CHAPTER 1

INTRODUCTION

1.1 Background

This chapter will highlight on motivations, problem statement, research question, research objectives and organization of thesis. Besides, this chapter explains on research scope and significance of this research.

1.2 Motivations

The challenges of humanitarian organizations are the limited decision technologies to assist the disaster relief operation. In Malaysia, almost every year the country will facing flood issue (Abdullahi, 2014). In flood disaster scene, the main task is to ensure that assistance and aid are provided to disaster victims in an orderly and effective manner from the national level downwards. Its approach is largely reactive to flood disasters (Chan, 2015). Thus, principles from the field of selection strategic distribution centre is helpful for volunteer to gather and distribute the basic need. Disaster management in Malaysia is traditionally almost entirely based on a government-centric top-down approach. National Security Council (NSC) under the Prime Minister's Office is responsible for policies and National Disaster Management and Relief Committee (NDMRC) is responsible for coordinating all relief operations before, during and after a disaster (Chan, 2015). Inefficiency and problem in managing basic need distribution affected victims and they do not receive any during flood tragedy in Kelantan (UKM News Portal, 2016). Disaster management can be done

efficiently, and we can assist the disaster victim to receive the help in all aspect timely (Utusan, 2016).

In order to address the issue, the concept of K-Nearest Neighbor Algorithm (kNN) seems practical with this problem. K-Nearest Neighbor Algorithm (kNN) is one of the most simple and straightforward data mining techniques. It is called Memory-Based Classification as the training examples need to be in the memory at run-time (Cunningham & Delani, 2007). The classification of disaster victim houses and distribution centres by kNN is predicted using kNN algorithm. The average value for the k nearest neighbors or a point can predict the value for a new point.

Over the years, we can see the growing number of applications in disaster relief operations (Zheng et al., 2015). An optimization approach is one of the alternative for complex disaster relief operation problems such as transportation problems, routing problems, roadway repair problems, location, and allocation problems (Farahani et. al, 2010). The optimization gives impact such as the hill-climbing algorithm is very fast and very effective in the extraction of low-level feature (Goyal, 2014). Genetic algorithms (GA) and Simulated annealing (SA) are also an option for solution methods (Li & Wei, 2007). Combination optimization technology and involvement of expertise lead to overcome the complexity problem. However, the application of the evolutionary algorithm still having many limitations and disadvantages (Zeng et al., 2015). Effective and timely relief activities are really needed to improve the stability in the region (Osa, 2013). Disaster can cause long-term consequences. This is because assets and economic activity can be distorted due to the

disaster (Hallegatte, 2017). Thus, adequate outside help is needed in the relief stage to help the impacted society fully recover and not let future disasters become vulnerable (John, 2015).

1.3 Problem Statement

Inefficiency of distribution centre selection in disaster relief operation makes difficulty for volunteer perform humanitarian task (Maharjan & Hanaoka, 2017). One of the job scope in disaster relief operation is to distribute the needs to the disaster victim. Thus, a strategic location choose of operation centre is being a concern. It has been pointed out that not all disaster area can be covered during disaster recovery operation (Falasca et al.,2009). The needs are not equally distributed in the corresponding disaster area (Noorizudin, 2016). There is lack of effective decision model to assist in pointing out a strategic disaster relief distribution centre in one disaster area that can cover all needed disaster victim. For example, in flood disaster scene, the main task is to ensure that assistance and aid are provided to be received by the flood victims timely. Inefficiency and problem in managing basic need distribution affected victims and they do not receive any during flood tragedy in Kelantan (UKM News Portal, 2016). There problems with *k*-means algorithm is sensitive to the outliers. (Xiaoliang, 2020). Optimisation will solve the problems in the outliers.

1.4 Research Question

Based on the problem statements above, the number of questions arose that need to be addressed such like:

a) What is the current state-of-art of disaster relief operation to decide the distribution

centre?

b) Is there any chances for further enhancement in order to meet nearly equal demand point between distribution centre?

c) How can the proposed algorithm shows as an effective approach in determining the distribution centre?

1.5 Research Objective

In response to the research problem, it is needed to understand the context of optimization to solve the problem in disaster relief operation. From these reasons, the objectives of this study are:

a) To study the existing algorithm for determine the distribution centre in post disaster event.

b) To propose a new algorithm for minimize the difference between demand point covered by each distribution Centre.

c) To compare the number of demand point covered by existing KNN and the proposed algorithm.

1.6 Thesis Structure

The rest of the thesis is structured followed by Chapter 2 which is contains related studies literature and the fundamental knowledge of the subject matter is discussed. This includes an overview of disaster management, disaster relief operation and optimization approach. Chapter 3 discusses on development of an alternative to determine the distribution centre in the post disaster scenario. This includes the phases and experiment involved, research tools and environment as whole. Then, chapter 4 explain on finding and discussion of the

proposed algorithm against other existing optimization algorithm in term of optimal location and nearly equal distribution. Lastly in chapter 5 will summarize the overall thesis by presenting achievements with respect to the conduct of this research. In addition, this chapter also highlights the limitations identified while the research had been conducted, and finally presents potential future works for improving the limitation of the present research.