5.1. Discussion

Appropriate heuristic Procedure can decrease the probability an algorithm trapped in local optimal. From case study one the heuristic procedure effect significantly to the results which is obtained. APSO can get good results. APSO which is enchanted by heuristic procedure become HAPSO is proven give better results than other approaches. HAPSO still can be improved because the number of successful hit still 12 times among 30 times runs. HAPSO can get better total material handling cost but the consistency to get the best value can be improved again. With “comparison within” the hybridization of meta-heuristic to become HAPSO is worthwhile because it can obtain better results.

From case study 2, HAPSO can get the optimal solution although in small population size and small maximal iteration. With appropriate of heuristic procedure HAPSO can be better than other paper’s works. The relationship column in descendent table is the key to obtain the appropriate heuristic procedure. In this case consider the two first of the “relationship” column. Therefore the appropriate heuristic procedure is obtained. Then the initial heuristic particles are obtained. HAPSO has been proved obtain better results than the other papers approaches. With “comparison within” the hybridization of meta-heuristic to become HAPSO is worthwhile because it can obtain better results.

From case study 3, the limitation of HAPSO is known. In this case HAPSO cannot become the best algorithm for all problems. It still better algorithm for some other papers approaches. The limitation of the HAPSO is from the datasets. This case study’s flow material datasets are distributed almost evenly. There are many same numbers in flow material dataset. Therefore the descendent table cannot give prioritizing of which facilities must be adjacent. From “comparison within” in problem with 20 machines, APSO performs better
than HAPSO. It means the heuristic procedure make the results worse in this problem.

5.2 Conclusion
This research develop new hybrid meta-heuristic that consist of EDA, PSO, TS and enchanted by heuristic procedure. It is called HAPSO. HAPSO can solve the MLFLP effective and efficiently. From the results of the study case, this research can be concluded as fellow:

1. HAPSO can solve the MLFLP effectively and efficiently
2. HAPSO can perform better than other previous approaches. From case study one HAPSO get better total material handling cost, from case study two can obtain better results from other previous approaches, from case study three can get better results from other approaches.
3. The appropriate heuristic procedure can prevent the algorithm trapped in local optimal
4. HAPSO still can obtain the best solution although in small population size and small maximal iteration in small case study with 9 decision variables
5. HAPSO has limitation in problem with the datasets have many same values and the value distributed evenly in the datasets.

5.3 Future Research
HAPSO algorithm still can be improved because HAPSO still not yet become the best for all the case study. The computational time can be decrease by change the language of programming. It can be changed to C++ as an example. Interface for user can be develop to make HAPSO user friendly for the real users.