FACULTY OF TECHNOLOGY MANAGEMENT AND TECHNOPRENEURSHIP

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

THE IMPORTANCE OF GREEN UNIVERSITY ADOPTION TO IMPROVE ENVIRONMENT IN UTEM (UNIVERSITI TEKNIKAL MALAYSIA MELAKA)

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APPROVAL

"I hereby declared that I had read through this thesis and in my opinion that this thesis is adequate in terms of scope and quality which fulfil the requirements for the award of Bachelor of Technology Management Innovation."

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DECLARATION

"I declare that this project is the result of my own research except that is cited in the references. The research project has not been for any degree and is not concurrently submitted in the candidature of any other degree."

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Name : MUHAMMAD ASYRAF BIN SHAMSUDIN

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ABSTRACT

In light of growing global issues such as climate change, population growth, environmental degradation, and inefficient use and depletion of natural resources, countries must employ environmentally friendly technology and methods to economic activity, particularly beginning at the bottom, which is educational institutions. Natural resource depletion, overpopulation-caused climate change, and the fast economic ascent of new industrial countries, particularly Malaysia, are widely regarded as having significant environmental repercussions. This article mainly highlights the importance of green technology adoption to improve environment in UTEM. This study applied quantitative research and data was collected using a questionnaire that has been distributed randomly selected by 200 respondents.

KEYWORDS: Green Technology, emerging, environment, UTEM

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CHAPTER 1

INTRODUCTION

1.1 Background of study

In view of expanding global issues such as climate change, population increase, environmental degradation, and inefficient use and depletion of natural resources, countries must utilise environmentally friendly technology and methods to economic activity especially starting from the bottom which is starting from educational institutions. Threats such as natural resource depletion, climate change caused by overpopulation, and the accelerated economic rise of new industrial countries, particularly Malaysia, are widely acknowledged as having negative environmental consequences.

Green Technology works to lessen toxicity in nature by either counteracting it or changing the conditions that cause it. This can result in environmental, economic, and ecological equilibrium. It contributes to the reduction of greenhouse gas emissions and the depletion of the ozone layer, both of which contribute to global warming. Every day, it becomes clearer that we must spend more on green solutions for humanity's existence, and the importance of green technology rests in lowering environmental dangers and conserving natural resources.

1.2 Problem Statement

Recycling, renewable resources, health and safety concerns, energy efficiency, and other aspects of green technology are examples. Green technology provides people with hope that pollution and the effects of climate change can be reversed. Firstly, the problem for implementing green university is Malaysia did not have a proper technology that can develop green technology. As we know, Malaysia is a developing country. In this case, our country is not a country that exports technology because Malaysia takes technology from other countries. To develop local technology in order to sustain national competency, Malaysia is shifting towards becoming a knowledge-based economy after the launch of the long term policy plan

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(Suzana, 2013). However, Malaysia is still a long way to develop or create its own technology. Due to that, our country does not have proper technology that can develop green technology on its own.

Next, the problem of green university adoption is because pollution from industrial sector. Pollution is a global phenomenon that has been demonstrated to be responsible for innumerable untold harm to the environment and ecosystem at large, resulting in global warming, climate change, ecosystem deterioration, and resource shortages. With a contribution rate of 61 percent, industrial activities have been proven to be a major contributor to the global threat of environmental pollution. Pollution as an entity is seen by many scholars because of industrialization and economic development, and numerous attempts have been made to clarify and explain the relationship that exists between pollution and industrialization (Asici, 2015). Developing countries such as Malaysia have an impact on the industrial sector, but they also endanger the natural environment or cause biodiversity loss. Industrial operations have a negative impact on the ecosystem, causing environmental degradation, which is a major concern today. Significant efforts have been made to minimise pollution, but there is still a need for a solid monitoring system, policy implementation procedures, and the development of green technologies.

Furthermore, financial factors also become a problem to develop or green university adoption. Developing a country with strong science and technology background requires heavy investment in research and development (R&D) activity (Suzana, 2013). A considerable amount of money is required to create or develop new green technology. Similarly, if an organization or government wishes to import technology from another production country, substantial funds are required. This issue can be solved if our country or educational institution produces green technologies. Nonetheless, because the government must issue enormous budgets, financial concerns can be a serious difficulty.

Beside, less awareness that can push or motivate the knowledge to implement green university can be part of the problem. The main thrust in the Green Technology sector is to provide education and public awareness on green technology as well as to promote the widespread use of green technology (KeTTHA, 2019). Organizations should raise awareness of green practices to ensure that people have a basic understanding of them. However, the application of green practices may complicate the process and necessitate a learning and training programmed. As a result, the effectiveness of the organization's training programmed

will increase green practices among them. Knowledge of green practices has been an important aspect in implementing green practices. A pro-environmental approach necessitates student knowledge and abilities to elicit emotional involvement in green practices. Another expert noted that to achieve the desired environmental performance, students must have the necessary skills and knowledge, because a lack of knowledge leads to failures in the adoption of green practices.

Finally, why I choose this research in UTEM is because the unplanned management of natural resources in UTEM such as the release of carbon dioxide gas into the atmosphere, the disposal of solid waste and so on causes pollution. If the management of these natural resources is not managed well, it also affects the quality of life of students and staff and the environment at UTEM.

1.3 Research Question

1. What is the level of UTEM students' knowledge regarding green technology?

2. What are the advantages and disadvantages of implementation or emerging green technology?

3. What activities can be done to make UTEM a safe environment using green technology?

1.4 Research Objective

1. To study the level of knowledge of UTEM citizens about green technology.

2. To investigate the advantages and disadvantages of using green technology.

3. To examine what activities can be done to make a safe environment using green technology in UTEM

1.5 Research Scope

This study will discuss the level of knowledge of UTEM student

1.6 Limitation/Key Assumptions of the Study

The researcher face constraint in term of data obtained from respondent. This is because the researcher was not able to check whether respondent provided the honest answer. Besides, respondent know or understand about topic of the study.

1.7 Important of the Study

The purpose of this study is to create awareness on how the green technology can give a lot of benefit to the people. Green technology is one of the factors that can help to reduce environmental degradation and promote a healthy environment. Furthermore, green technology should be used in the field of education to teach in students an appreciation for the environment.

1.8 Summary

This chapter describes the fundamental understanding of how to do this research study. This chapter briefly provide guidelines for further explanation about background of the study, problem statement, research question, research objective, the scope of study, limitation and important of the study. This study can help people to gain more knowledge about the importance of emerging green technology.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter deals with the assessment of literature which relates to the topic of the research which is the importance of emerging green technology to improve the environment in UTEM. Several literatures would be selected, and relevant areas would be reviewed. In this chapter, the researcher will define the meaning of green technology, identify important emerging green technology, investigates what environment that use green technology, reviewing issue pertaining to green technology and solution to emphasis on the use of green technology. This chapter provides information about aspects of previous works which related to this study. In other words, several presentations culled from various sources are under review here.

2.1 Green Technology

Our earth is suffering from terrible repercussions, most of which are the result of human activity. The development of sustainable technology becomes critical and could have a positive impact on the environment if green technologies are made available to everyone on the planet.

The term technology typically refers to the use of diverse techniques, skills, procedures, and processes for all practical reasons or to attain specific goals such as scientific exploration or research. Green Technology, or Green Tech for short, is a technology that is ecologically benign in its manufacture, supply chain, or use. Green tech is an umbrella term that continuously develops products, systems or equipment which are less taxing to the natural environment and its resources which limit and diminishes the negative effect of human exercises (Wahid Ali, 2020). Another definition of green technology can be defined as one application, equipment or system that has characteristics that prioritize the preservation of the surrounding environment and are environmentally friendly (Rahman H A, 2017). The existence

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of green technology is built on human consciousness to preserve ecological sustainability, which influences human life sustainability.

Green technology has so far been underutilised, particularly in underdeveloped nations such as Malaysia. There are numerous causes that have led to the optimal use of green technology, ranging from technical considerations such as costs to more basic matters such as public awareness of the necessity of environmental protection. As a result, it is critical to expose green technology to the community at an early age, for example, through green ethos education events for university student.

Green technology is carried out by applying a "green concept" which contains aspects of ZEB (Zero Energy Building) and 3R (Reuse, Reduce, Recycle) (Pambudi G, 2015). The characteristics of Green Technology include sustainable, using reclaimed natural resources, producing products that can be reused, reducing waste products and pollutants, and can be used in the recycling process (recycle), innovative and not harmful to health and the environment, creating activities and products that are beneficial to the environment and can protect the earth (Nefilinda, 2014).

The primary purpose of developing Green Technology is to limit climate change, conserve the natural environment, reduce our reliance on non-renewable resources such as fossil fuels, and repair environmental damage. The world's natural resources are finite, with some already depleted or damaged. Household batteries and gadgets, for example, can contain hazardous compounds that can pollute groundwater after disposal, poisoning our soil and water with substances that cannot be removed from drinking water and food crops produced on polluted soil. The dangers to human health are enormous. As a result, it is imperative that every investor consider becoming green. They should understand that green inventions technology is profitable.

2.2 Important green technology adoption

From Cambridge Dictionary, it is stated that the word of adoption is define as accepting or starting to use something new. Based on the meaning of the word, the term of accepting is used as the basis for the emphasis on the use of green technology. The adoption of green technology phrase points to the beginning that today's world needs green technology. Adoption of a new technology or technologies may provide benefits which may not be internalized by the agents making the adoption decisions. Possible examples include

safer equipment and processes for both manufacturing and service firms, as well as the purchase of environmentally friendly goods such as vehicles and appliances in the realm of consumer products. In such cases, the firms producing such products as well as the firms or consumers adopting the products must be aware of the regulatory environment (Bryan K.B., 2011)

The active use of green technology can help significantly reduce pollution (Ashyl Dasy, 2020). As a result, both developed and developing countries are turning to this type of technology to help them preserve the environment from harmful repercussions. Although pollution is an old problem, green technology adoption is a relatively new concept. It is growing increasingly popular as people realise that we are truly killing our planet. It has become critical to maintain our world, and green technology adoption is unquestionably more than a passing fad.

New technologies are crucial in dealing with the problem of air and water pollution, which is an increasingly important issue with serious health and environmental consequences. However, adoption of environmentally friendly technologies can be slow if the new technologies are not superior in terms of the firms' private incentives, if firms have long equipment replacement cycles, or if firms do not have sufficient information to evaluate whether or not a switch to a green technology is in their private interests (Bryan K.B., 2011).

2.3 Environment that use green technology

Everything that surrounds or affects an organism during its lifetime is referred to as its environment, or simply everything that surrounds a living organism such as people, places, and things, which can be either natural or synthetic. The word environment is derived from the French word 'environner,' which means to encircle or surround. The environment is believed to be an inseparable whole composed of interacting systems of physical, biological, and cultural factors that are interconnected individually and collectively in a variety of ways. Physical components (space, landforms, waterbodies, climate, soils, rocks, and minerals) influence the varied character of the human environment, as well as its opportunities and constraints. The biosphere is made up of biological elements (plants, animals, microorganisms, and humans).

From the above description, we can understand that the interaction between life with other biological elements can be considered as an aspect in the environment. An unpleasant environment makes the interaction between living things and biological elements unbalanced.

Pollution is one of the essential elements that cause the environment to be bad and requires the use of green technology as a solution.

National Geographic define pollution as introduction of harmful materials into the environment. Pollutants may be naturally occurring, such as volcanic ash. They can also be caused by human activities, such as factory runoff or waste. Pollutants have a negative impact on the quality of the air, water, and land. From single-celled microorganisms to blue whales, all living creatures rely on Earth's supply of air and water. When these resources are contaminated, all kinds of life are jeopardised. Pollution is a worldwide issue. Although metropolitan regions are typically more polluted than rural ones, pollution can migrate to isolated locations where no people dwell. Air pollution, water pollution, and land contamination are the three major types of pollution. This polluted environment makes the use of green technology necessary in daily life to save the existing environment.

Polluted environment also occurs in educational institutions as well as in universities in Malaysia. The management of the university has highlighted the importance of green technology as a measure in conserving and preserving the environment for the comfort of its students. Through an article published by Ruwaida in 2019 in Berita Harian, Universiti Teknologi MARA (UiTM) has collaborated with Sunway University's Nano-Materials and Energy Technology Research Centre (RCNMET) to develop green technology based on nanocomposite polymers. The collaboration involves environmental conservation efforts through the use of solar energy -based green technology in the degradation of less hazardous materials. The production of nanocomposite polymer materials can also be used in the production of hydrogen gas as an alternative energy source in the future as an effort to reduce carbon production (Ruwaida, 2019).

In addition, according to Asrizam, the rising ambient temperature has led to the high use of air conditioners and fans in the community to reduce the effects of this heat. This factor also results in an increase in electricity consumption in a building, especially in Universiti Putra Malaysia (UPM). New innovations have been produced by a group of researchers from the Institute of Advanced Technology (ITMA) at Universiti Putra Malaysia (UPM) to overcome this problem. Nano Phase Change Material (Nano PCM) has been developed which can help cool the building temperature and in turn can reduce the use of air conditioning, thus saving electricity costs (Asrizam, 2022). UTEM, which is notorious for odor pollution caused by chicken coops in the surrounding area, has lowered air quality and provided discomfort to students. UTEM needs to solve this problem by developing green technologies that can

overcome this problem. This is very important to ensure that the environment in the UTEM area is always protected and not polluted.

2.4 Issue pertaining to green technology

Increased material and energy efficiency in existing manufacturing processes, for example, are critical components of the shift to a green technology. However, more significant, if not radical, technological innovation is required. For instance, replacing fossil fuels in the transport sector as well as in iron and steel production requires fundamental technological shifts and not just incremental efficiency improvements (Nilsson LJ, 2017).

The issue for pertaining to green technology is new green technologies frequently face unfair competition from incumbent technologies. The incumbents, which may be close equivalents for their greener competitors, will have a relative competitive advantage because they were permitted to expand during periods of less stringent environmental rules, as well as tailor-made institutions and infrastructures. This results in path-dependence, or the economy becoming locked into specific technology trajectories. When developing new goods and processes, corporations often use acquired technology-specific knowledge, and technological decisions tend to be particularly self-reinforcing if the investments are defined by high initial costs and increasing returns from adoption. Existing institutions, such as regulations, norms of conduct, and so on, may also contribute to route dependence because they frequently favour incumbent technologies.

2.5 Solution on how to increase on protecting environment using gap analysis

Through observations or studies from environmental experts, they unanimously agree that the use of green technology is highly encouraged in caring for the environment, especially in preventing pollution. This can be assessed based on gap analysis that can help influence the use of green technology.

Gap analysis is either a tool or a process to identify where gaps are and what differences exist between an organization's current situation and "what ought to be" in place (Sora Kim, 2018). The gap analysis results show crucial areas where managers should take action to close the gaps and provide an objective and detailed view of the direction and magnitude of gaps among affected constituents. Based on the definition, this gap analysis can give us an idea of how much we need the use of green technology.

Firstly, the strength of using green technology. Using green technology, we can get energy saving from the implementation of the technology. One advantage of environmental technology is that they allow us to conserve a significant amount of energy. For example, by manufacturing more energy-efficient items, we must consume less energy in all aspects of our everyday lives.

Next, the opportunities using green technology. The green technology can give opportunities on how to increase recycling among people. Recycling aims to conserve scarce resources by recycling items or developing environmentally friendly substitutes. While the most common types of recycling are plastic, glass, paper, and metal waste, more sophisticated techniques can be utilised to recover valuable raw materials from e-waste or vehicle parts.

Furthermore, the weakness of green technology. The greatest weakness of green technology is that it frequently requires a large initial investment. Installing a new roof or new insulation to minimise heat from fleeing your home, for example, would be considered a green home improvement, but the work would be expensive.

Finally, the threat of use green technology which is lack of knowledge about green technology. Lack of knowledge about technology can be a threat to the implementation of green technology. This is because people do not know that how effective it is to the environment if using green technology. Exposure to this green technology is needed to influence people to use more green technology in their daily lives.

2.6 Conceptual Framework

<u>Independent Variable</u>   **<u>Dependent Variable</u>**

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┌─────────────────┐
│    Pollution    │
│   prevention    │──────────────────┐
└─────────────────┘                  │
                                     │
┌─────────────────┐                  ▼
│ Reducing global │           ┌─────────────────┐
│     warming     │─────────► │   UTEM Green    │
└─────────────────┘           │   Technology    │
                              │    Adoption     │
┌─────────────────┐           └─────────────────┘
│ Financial support│──────────►      ▲
└─────────────────┘                  │
                                     │
┌─────────────────┐                  │
│ Green technology│──────────────────┘
│    awareness    │
└─────────────────┘
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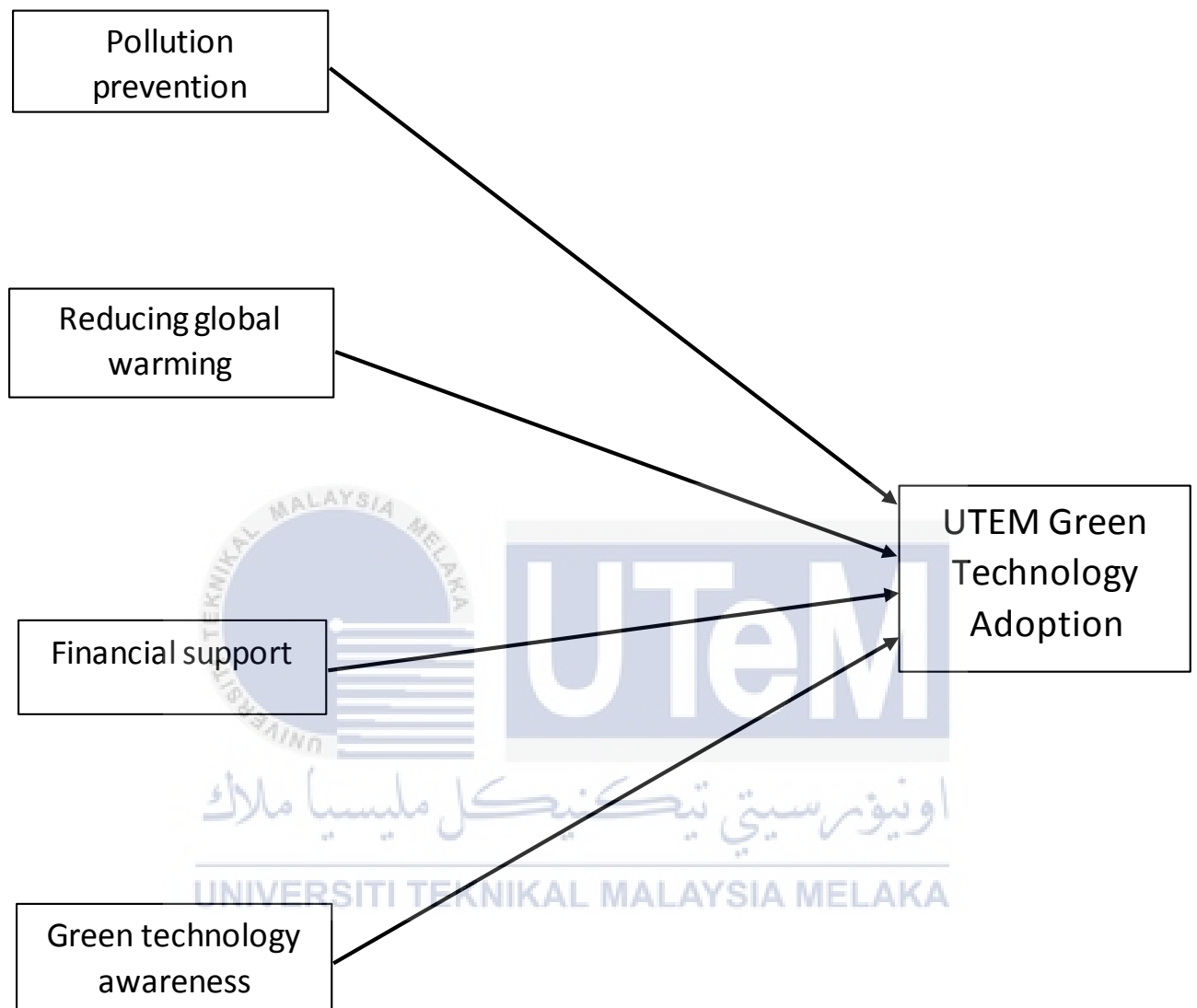
2.6.1 Dependent Variable

The dependent variable is the one that changes as a result of the independent variable's modification. It is the outcome that you wish to quantify, and it is "dependent" on your independent variable.

2.6.1.1 UTEM Green Technology Adoption

To adopt green technology in UTEM is one effort so that all the faculties, staff members and students can join such an effort. As the cradles of educating "future leaders", universities should address various needs of local societies. With the increasing concerns on different environmental issues and more recently a need to respond climate change, universities should create knowledge and integrate sustainability in educational and research programs, as well as promoting environmental issues to the society. Under such a circumstance, green university efforts have been initiated worldwide (Yong Geng, 2012).

There is need for higher education institutions (HEI) to implement Green initiatives in supporting sustainability attainment for waste decrease, energy efficiency, water utilization reduction, healthy working surroundings as well as clean indoor air (Sonetti et al., 2016). These initiatives can bring about improved quality of life for all, better economic vitality and a reduced environmental footprint (Mat et al., 2011). Higher education institutions are similar to smaller cities in terms of urban characteristics and population size. Besides, several activities take place across the campuses, which possess direct or indirect impacts on the natural environment (Alshuwaikhat and Abubakar, 2008). Hence, it is required for practitioners in higher education institutions to implement Green practices, where these practitioners can assist in providing multidisciplinary Green technical solutions in achieving sustainable development within the university (Zakaria et al., 2016).

2.6.2 Independent Variable

An independent variable in an experimental study is a variable that is controlled or modified to observe what effects it has. It's called "independent" because it's unaffected by the other variables in the study.

2.6.2.1 Pollution prevention

Pollution is an unfavourable alteration in the physical, chemical or biological characteristics of air, water and land that may or will adversely affect human life, industrial life, industrial progress, living conditions and cultural assets (Abhijit Mitra, 2018). The major goal of green technology is to reduce the greenhouse effect and pollution. The main idea is to create revolutionary inventions that do not deplete natural resources. It will cause less harm to humans, animals, and the overall health of our world. Our world is clearly beginning to suffocate as a result of all the pollution that we produce. However, if there is a will, there is a way to make this difficulty considerably smaller. Day after day it is getting more obvious that we need to invest more in green solutions for the survival of mankind and the necessity of green tech lies in reducing the risks posed to the environment and in conserving natural resources (Mariya Noor, 2020). The successful application of green technologies will make a significant contribution to pollution reduction. This is why many developed and developing countries are now shifting to this type of technology to help safeguard people from the negative effects of climate change. Air quality is very important because the air we breathe must be fresh and clean. The air quality available at UTEM may not reach the actual quality because there is odor pollution released through the chicken coops around the UTEM area. The pollution may not be as big as other pollution, however, it disrupts the comfort of students living in the UTEM area. With this green technology, a little will reduce the smell and further improve the air quality in the UTEM area.

2.6.2.2 Reducing global warming

Global warming begins when sunlight reaches the Earth (Umair Shahzad, 2015). Because global warming is one of the most serious problems that humanity faces today,

everyone should take steps to mitigate climate change. Human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, with a likely range of 0.8°C to 1.2°C. Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate (Masson, 2019). Student residences at UTEM often receive a lot of heat as a result of this global warming. Plus, even during the night, the staying students will also experience heat that may not provide comfort when students want to sleep or rest. Green technology can assist us in this endeavour because they can save a significant amount of energy. Because the majority of our energy is still produced from fossil fuels, reducing energy usage also reduces the amount of fossil fuels that must be used. As a result, less greenhouse gases are emitted into our atmosphere, and global warming can be delayed to some extent.

2.6.2.3 Financial support

Perhaps the greatest disadvantage of going green is that it often requires a large initial cost (Mahmood Zohoori, 2017). Upfront costs present a large deterrent to going green (Mohammad, 2017). Installing a new roof or new insulation to keep heat from escaping your home would be considered a green home improvement, but it would cost a large sum of money to get the work done. Similarly, buying a hybrid vehicle that gets good gas mileage can reduce energy consumption, but hybrid vehicles often cost many thousands of dollars more than similar vehicles without hybrid technology (Abolfazl, 2017). One issue with environmental technology is that it is relatively new, and large funds must be spent on research and development in order to employ this type of technology on the scale required to have a meaningful environmental impact. As a result, organisations like UTEM must invest substantial sums of money up front, which may hinder and slow the development of sophisticated green technology to some extent. Not only can the expenses of researching green technology be high, but so can the price of implementing them.

2.6.2.4 Green technology awareness

Many people may still be unaware of our environmental concerns and the importance of developing solutions to them. The management should be proactive about the environmental