LOW-COST TAP WATER PURIFICATION SYSTEM (LOCO DEVICE)

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Abstract

This study is focusing on the safe and clean water which is the essential element in our life. Safe and readily available water is important for public health, whether it is used for drinking, domestic use and many more. Improved water supply and sanitation, and better management of water resources can boost countries' economic growth and can contribute greatly to poverty reduction. In the market nowadays, there are various types and brands of water purification devices that could eliminate all the germs and bacteria in the water. Unfortunately, all the well-known brands are too expensive. It can cost up to thousands of ringgits excluded the maintenance and replacement works. Thus, it becomes a burden for low and middle-income families to have an assurance to consume a safe and clean water. Therefore, LOCO device is a low-cost tap water purification system is built to help these families to have the same quality of water with other famous brands of water purification devices. LOCO device is a modification of an existing water filter that can be found in the market. With this production of LOCO device, it could help these families to have a safe and clean water for a cheaper price especially for those who live in the rural area.

***Keywords*:** drinking water, water purification system, LOCO device,

I. INTRODUCTION

Water is a fundamental human need. A human body is approximately 70 percent water by weight and water is crucial for all known forms of life. Yusuf et. al [1] stated that each person in this world need up to 50 litres of water per day and the supplied water must be portable to be used for daily basis activities.

World Health Organization [2] stated that over 1 billion of human population in this world were lacking to the access of clean and safe water supplies. This serious matter is caused by the widespread of microbial contamination in drinking water. El-Harbawi et.al [3] pointed out that 1.8 million of death and loss are happening every year. That is approximately 6% of populations in this world were dying due to this water problem.

Water scarcity has become a serious health issue and half of the world population will be living in water-stress area by 2025 [2]. According to Yuk et. al [4], rapid urbanization and growing population in Malaysia are one of the factors contribute to the high demand of potable water in Malaysia. According Ahmed et. al [5], Malaysia is endowed with abundant of water resources but the demand for portable water is increasing in recent years. Consequently, an access to potable water is becoming a tremendous challenge for the water authorities to surmount. Besides uncontrolled waste discharged in Malaysia was led to the fulminant problem in water resources in term of quality and quantity of water.

A large consumption of polluted water may derive to a serious waterborne disease while the water purification devices available in market are too expensive. Besides, some water purification devices relying on electricity for its to be function. In the market nowadays, there are various types and brands of water purification devices that could eliminate all the germs and bacteria in the water. Unfortunately, all the well-known brands are too expensive. It can cost up to thousands of Ringgits excluded the maintenance and replacement works. This high technology needs a large cost for operation and maintenance and cause problems to low and middle-income earners to purchase the purification water devices. Thus, it becomes a burden to people in order to consume a safe and clean water. Therefore, LOCO Device is a low-cost tap water purification system is designed to help most people to have the same quality of water with other famous brands of water purification devices.

2. METHODOLOGY

Due to the unsatisfying quality of tap water, a water purification is a must to consume a safe and clean water. Therefore, LOCO Device is designed from the modification of the existing water purification system available in the market. Thus, there are many aspects that need to be considered such as the cost of production, maintenance and many more on the production of LOCO device.

Figure 1 shows the schematic diagram and prototype of LOCO device. LOCO Device is divided into 3 layers of purification processes. The outer layer is a ceramic filter that has the ability in removal of microorganism. At the 1st layer, fine particles of active charcoal carbon (ACC) is used to remove chlorine, heavy metals, inorganic impurities and pollutant in tap water. At the 2nd layer, a cotton pad filter is placed to reduce the contamination in water sample as well as to secure the ACC and trap smaller particles of contaminants. Lastly, at the 3rd layer,consist of medical stones, tourmaline stones and alkali energy natural stones that are used to eliminate pathogen, improve taste and odour and neutralised the charges in tap water. Table 1 shows the function of each type of chosen filter media. The tap water must flow through the 1st layer then to the 2nd layer and lastly to the 3rd layer.

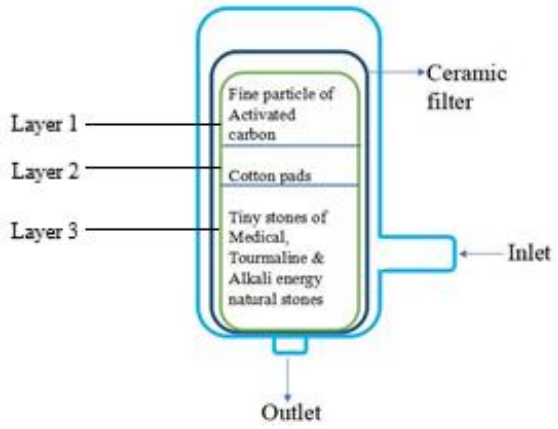

Figure 1: Schematic diagram of ceramic filter of LOCO Device

Table 1: Types of filter media used and its functions

Layer	Type of filter media	Function
1	Activated Charcoal Carbon (ACC)	To remove chlorine, heavy metals, inorganic impurities and pollutant in tap water
2	Cotton pad filter	To reduce the contamination in water sample as well as to secure the ACC and trap smaller particles of contaminants
3	Medical stones (red colour stones)	To eliminate pathogen
	Tourmaline stone (blue-grey colour stone)	To improve taste and odour
	Alkali Energy Natural stone (White stone)	To neutralise the charges in tap water.

Several purification devices were chosen for comparison the level of water quality filtered using those devices. A number of tests had been conducted to determine the level of water quality as follow; Total Dissolved Solids (TDS), turbidity, pH, Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Coliform and E. coli.