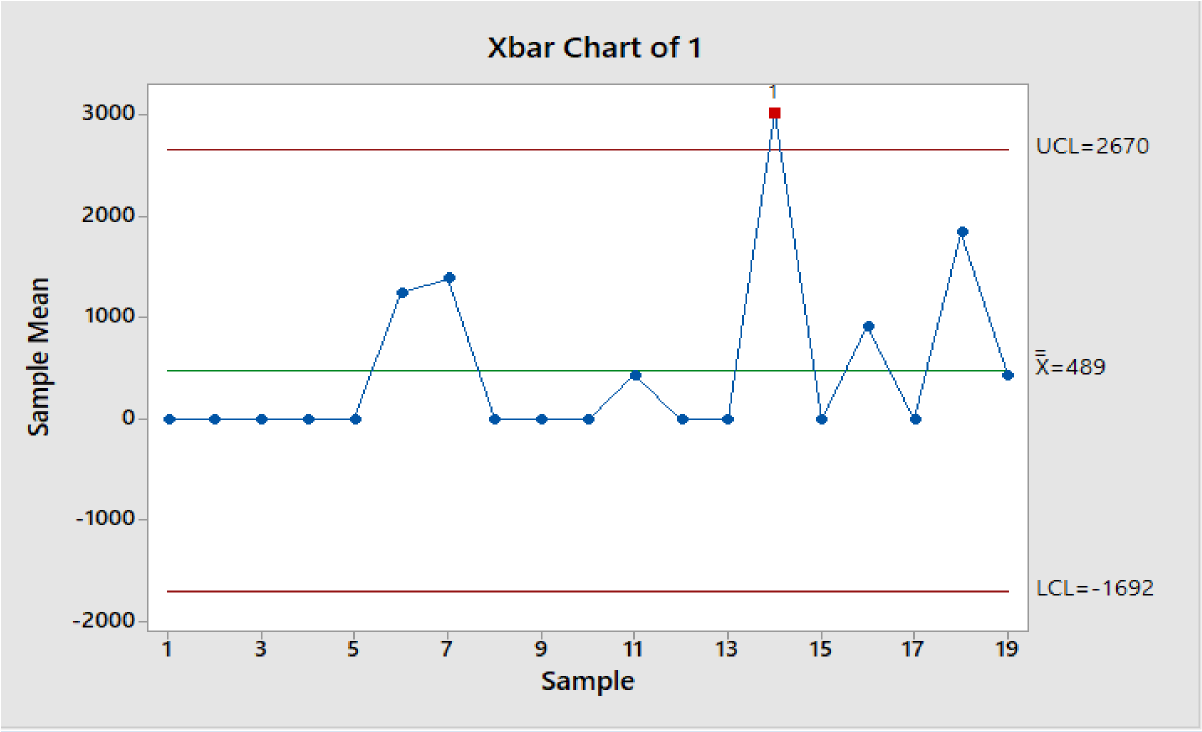

Figure 15 Control chart X-bar R chart with sub-group of food & beverage

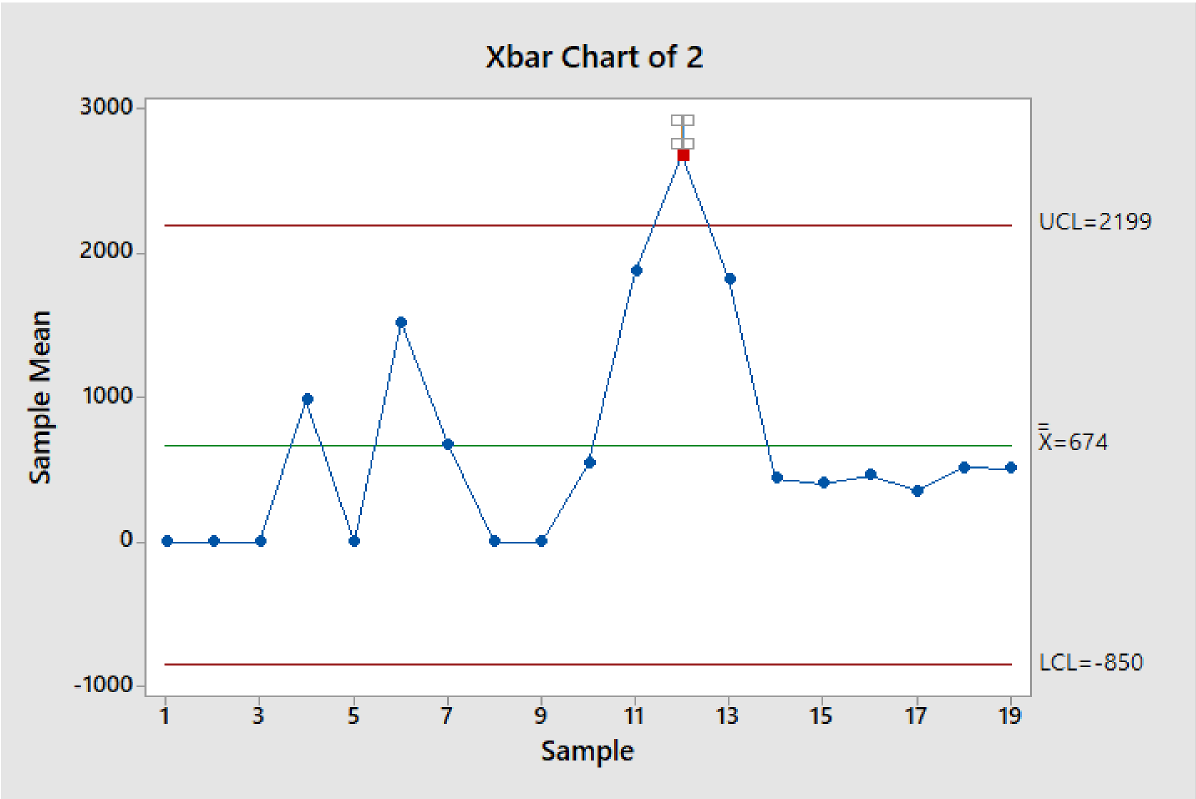

Figure 16 Control chart X-bar R chart with sub-group of Non-IT

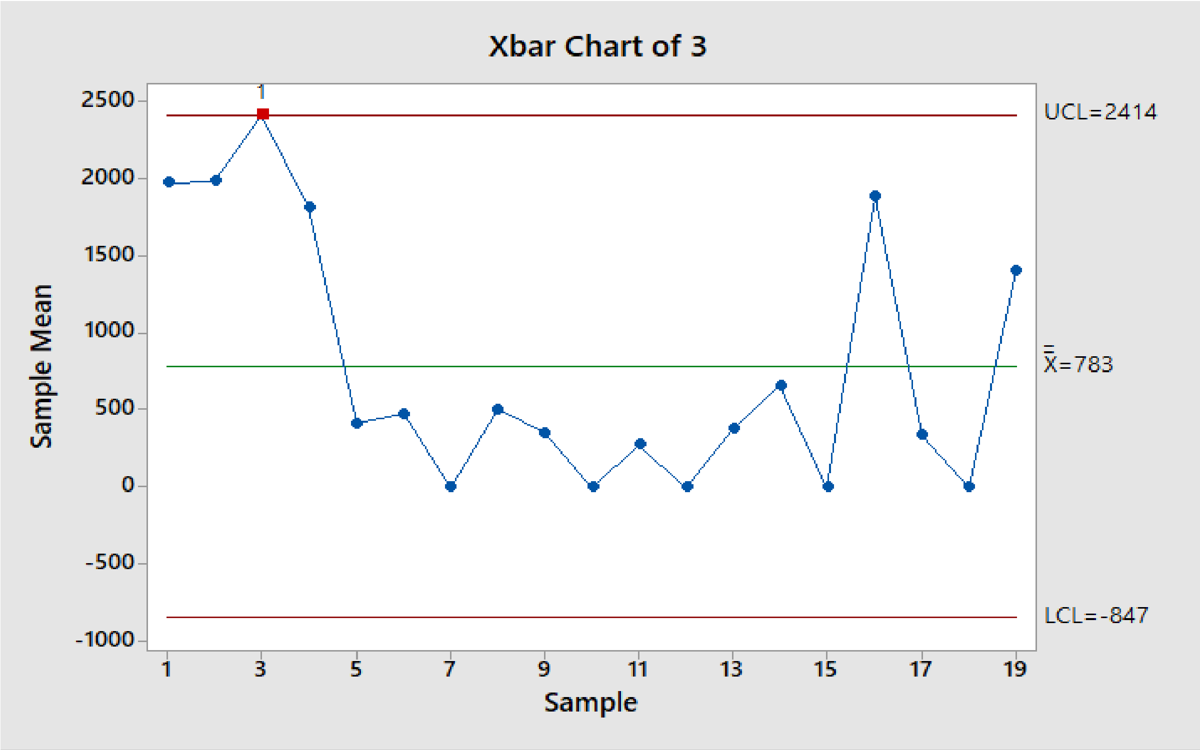

Figure 17 Control chart X-bar R chart with sub-group of IT

From the Control chart X-bar R chart, Category 1 refers to F&B which is the part that uses electrical appliances. Category 2 is the Non-IT and decorations. Category 3 is IT including PC/Notebook. It shows parts of service quality beyond the specified UCL from the calculation.

Conclusion

This study can be concluded that from the maintenance situation of the maintenance department in excess of the quality standard and service level agreement is within the F&B group and the issues from the electrical equipment used in the area of making drinks for customers. Microwave, oven, refrigerator, and ice maker machine, for example. When there is a problem of damage to the device, the stores need to wait for the replacement machine. Some types of equipment must be repaired or have to wait for a long time or may have to wait for spare parts. The performance measurement could take a long time. The efficiency of the maintenance unit should be to collect the statistics of waste products and order the equipment that could lose to spare parts in order to replace the damaged goods immediately to reduce repair time.

For Category 2, Non-IT, and decoration works is founded that the matter of the finishing of the material with some cases does not touch the point to the customer and does not affect the retail service. The maintenance department is ignored such maintenance resulting in repairs, sometimes taking longer to perform than usual in some cases.

For Category 3, IT, including PC and notebook. From observation, the problem of repairing IT is mainly the problem causing the notebook. It is founded that the problem of the repair problem comes from having the policy to change notebook every 5 years. In some cases of damage, there is no repair. The officer waits to change the new device to swap with the old device. Or in some cases, the machine that is broken is a machine for training and is a back-office machine which has no effect on operation, causing negligence in repairing and following up repair work.

From the cases, it is founded that the ineffective management of the repair work. Part of it comes from ignoring the follow-up work of the maintenance department itself. Therefore, the performance measurement is not possible according to the quality that it should be from the analysis of the Control Chart, it is illustrated that the parts that are considered out of control are minimal. The quality of maintenance is therefore acceptable.

From the above Therefore, it can be concluded that the repair process does not have any other problems. However, it is found that the out-of-control repair process is caused by a majority of human errors, resulting in the out of control of the fault notification. The researcher sees there should be an improvement in the notification process by improving system to prevent staff negligence or should use the system to catch the physical monitor of the store. It may have set routine to inspect each branch of the shop so it is not to be out of control according to the research results the process in quality control inevitably leads to the cost of quality control. As a result of this research, the error is caused by human error in this part, if the error is reduced by improving the repair process Inevitably reduces costs that can occurs with the cost of repairs that are ignored will have higher value. As some cases have found that the physical properties of some stores that are damaged will affect other parts is like a chain reaction resulting in higher repair costs. But it can calculate the appropriateness for further operations in further research.

In further research, the additional part of this research is about improvements in management and inspection processes in terms of maintenance, using experimental theory design and quality control. After improving the maintenance process, the guidelines for this research can be added using Six Sigma (Hill, Thomas, Mason-Jones, & El-Kateb, 2017). **The Implementation of a Lean Six Sigma Framework to Enhance Operational Performance in an MRO Facility**). Six sigma has the following management concepts:

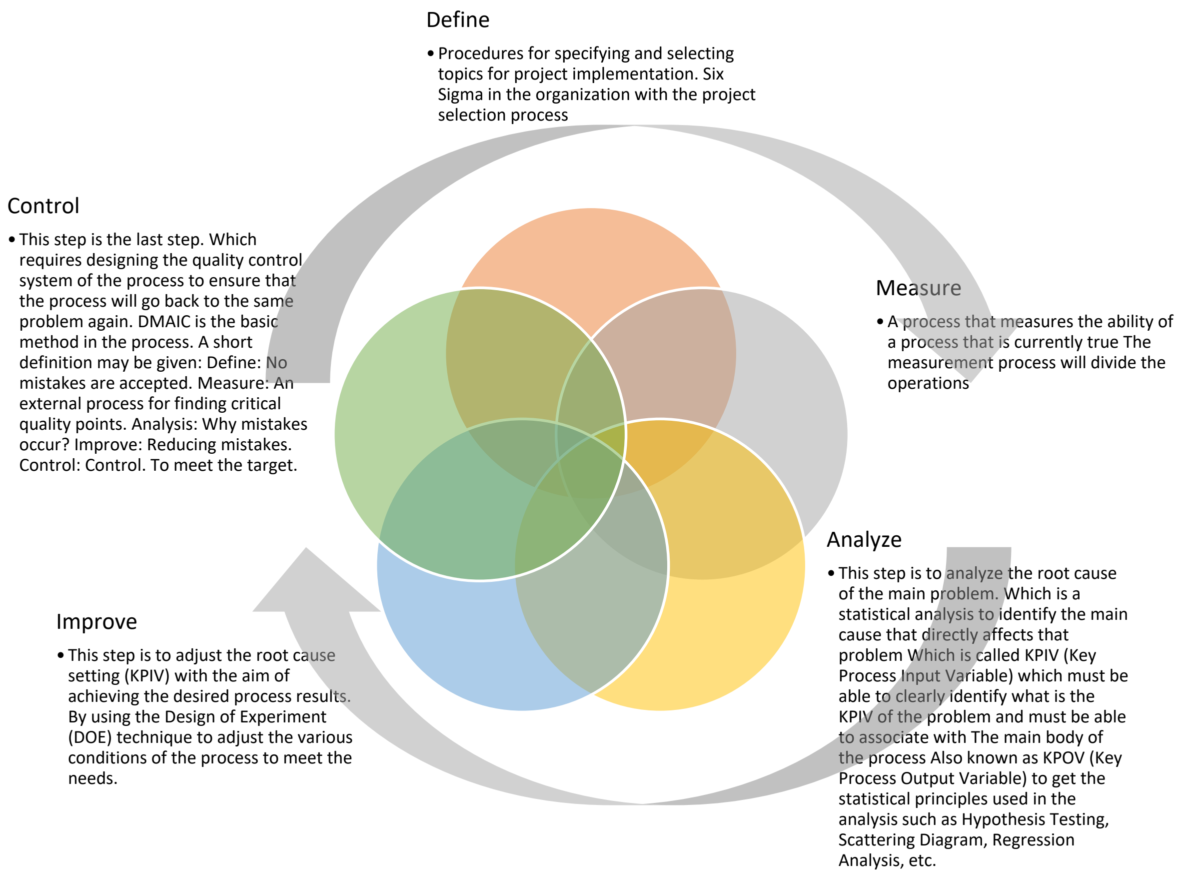

Figure 16 Achieving the six-sigma key strategy, which involves five steps, which consist of Define - Measure - Analyze - Improve - Control.

1. Focusing on creating skills and learning for employees systematically and strictly, knowing problems and defining them as short- and long-term improvement projects.

2. Measure where results are primarily improved.

3. Use a team that has good or excellent work evaluation results to make improvements and make decisions for talented people to have 100% time to solve problems for the organization.

4. Creating project leaders for the future.

5. Use data only as a decision.

6. Emphasize responsibility for the project.

7. Commitment from management.

From that concept Combined with the principles of Six sigma according to figure 16, by defining the problems of operation and measurement. In this research, analysis and problems and measurements have been partially in further research Can complete the control of operations and processes and then will enter the Six sigma system completely to increase capacity and Increased efficiency in repairing operations and able to maintain maintenance quality with fewer errors.

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