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Identification of Production Decline Factors using the LEAN DMAI Method

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Abstract. PT Himalaya Mitra Sukses, is a company engaged in the cooking seasoning and flavoring industry. The products produced include tomato sauce, chili sauce, and premix flour. The company has problems achieving less than optimal productivity, which later became the basis of this research. In this research, identification of waste that occurs in the production process using the Lean DMAI method. The data in this research were processed and analyzed based on 4 main stages: (1) Big Picture Mapping (BPM); (2) making Pareto Diagrams; (3) Root Cause Analysis (RCA); (4) the Failure Mode Effect and Analysis (FMEA) method to reduce the existing waste. Based on the results of the research, it is known that the types of waste identified are overproduction, defects, waiting processes, unnecessary inventory, and excess displacement. Of these many factors, the largest waste is caused by the defect factor of the tomato sauce type product which is runny and too acidic, because the operator does not follow the existing SOP with an RPN value of 392.

Keywords: Big Picture Mapping (BPM); Failure Mode Effect and Analysis (FMEA); Pareto Diagrams, production;; decline; Root Cause Analysis (RCA); waste.

Abstrak. PT Himalaya Mitra Sukses, merupakan perusahaan yang bergerak pada industri bumbu masak dan penyedap masakan. Produk yang dihasilkan diantaranya adalah saos tomat, sambal, dan tepung premiks. Perusahaan memiliki permasalahan pencapaian produktivitas yang kurang optimal, yang kemudian menjadi dasar penelitian ini. Pada penelitian ini dilakukan identifikasi pemborosan (waste) yang terjadi pada proses produksi dengan menggunakan metode Lean DMAI. Data pada penelitian ini diolah dan dianalisis berdasarkan 4 tahap utama yakni : (1) Big Picture Mapping (BPM); (2) pembuatan Diagram Pareto; (3) Root Cause Analysis (RCA); (4) metode Failure Mode Effect and Analysis (FMEA) untuk mengurangi pemborosan yang ada. Berdasarkan hasil penelitian diketahui bahwa jenis waste yang teridentifikasi adalah produksi berlebih, defect, proses menunggu,

persediaan yang tidak perlu, dan perpindahan berlebih. Dari sekian banyak faktor tersebut, waste terbesar diakibatkan oleh faktor defect produk jenis saos tomat yang encer dan terlalu asam, dikarenakan operator tidak mengikuti SOP yang ada dengan nilai RPN 392.

Kata Kunci: Big Picture Mapping (BPM); Failure Mode Effect and Analysis (FMEA); Pareto Diagrams, produksi; pemborosan; penurunan; Root Cause Analysis (RCA).

I. Introduction 1

The era of the industrial revolution 4.0, there are some manufacturing companies, especially in the industry. Human Resources (HR) can also affect the company because it can provide an optimal contribution. With optimal human resources, it can provide maximum productivity, especially in the production area.

This can have a good impact on waste in the production process in the form of defects and delays, so that the fulfillment of production targets does not require a long time, which ultimately limits the time and targets can be achieved. In manufacturing companies, there are several activities that have non-value-added that can lead to waste and result in inefficient use of resources (Febianti et al., 2018; Ristyowati et al., 2017) (Prasetyawati et al., 2018). The value-added is able to provide results for a company so that it can compete with other companies (Suparno & Susanto, 2021) (Rahmatillah et al., 2019). To achieve this goal, it is necessary to reduce the existing production process. Because by 8 reducing the amount of waste, the cost of production and rework will be minimized (Santoso & Fudhla, 2018). Can be avoided by reducing the amount of waste, can minimize rework, which can emphasize high production costs (Santoso & Fudhla, 2018).

In this research, we will use the application of lean DMAI where there are four basic stages or steps in implementing this strategy, i.e. Defect-Measure-Analyze-Improve (DMAI) at 3 PT Himalaya Mitra Sukses.

PT Himalaya Mitra Sukses, is a company engaged in the cooking spice and food seasoning industry. The products produced are tomato sauce, chili sauce, and premix flour. In

reducing waste problem at PT Himalaya Mitra Sukses is to use the Lean Manufacturing method (Abdul Khannan & Haryono, 2015) (Yunita & Adi, 2019). Lean manufacturing is an approach to system efficiency by minimizing waste that occurs in the process flow (Mantiri et al., 2017). The application of lean is expected to have 3 results, namely a better process by providing value-added to customers or customers that is efficient, better working conditions, namely with a better and clearer work flow and can provide great ability to improve or improve something in condition, and can meet the objectives or company needs that include value and profit (Suparno & Susanto, 2021) (Ristyowati et al., 2017).

For this reason, this research aims to minimize waste of production process activities so that the target for order fulfillment can be achieved (Setiyawan et al., 2013).

II. Research Methods

In this research, a quantitative approach was analyzed, where this research was conducted at PT Himalaya Mitra Sukses which is located on Jl. Raya Cangkir KM 22 Driyorejo - Gresik. The data is to identify waste that occurs in the production process by using Lean DMAI (Prakoso et al., 2017).

Data processing with DMAI

In this research using the data processing stages as follows (Figure 1):

1. Identification

The process of identifying problems related to waste in the production process carried out with material flow data from goods to suppliers, PPIC, production, packaging, warehouses by making Big Picture Mapping (BPM) which contains the lead time of each work station and adds flow information on the process under review (Febianti et al., 2018) (Prakoso et al., 2017).

2. Measurement

Measure the waste that has been identified, by making a Pareto diagram.

3. Data Analysis

It is an activity to analyze the problems that occur, along with their causes. The tools used are Root Cause Analysis (RCA) and Failure Mode Effect and Analysis (FMEA).

4. Recommendations and improvements

Is the stage of providing recommendations for improvements to the problems that have been researched (Prasetiyo et al., 2022).

Figure 1. Research Flowchart (Prasetyawati et al., 2018) (Abdul Khannan & Haryono, 2015)

III. Result and Discussion

Identification

At this stage, targeting and identification of the total number of product defects will be carried out. At this stage also defined the type of waste found in the production of tomato sauce at 3 PT Himalaya Mitra Sukses Driyorejo-Gresik.

6 Big Picture Mapping (BPM)

Based on the Big picture mapping above, it can be seen that pr Productoduct requests come from customers who place orders to the Head of Marketing, the marketing department forwards information to the Head of Production for production planning. The Head of Production checks the material stock in the warehouse, if the stock of material runs out, the Head of Production will contact the supplier to purchase the material. Then the supplier 14 will send the material to be stored in the warehouse and prepared for the production process. The production process will run, at work station 1 which is taking all raw materials, at work station 2 is the mixing process, work station 3 is the first filter process, at work station 4 is the cooking process, then at work station 5 is the second filter process, the storage process in work station 6, and the last work station is on the

packaging process.

Figure 2. Big Picture Mapping Tomato Sauce Production (Abdul Khannan & Haryono, 2015)

Measurement

In carrying out the production process at 3 PT Himalaya Mitra Sukses there are several wastes identified from company data including:

Over Production

This waste occurs because the company produces more than the production target and customer demand (Rahmatillah et al., 2019).

Table 1. Over production Data

No	Month	Production Targets (Pcs)	Production Result (Pcs)	Over Production (Pcs)	Percentage (%)
1	January	315,000	325,500	10,500	3.33
2	February				

365,000

370,100

5,100

1.40

3

March

505,500

520,005

14,505

2.87

4

April

445,050

450,000

4,950

1.11

5

May

445,050

450,000

4,950

1.11

6

June

505,550

518,500

12,950

2.56

7

July

487,800

489,115

1,315

0.27

8

August

345,500

350,000

4,500

1.30

9

September

400,050

400,255

205

0.05

10

October

500,500

503,250

2,750

0.55

11

November

426,000

426,950

950

0.22

12

December

449,000

450,000

1,000

0.22

Total Production per Year

5,190,000

5,253,675

63,675

15.00

From the table it can be seen that in one year 3 PT Himalaya Mitra Sukses was able to produce 5,253,675 Pcs of sauce or 15% of the initial production target, The highest production occurred in March with a result of 520,005 Pcs, the lowest in January with a result of 325,500 Pcs,

Defect Product

This waste occurs because the resulting product does not meet the specified standards (damaged).

Table 2. Product Defect Data

No

Month

Production Result (Pcs)

Reject (Pcs)

Percentage (%)

1

January

325,500

3,397

1.04

2

February

370,100

7,000

1.89

3

March

520,005

4,811

0.93

4

5

April

May

450,000

450,000

3,529

4,789

0.78

1.06

6

June

518,500

6,130

1.18

7

July

489,115

5,136

1.05

8

August

350,000

4,990

1.43

9

September

400,255

4,155

1.04

10

October

503,250

5,100

1.01

11

November

426,950

4,180

0.98

12

December

450,000

3,280

0.73

Total Production per Year

5,253,675

56,497

13.13

From the table above, it can be seen that in one year the total product defects were 56,497 Pcs. With the highest level of product defects occurred in February with a total defect of 7,000 Pcs of production.

Waiting Process

This waste occurs because the WIP must wait for the next process. From the table above, it can be seen that in one year the total WIP 9 waiting for the next process is 43,200 Pcs. The highest number of waiting WIPs occurred in June and March of 7,000 Pcs, while the lowest number of waiting WIPs occurred in April and May of 2,500 Pcs.

Table 3. Waiting Process

No

Month

Production Result (Pcs)

Waiting

(Pcs)

Percentage (%)

1

January

325,500

3,500

1.08

2

February

370,100

3,050

0.82

3

March

520,005

5,000

0.96

4

April

450,000

2,500

0.56

5

May

450,000

2,550

0.57

6

June

518,500

5,000

0.96

7

July

489,115

3,500

0.72

8

August

350,000

3,550

1.01

9

September

400,255

4,050

1.01

10

October

503,250

3,000

0.60

11

November

426,950

4,000

0.94

12

December

450,000

3,500

0.78

Total Production per Year

5,253,675

43,200

10.00

Unnecessary Inventories

This waste occurs because the company provides too many raw materials so that it exceeds the capacity of the storage warehouse. From the table above, it can be seen that in one year the total remaining inventory 2 of raw materials is 10,837 Kg. The most remaining inventory of raw materials was in March with the amount of 1,100 Kg.

Table 4. Raw Material Inventory Data

No

Month

Production Result (Pcs)

Before production (Kg)

After production (Kg)

Percentage (%)

1

January

325,500

45,650

650

0.20

2

February

370,100

49,288

986

0.,27

3

March

520,005

69,789

1,100

0.21

4

April

450,000

61,525

1,025

0.23

5

May

450,000

61,525

700

0.16

6

June

518,500

68,462

590

0.11

7

July

489,115

63,100

1,050

0.21

8

August

350,000

48,469

725

0.21

9

September

400,255

56,005

1,000

0.25

10

October

503,250

67,024

971

0.19

11

November

426,950

59,451

1,015

0.24

12

December

450,000

61,525

1,025

0.23

Total Production per Year

5,253,675

711,813

10,837

2.50

Transportation

Transportation [2] is a type of waste that occurs due to discarding reject products throughout the production process. In one such transportation activity, 500 defective products can be loaded.

Table 5. Transportation Waste Data

No

Month

Production Result (Pcs)

Reject (Pcs)

Incident

Percentage (%)

1

January

325,500

3,397

7

0.0021

2

February

370,100

7,000

14

0.0038

3

March

520,005

4,811

10

0.0019

4

April

450,000

3,529

7

0.0016

5

May

450,000

4,789

10

0.0021

6

June

518,500

6,130

12

0.0024

7

July

489,115

5,136

10

0.0021

8

August

350,000

4,990

10

0.0029

9

September

400,255

4,155

8

0.0021

10

October

503,250

5,100

10

0.0020

11

November

426,950

4,180

8

0.0020

12

December

450,000

3,280

7

0.0015

Total Production per Year

5,253,675

56,497

113

0.03

Priority Improvement Based on Pareto Diagram

In this stage 2 the waste that occurs in the tomato sauce production process at PT Himalaya Mitra Sukses will be sorted based on the number of incident that occur so that it can be focused on the direction of problem solving,

Table 6. Waste Data

No

Waste

Total

Percentage (%)

Cumulative (%)

1

Over Production

63675

28

28

2

Defect Product

56497

24

52

3

Waiting Process

43200

19

71

4

Unnecessary inventories

10837

5

76

5

Transportation

56497

24

100

Figure 3. Pareto Diagrams of Waste Data (Nur Asnan & Fahma, 2019)

2 Based on the results shown by the Pareto Diagram above, it can be concluded that the three highest types of waste are based on the 80/20 principle, namely 20% of the causes

are responsible for 80% of the problems that arise or vice versa. Referring to the 80/20 principle, the highest waste taken for analysis is overproduction with Cumulative 34% then defect with cumulative 66% and the last is waiting waste with Cumulative 91%.

Data Analysis

Root Cause Analysis (RCA)

At this stage, using the Root Cause Analysis (RCA) method, identification of the root causes of waste and corrective steps or suggestions can be applied to minimize the number of defective products in the production process and product quality (Nisanti & Puspitasari, 2021) (Tri Irawan et al., 2018) (Setiyawan et al., 2013). The waste that occurs in the Tomato Sauce production process at PT Himalaya Mitra Sukses will be identified as the cause and effect so that it can make repairs easier.

The results of the RCA analysis show the causes of waste that occur among others, as follows:

Table 7. Root Cause Analysis (RCA) (Tri Irawan et al., 2018) (Setiyawan et al., 2013)

No

Waste

Sub Waste

Why1

Why2

Why3

Why4

Why5

1

Over

production

No production scheduling system

There is no specific department that handles the production planning function

Its function is still being handled by the company's leadership

2

Defect Product

Different product weight

Packing machine settings are always changing (not fixed)

The machine often has trouble

Lack of packing machine maintenance

No scheduling of packing machine maintenance

Product packaging often shrinks

The seal on the packing machine is too hot

Packing machine settings are always changing

The engine is worn

Lack of packaging machine maintenance

No scheduling of packaging machine maintenance

Tomato sauce is not thick and sour

Incorrect product formulation

Operator error

Cooking operators do not follow the SOP

SOP is hard to understand

Fibrous tomato sauce

Tepung onggok terlalu berserat

2 Quality of raw materials is not good

Receipt of raw materials is not checked carefully

There is no SOP for receiving raw materials

3

Waiting Process

Waiting for the packing process

Production process time increases

WIP stack

Many WIPs have not been packaged

WIP packaging is too long

Lack of manpower

Late raw materials

The process of taking raw materials is too long

Location of scattered raw material warehouses

Over Production

The reason is the absence of a production scheduling system. Because there is no department/section that specifically handles the production planning function. The root

cause is a function that is still held by the company's leadership.

Defect Production

There are several causes for different product weights:

- The first cause is the packing machine settings are always changing. Which is because the machine is often disturbed and the lack of maintenance of the packing machine. The root cause is that there is no packing machine maintenance schedule
- The product packaging often shrinks, which is because the seal on the packing machine is too hot, the lack of maintenance for the packing machine. The root cause is that there is no packing machine maintenance schedule
- The the tomato sauce is not thick and sour. Due to improper product formulation. The root of the problem was due to operator carelessness in mixing the ingredients which, due to the existing SOPs, was difficult to understand.
- fibrous tomato sauce, Because the raw material for cassava dregs flour is too fibrous and the receipt of raw materials is not checked carefully. The root of the problem is that the process of taking raw materials takes too long is that there is no SOP for receiving raw materials.

Waiting Process

WIP waiting for the packing process. Due to the accumulation of unpackaged WIP. The root of the problem is that WIP packaging takes too long due to lack of manpower. And the other reason is the raw material that arrives late. Due to the root of the problem, the location of the raw material warehouse is scattered.

Failure Mode Effect and Analysis (FMEA)

After knowing the root cause of the problem from the sub-waste that occurred, further discussions were carried out with the authorized superiors to determine the severity, occurrence, and detection values to obtain the RPN (Risk Priority Number) value (Setiyawan

et al., 2013). With the aim of knowing the priority of improvements that can be made. At this stage, the failure mode effect analysis (FMEA) method is used (Nisanti & Puspitasari, 2021). For more details will be explained in the following table bellow:

Table 8. Failure Mode Effect and Analysis (FMEA) (Nisanti & Puspitasari, 2021)

No

Waste

Sub Waste

Effect

Sev

Cause

Occ

Control

Det

RPN

1

Over production

Storage volume is too big

4

No integrated production scheduling system

4

Visuals on the arrangement of items

5

80

Product storage is too long

4

No integrated production scheduling system

4

Visuals on the shape of the item

4

64

2

Defect

Product

Different product weight

Product weight is not the same

4

No machine maintenance scheduling system

4

Visuals on the shape of the item

4

64

Product packaging often shrinks (product defects)

Packaging display is not attractive

6

No machine maintenance scheduling system

4

Visuals on the shape of the item

4

96

Tomato sauce is not thick and sour

Discarded

8

Cooking operators do not follow the SOP

7

Physical Observation

7

392

Fibrous tomato sauce

Discarded

5

There is no SOP for receiving raw materials

4

Visuals on the shape of the item

4

80

3

Waiting Process

Waiting for WIP packaging process

WIP stack

3

Lack of human labor

4

Visual

4

48

Based on the FMEA method, it can be seen that the highest value is in defects due to the tomato sauce being not thick and sour due to the cooking operator not following the SOP with an RPN value of 392. And the second highest value is defects due to product

packaging often shrinking because there is no packaging machine maintenance scheduling system with an RPN value of 96.

Improvement Suggestions

Improve is a phase in the DMAI cycle to fix problems that have been carried out in define, measure and analyze processes based on the data obtained. The next step is to provide improvement recommendations, which is followed by selecting priority recommendations for improvement using the FMEA tool. The recommendations for improvement given will be made in order to overcome some of the waste that occurs. From the research that has been carried out by applying the concept of Lean DMAI, the first recommendation for improvement is to make Standard Operational Procedures (SOP) for the new tomato sauce production process that is easier to understand. The proposed SOPs are as follows:

Table 9. Proposed Improvement of Tomato Sauce Production Process SOP

Activity

Subject

Process

Location

Time Processing

Person responsible

Corrective Action

A. 1. Flour acceptance: Flour must comply with specification standards

Starch flour and Corn Starch

Sampling

Raw Material Warehouse

Every new product comes

Head of raw material warehouse

Sampling results are not up to standard >10% rejected

2. Storage

Starch flour and Corn Starch

On the pallet

Raw Material Warehouse

After received

Sseparated

3. Sifting

Starch flour and Corn Starch

Sift by machine

Sauce Processing Room

Each will be processed

Weighing Operators

Sieve check

4. Weighing

Starch flour and dan Corn Starch

Weighing with a digital scale

Raw Material Warehouse

Each will be processed after the sieve

Weigh calibration

B. 1.Condiment acceptance: Seasonings must comply with specification standards

- Salt

- Sugar Pasir

- Vinegar + Tomato Paste

- Saccharin

-MSG

-Extra Chili

-Garlic Oil

-Sunset Yellow

- Citric Acid

- Natrium Benzoat

Sampling

Raw Material Warehouse

After arrival

Staff R&D

Sampling results are not up to standard, rejected

2. Storage

-Salt

On the pallet

Raw Material Warehouse

After received

Head of raw material warehouse

Separated

- Sugar Pasir

- Vinegar + Tomato Paste

-Saccharin

-MSG

-Extra Chili

- Garlic Oil

- Sunset Yellow

- Citric Acid

- Natrium Benzoat

3. Weighing

- Salt

Weighing with a digital scale

R&D formula room

After Stored

Staff R&D

Weigh calibration

- Sugar

- Vinegar + Tomato Paste

- Saccharin

- MSG

- Extra Chili

- Garlic Oil

- Sunset Yellow

- Nitric Acid

-Natrium Benzoat

C. 1. Production process: Mixing

- Tomato paste

- Corn Starch

- Corn Starch or Starch flour

- Water

Enter the dough mixer-double jacket

Production process room

After weighing

Mixing Process Operators

If less homogeneous, mixing time is added

2. Cooking

Tomato sauce base dough until it becomes perfect gelatinization

Cooking mixer double jacket 90oC,±10 Minute

Production process room

2 During the production process

Cooking Process Operator

Rework

+ Citric Acid, Salt, Sugar, Saccharin, MSG, Vinegar, Extra Chili, Garlic Oil, Pewarna, Na-Benzoat.

3. Cooling

Tomato Sauce

Storage 60°-70°C

Production process room

During the production process

Packaging Process Operator

Cooling time added

4. Packaging

Tomato Sauce

Packed with vertical packaging

Packing Room

After weighing process

Rework

5. Sorting

Packaged Tomato Sauce

Sorted

Packing Room

After the packing process

Separated& re-cooking

6. Storage

Tomato Sauce has been put in a ball or box

Stored at room temperature, on a plastic pallet

Finished goods warehouse

After storage

Warehouse Staff

Temperature and humidity check

7. Distribution

Tomato sauce ready to be sent

Visual Check

Finished goods warehouse

After storage

Warehouse Staff

Transportation equipment is not up to standard, returned/

replaced with another

4 From the results of the identification of waste by research data, the types of waste that occur most often to those that rarely occur are (1) overproduction: this waste occurs because the company produces more than the production target and customer demand; (2) defects product: this waste occurs because the resulting product does not meet the specified standards (damaged); (3) unnecessary inventory; (4) unnecessary movements; (5) excess displacement; (6) waiting and inappropriate processes.

IV. Conclusion

The types of waste identified in the tomato sauce production process at 3 PT Himalaya Mitra Sukses are: overproduction, defect production, unnecessary Inventories, unnecessary motion and transportation. From the research that has been done by applying the Lean DMAI method, the recommendation for improvement is to create a 4 Standard Operational Procedure (SOP) for the new tomato sauce production process that is easier to understand. Of these many factors, the largest 9 waste is caused by the defect factor of the tomato sauce type product which is runny and too acidic, because the operator does not follow the existing SOP with an RPN value of 392.

References

1

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Diajukan: 04-10-2022 Diperbaiki: xx-xx-xxxx

Disetujui: xx-xx-xxxx

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1 JURNAL ILMIAH TEKNIK INDUSTRI

ISSN: 1412-6869 (Print), ISSN: 2460-4038 (Online)

Journal homepage: http://journals.ums.ac.id/index.php/jiti/index

doi: 10.23917/jiti.v17i1.5203

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Jurnal Ilmiah Teknik Industri p-ISSN 1412-6869 e-ISSN 2460-4038

Ika, dkk. / Identification of Production Decline Factors… JITI, Vol.XX (X), Juni 2023, 36 – 45

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Jurnal Ilmiah Teknik Industri p-ISSN 1412-6869 e-ISSN 2460-4038

Ika, dkk. / Identification of Production Decline Factors… JITI, Vol.XX (X), Juni 2023, 36 – 45

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Ika, dkk. / Identification of Production Decline Factors… JITI, Vol.XX (X), Juni 2023, 36 – 45

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Jurnal Ilmiah Teknik Industri p-ISSN 1412-6869 e-ISSN 2460-4038
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Ika, dkk. / Identification of Production Decline Factors... JITI, Vol.XX (X), Juni 2023, 36 – 45

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