CHAPTER VI
CONCLUSIONS AND SUGGESTIONS

This chapter briefly reviews conclusions attained from all the phases of the research, presents operational recommendations for the company, and also presents recommendations for upcoming researches with similar area.

6.1 CONCLUSIONS

Conclusions that are attained during the research are:

1. The unaligned rear fender defect problem is the most dominant defect in the assembling process of Karisma 125D in Unit A Assembling Section of PT. Astra Honda Motor. The acute problem takes up more than 40% of all defects, thus needed to be prioritized. Focusing on this defect would give the company the most gains.

2. The assembling process of Karisma 125D is currently at level 3.70 Sigma. Focusing on the unaligned rear fender defect problem would risen the sigma level up to 3.90 sigma and saving the company more than 125 millions rupiah annually.

3. Multi-vari study shows that the defect is not time related, and the variation of the defect is from unit-to-unit.

4. Components search successfully corners the Red X of the defect which is frame body. There is no interaction effect between frame body and any other parts. Thus, the suspicions to rear fender plastic part, and swing arms part, are not proven. However, there is also a Pink X, which is the nut adjusting process. This process does not change the status of OK unit to NG unit and vice versa, but it is somewhat important in minimizing the deviation of rear fender.

5. Paired comparisons and scatter plot analysis corner an even more detail Red X which is the asymmetry of the height of the left and the right rear fender stays of frame body (where the rear fender sits or is bolted to the frame body), measured from the reference point of frame body.

6. An additional multi-vari study confirms that the handling method of frame body in Painting Steel Section is significant to the rear fender defect. However, it is not confirmed yet that this factor is the only causal factor. There might be other causal factors occurring in Painting Steel Section and Welding Section that, unfortunately, could not be detected because this research is bounded in the Unit A Assembling Section only.
7. Four alternatives are generated in the Improve phase based on the fact that any prevention of the rear fender stays having direct impact with other hard objects would be effective to tackle the unaligned rear fender defect problem. Those four alternatives are: training operators to handle the frame body more carefully, making or buying more carts, planting stopper bars to the floor to prevent rear fender stays from hitting it when the frame body is put on the floor, and creating stopper clips that work the same way with the stopper bars except that they are clipped to the frame body.

8. Criteria/decision matrix selects the optimal solution, which is the stopper clips, by giving score to each weighted criteria to each alternative and choosing the one with the highest score. The criteria being considered are benefit, effort, availability, cost, and safety.

9. A set of control tools is created to maintain the improvement and preventing the unaligned rear fender defect from reoccurring.

6.2 SUGGESTIONS

6.2.1 FOR THE COMPANY

1. Give recommendation to the suppliers to add secondary bar signs between the ones already exist in the swing arms parts to increase the accuracy of alignment between the left and the right operators.

2. Ordering stopper clips made from plastic or rubber to protect the rear fender stays of frame body from direct impact with the floor when the frame body has to be put on the floor.

3. Designing a new job description regarding the handling and controlling of these clips. The description should includes installing the clips at the end of painting process before the frame bodies are put on the floor, removing the clips from the frame bodies at the beginning of assembling process, collecting the clips and sending them back to Painting Steel Section to be reuse, and inspecting the amount and quality of the clips at the end of every shift.

4. Training operators to handle frame body more carefully.

5. Researching the Painting Steel and Welding Section to look for other possible causal factors (the Pink X) for unaligned rear fender defect problem that have not yet been searched because of the boundaries of this research.

6. Maintaining control and inspection of the improved process with persistence.
7. Applying the Six Sigma framework, its tools, its philosophy, and the Shainin/Bhote Design of Experiment method gradually to upgrade the old PDCA framework and the 7-tools that have been used by the company for a long time.

8. Open connection links with academic institutions to gain mutual benefits of implementing or even creating new methods, frameworks, and tools, distinctive to the company.

6.2.1 FOR UPCOMING RESEARCHES

1. A research using Shainin/Bhote DOE would be successful only if the researcher and the company apply full cooperation to each other. If the company does not support the research fully, it will be hard to attain important data or resources needed for the experiments. The company must also realize that the full benefits of Shainin/Bhote DOE can only be achieved when the company opens itself to the researcher.

2. Shainin/Bhote DOE, or any other quality improvement tools, would be stronger if embedded into strong quality improvement framework such as Six Sigma. Applying a quality improvement tools without a clear understanding of the problem and structured steps need to be taken is a common mistake in researches conducted by under-graduate students.

3. This research finds that the acute problem being examined only has one dominant causal factor without any interaction effect. Thus, only a few of Shainin/Bhote DOE tools are used in this research. There are still many tools that have not been covered because they are not needed in this case, such as Product/Process Search, Variables Search, Full Factorial, B versus C, Response Surface Methodology, Pre-Control, and Multiple Environment Over Stress Test. Always be prepared to apply these stronger tools if the problems being examined turn out to be much more complicated than the one in this research.