

## CHAPTER I

### INTRODUCTION

#### 1.1 Background

We live in the era of the knowledge revolution, when the power of a nation is determined not by the number of soldiers in its army but the knowledge it possesses. Science, medicine, engineering and business propel nations towards a higher quality of life. We are now adopting intelligent machines that can capture the expertise of such knowledgeable people and reason in a manner similar to humans. The desire for intelligent machines was just an elusive dream until the first computer was developed. The early computers could manipulate large data bases effectively by following prescribed algorithms but could not reason about the information provided. This gave rise to the question of whether computers could ever think. Alan Turing defined the intelligent behaviour of a computer as the ability to achieve human-level performance in a cognitive task. The Turing test provided a basis for the verification and validation of knowledge-based systems. In 1956, a summer workshop at Dartmouth College brought together ten researchers interested in the study of machine intelligence, and a new science – artificial intelligence – was born. Since the early 1950s, AI technology has been developed from the curiosity of a few researchers to a valuable tool to support humans making decisions.

Artificial intelligence (AI) is the intelligence of machines and the branch of computer science that aims to create it. It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the task of using

computers to understand human intelligence, but AI does not confine itself to methods that are biologically observable. We have seen historical cycles of AI from the era of great ideas and great expectations. Thus, the development of artificial intelligence has major impact in our daily life, one of the impacts is on the applications in industrial field.

The service industry is very wide in its nature. It covers a large range of activities that add value to businesses and individuals, but the output is not a physical product, instead this industry enhances, maintains, repairs, shapes and perform different alterations to physical items. It also covers activities such as transportation, medical services, education, banking, insurance, waste disposal, telecommunications services and other complex activities that are crucial to a society's proper functioning. This industry is said to produce more than 70% of the jobs of most developed economies and also represents a large part of these country's gross domestic products (World Bank national accounts data). Services are also classified as the tertiary industry, where they are separated as profit and non-profit depending on the nature of the organization's activities.

Manufacturing industries are those that engage in the transformation of goods, materials or substances into new products. The manufacturing industry is one of the largest sectors of the U.S. economy, employing more than 12 million workers (Jeff Immelt, 2019). Today, technology is causing the country's economy to move towards offering services as opposed to producing goods. However, it is becoming clear to economists that a healthy manufacturing industry is one of the hallmark indicators of a healthy, thriving economy. And manufacturing intermingles with nearly every area of the economy.

Artificial intelligence is consisted of several techniques, in this research, the branches of artificial intelligent discussed are the expert system, fuzzy logic and artificial neural network. Expert systems, artificial neural networks, fuzzy systems and evolutionary computation are major technologies used in artificial intelligence and intelligent system. Hundreds of tools support these technologies, and thousands of scientific papers continue to push their boundaries (Negnevitsky,2005). Expert system, fuzzy logic and artificial

neural network also is the most commonly techniques that shows up when the researcher finds the application of artificial intelligence.

Expert system is a computer system that emulates the decision-making ability of a human expert. Expert systems are designed to solve complex problems by reasoning through bodies of knowledge, represented mainly as if-then rules rather than through conventional procedural code (Jackson Peter, 1998).

Fuzzy logic is a technique to describe the vague and ambiguous terms. The term fuzzy refers to things which are not clear or are vague. In the real world many times we encounter a situation when we cannot determine whether the state is true or false, their fuzzy logic provides a very valuable flexibility for reasoning. In this way, we can consider the inaccuracies and uncertainties of any situation. In Boolean system truth value, 1.0 represents absolute truth value and 0.0 represents absolute false value. But in the fuzzy system, there is no logic for absolute truth and absolute false value. But in fuzzy logic, there is intermediate value too present which is partially true and partially false.

Artificial neural network or connectionist systems are computing systems that are inspired by, but not identical to, biological neural networks that constitute animal brains. Such systems "learn" to perform tasks by considering examples, generally without programmed with task-specific rules.

This research tries to analyse the influence of artificial intelligence development on the service and manufacturing industry as the large sectors on economic growth. As the commonly techniques used in artificial intelligence is expert system, fuzzy logic and artificial neural network, the researcher tries to find the application of each technique. By analysing the influence of artificial intelligence (AI) on service and manufacturing industry on its application field, the existing application can be implemented spreadly, also can be explored more the application field based on the analysis of existing application field

There is only one research about systematic literature review of expert system, fuzzy logic and artificial neural network. The research is conducted by Amin et al, (2015) about fuzzy, neural network and expert systems methodologies and application. Although there is only one research that systematically reviewed the applications of expert system, fuzzy logic and artificial neural network, this research will analyse the newer applications of expert system, fuzzy logic and artificial neural network by systematically collecting and analyse newer research articles.

## 1.2 Problem Formulation

This research is used to systematically collecting and critically analyse the existing application of expert system, fuzzy logic and artificial neural network:

1. What is the expert system, fuzzy logic and artificial neural network application field?
2. How is the map analysis on expert system, fuzzy logic and artificial neural network application?
3. What is the further research recommendation to explore more applications of expert system, fuzzy logic and artificial neural network?

### **1.3 Research Objectives**

Based on problem formulation above, this research is created to fulfil several objectives as mentioned below:

1. Identify the expert system, fuzzy logic and artificial neural network application field.
2. Analyse the map of expert system, fuzzy logic and artificial neural network application.
3. Find further research recommendation to explore more application of expert system, fuzzy logic and artificial neural network.

### **1.4 Research Limitation**

Research limitation is the problem constraints to set the border of the research in order to keep the research inside the scope. Based on the background there are some limitation to focusing the research:

1. The research only focused on expert system, fuzzy logic and artificial neural network applications.
2. The research is applying systematic literature review, performing finding and discussion based on the existing papers and journals.
3. The research articles are derived from Elsevier (sciencedirect.com).
4. Research articles findings are accumulated from 2015 – 2019.

5. 55 research articles were derived to conduct the literature review.

### **1.5 Research Benefit**

By conducting this research, it is expected that some benefits can be obtained:

1. Research methodology can be used to conduct a systematic literature review.
2. Research question that can be used for better future research.

### **1.6 Systematical of Thesis Writing**

This thesis writing will be constructed as follows:

## **CHAPTER II LITERATURE REVIEW**

This chapter will be explaining the literature studies. The literature review is conducted in systematic literature review, the literature from previous research and research articles will be used for the study.

### **CHAPTER III**

### **RESEARCH METHODOLOGY**

This chapter will explain the steps on conducting the research that applied as a reference in order to keep focusing on the primarily goals, which are going to be achieved. This chapter will explain and summarize the phases of the systematic literature review undertaken, the method and tools are used to support every stage as well as the section of the article where these are addressed.

### **CHAPTER IV**

### **SYNTHESIS AND ANALYSIS**

This chapter explains the synthesis and analysis in phase of systematic literature review. It will explain on how the selection method for synthesis and analysis is conducted, and how the data from research articles are extracted.

### **CHAPTER V**

### **DISCUSSION AND RESULT**

This chapter discusses the finding research articles and literatures, also the explanation about the application of expert system, fuzzy logic and artificial neural network.

### **CHAPTER VI**

### **CONCLUSION**

This chapters describes the overall conclusion from the results of study and the suggestion for the future research

## REFERENCES

