CHAPTER V

DISCUSSION

1.1 Failure Mode and Analisys (FMEA)

In this study FMEA method will play a role in identifying risk events that might occur at the Sogan Batik production department. In addition FMEA method will also play a role to determine the score of each risk based on the criteria contained in FMEA which are severity, occurrence and detection.

1.1.1 Determine Risk Event

To determine the risk event that might occur in the Batik Sogan production department, the method that will be used is an interview with an expert on the production department. This expert is a division head in the production department. From the results of this interview, there are ten possible risks that can occur and can interfere with the business process at the Sogan Batik production department which will be shown in Table 5.1 below:

Table 1.1 Risk Event of Batik Sogan's Production Department

No	Code	Risk Event
1	R1	similar batik motive in the market
2	R2	Delay in supplier delivery of raw materials
3	R3	Lack of raw material inventory
4	R4	Defect on the product

5	R5	Delays in production process
6	R6	Delay in product delivery
7	R7	Worker accidents
8	R8	Defect material from supplier
9	R9	Low durability of machines
10	R10	Raw material damage in inventory

Table 5.1 above describes the risk event in Sogan Batik, especially in the production division.

1.1.2   Determine the Severity Occurrence and Detection Score

After determining the risk event, the next step is to determine the score of each risk based on severity, occurrence and detection. An assessment of severity is done to determine how much impact the company will receive if the risk occurs. Assessment of occurrence is done to determine the frequency of occurrence of the risk in the company. While the assessment on detection is done to determine the level of risk difficulty to be detected. Determining the value of each risk is carried out by the same expert. At this stage the expert will be asked to determine the score of each risk based on severity, occurrence and detection. The parameters used for this assessment are based on pre-existing research. The results of the assessment on each risk can be seen in Table 5.2 below:

Table 1.2 Score of Severity, Occurrence and Detection

Code	Risk Event	Severity	Occurrence	Detection
R1	Similar batik motive in the market	5	1	2
R2	Delay in supplier delivery of raw materials	3	3	4
R3	Lack of raw material inventory	4	3	2
R4	Defect on the product	5	2	2
R5	Delays in production process	4	2	2
R6	Delay in product delivery	4	2	3
R7	Worker accidents	2	4	2
R8	Defect material from supplier	3	2	2
R9	Low durability of machines	4	1	2
R10	Raw material damage in inventory	3	2	3

In this study, researchers only focus on the risks that occur in the production department of Sogan Batik. Researchers have not yet had the opportunity to find risks from other divisions

that exist in the company so that the results of this study might only help solve problems in the production department. The results that will be obtained will certainly be better if the research is carried out in every division in the company because each division must have different risks. In addition, researchers also have not had the opportunity to conduct research on companies engaged in other fields. Researchers only conduct research in the production department at batik manufacturing companies. Of course, the risks found in other companies such as food companies or furniture companies will vary. These deficiencies can be the basis for further research.

1.2   TOPSIS Method

In this study, TOPSIS method acts as a decision maker to determine the risk priority of each risk event. The data that has been collected at the FMEA stage which is risk event and score for each risk based on the severity, occurrence and detection events will be used as input to the TOPSIS calculation. In the TOPSIS calculation the first step that must be done is to determine the data from the criteria. The criteria in question are severity, occurrence and detection. The data that must be determined is the attributes of these criteria and the weight of each criteria. In this study, the researcher chose benefif as an attribute of all criteria. This is because the purpose of this study is to look for risk priority. So, the greater the value of alternative/risk, the alternative/ risk will become more priority. Weighting on the criteria will be determined by the expert from the Batik Sogan production department. This weighting is intended to determine the level of importance of each criterion. Based on the opinion of the expert, the weight of each criterion is severity (0.4), occurrence (0.3) and detection (0.3). If added up, the weight is 1.

Furthermore, the thing to do is conducting the normalization data on the matrix of decisions that have been made. Normalized data will be input for the weighted normalization stage. At this stage all normalized data will be multiplied by the weight of the respective criteria. The next step is to determine the positive and negative ideal solution. The positive ideal solution is symbolized A +, while the negative ideal solution is symbolized A-. To determine the value of A + and A- must be determined in advance whether the attribute of the criteria used is benefit or cost. In this research, all of the criteria are attribute benefits. So, the values of A + are gained by determining the highest alternative in each criterion while the A-values are gained by determining the lowest alternative in each criterion. From the calculation results, the A + value

in the criteria for severity, occurrence and detection is sequentially (0.166), (0.160) and (0.152). As for the A-value on the criteria of severity, occurrence and detection in sequence are (0.066), (0.040) and (0.076) .

The next step is to determine euclidean distance for positive and negative solution (D + and D-). The results of the D + calculation for each alternative are as follows. R1 (0.1424), R2 (0.0776), R3 (0.0923), R4 (0.1106), R5 (0.1155), R6 (0.0948), R7 (0.1254), R8 (0,1290), R9 (0,1462), R10 (0,1109). While the results of D- for each alternative are as follows. R1 (0,0997), R2 (0,1155), R3 (0,1041), R4 (0,1074), R5 (0,0776), R6 (0,0864), R7 (0,1203), R8 (0.0521), R9 (0.0664), R10 (0.0645). After getting the results, the last step that must be done is to calculate relative closeness to the ideal solution. The calculation is done by the formula that is already available. The results of this calculation will be the basis for determining the ranking of risk priority. The results obtained from this calculation are as follows. R1 (0,142), R2 (0,598), R3 (0,530), R4 (0,493), R5 (0,402), R6 (0,477), R7 (0,489, R8 (0,287), R9 (0,312), R10 (0,368). determine the ranking of each risk, the thing to do is sort the results of the calculation of relative closeness to the ideal solution.The greater the value, the risk will become more priority, so the ranking on risk priority is as follows:

1. Delay in supplier delivery of raw material
2. Lack of raw material in inventory
3. Defect on the product
4. Worker accidents
5. Delay in product delivery
6. Similar batik motive in the market
7. Delay in production process
8. Raw material damage in inventory
9. Low durability of machines
10. Defect material from supplier

In this study, researchers used the TOPSIS method as a decision maker. The researcher chooses TOPSIS as a decision maker because of the advantages of TOPSIS as described in the previous chapter. Based on expert opinion on Sogan Batik production department, the accuracy of the results of this method in the company is around 70%. The expert believes that the results

of the ranking at each risk are quite appropriate for the company. However, maybe this result will be slightly different compared to other MCDM methods such as SAW, ANP or ANP which certainly has their own advantages. Currently researchers have not had the opportunity to use other MCDM methods as a decision maker to support the FMEA method. This might be used as a basis for further research.

1.3   Recommendation of Actions From Researcher

The recomendation of actions to minimize the probability of risk occurring that can be given by the researcher are as follows:

1. Improve communication between workers from each division. This reduces the risk of miss communication among workers that can cause errors in the product manufacturing process. In addition, it can be suggested to reduce the risk is by updating the operational standards for systems and activities on Sogan Batik. This can be implemented if the old operational standard is not working properly and can increase the risk of errors in the process of making the product.

2. Try to make a unique batik design from Sogan Batik itself. This can reduce the risk of similarity in design with other batik companies. In addition, Sogan Batik also have to make a copyright on every design of their batik. This is implemented so that if there is batik that has the exact same design with Sogan Batik, Sogan Batik can claim that the design is his design.

3. Frequently update the schedule on the production process from the beginning of the process until the final process. If delay occurs due to slow workmanship by workers, then Sogan Batik must give a reprimand or sanction on the worker. It is intended that the production process can run in accordance with the time set. Delay in a process may affect other processes in the company.

4. Try to find alternative routes on product delivery. By using alternative routes, it is expected that the delivery process will be more no obstacles so that the delivery process can be on time to the destination.

5. Make or improve PPIC (Production Planning and Inventory Control). This is intended to reduce the risk of a material shortage in inventory when needed. By conducting inventory

control on a regular basis, the company can anticipate the lack of material and can keep the materials under the control so there is no damaged material in the inventory.

6. Increasing the intensity of communication with supplier. This is conducted in order to avoid schedule errors during material delivery. In addition, Sogan Batik also should set the rules on suppliers so that suppliers can work better and there is no delay in the delivery of raw materials or there is no more defect product. Sogan Batik can also provide a punishment to the supplier if the supplier is delayed for reasons that cannot be tolerated and if the product that delivered is defect.

7. Raise the standard of safety equipment on the workers and to check periodically on machines used by workers in the production process. Sogan Batik can also apply the 5S program (Seiri, Seiton, Seiso, Seiketsu, Shitsuke). 5S is a method of structuring and maintenance of intensive work areas originating from Japan used by management in an effort to maintain order, efficiency, and discipline at work sites. This can be implemented in various ways such as bordering each working area, putting the equipment in place provided, and cleaning all work areas after the job is finished.