3Rs Behaviour in Plastic Usage among International University Students in Thailand

Sandar Shwe Yee, Rashminda Attanayake

Siam University, Thailand

sandarshweyee4@gmail.com

ABSTRACT

This research was conducted to explore the factors affecting Thailand application of Reduce, Reuse and Recycle (3Rs) concept in plastic usage. This research paper described the global plastics usage and pollutions (Land pollution, Water pollution, Air pollution) cause by plastics usage. This study adopted independent variables from the Theory of Planned Behaviour (TPB), namely, attitude, subjective norm and perceived behavioral control and added on two more independent variables, habit and facilitating conditions to study the plastic usage. This study takes on dependent variable is 3Rs behavior. I used a self-administered questionnaire to collect and analyze the data. The results showed that all variables influence plastic use behavior. This study contributes to a better understanding of the relationship between the 3Rs behavior intention and environmental in plastic use. This research will contribute to reducing environmental pollution caused by plastic waste by proposing appropriate strategies.

Keywords: Reduce, reuse and recycle (3Rs), Plastic waste, Theory of planned behaviour (TPB)

INTRODUCTION

Background of the study

Plastic pollution is caused by the overproduction and consumption of plastics. Plastic pollution is a global problem as it has serious social and environmental impacts. Since plastic is composed of non-biodegradable substances, there is no safe way to dispose of plastic waste. Toxic chemicals harm humans, animals, and the environment. The purpose of this study is to investigate the factors that influence the application of the concepts of reduce, reuse and recycle (3Rs) of plastics. This study took variables from the theory of planned behavior (TPB): attitudes, subjective norms, perceived behavioral control, 3Rs behavioral intention, habit, facilitating conditions and 3Rs behavior to know usage of plastics. We used a self-administered questionnaire to collect and analyze the data. The results show that all variables affect the usage behavior of plastics. This study contributes to a better understanding of the relationships between the determinants of behavioral intent of plastic use when the 3Rs are applied. By recommending the right strategy, this study will help reduce the environmental pollution caused by plastics waste.

ISBN (e-book)

Significance of the Study

This study will analyze the perspective of young population specifically university students regarding 3Rs behaviour in plastic usage. According to past studies, there's a gap between intention and actual behaviour. Thus, this study will investigate the relationship between the intention and actual behaviour. Theory of planned behaviour (TPB) was adopted in this study. Habits and facilitating conditions were added into the model as theses factors will affect the behaviour.

Statement of problem

Nowadays, plastics became more and more widely used. Globally, plastics produce over 380 million tons of plastic every year. Plastics are used in many areas around the world. About 50% of plastics are made for single use. Around 500 billion plastic bags are used worldwide every year. More than 1 million bags are used every minute. The increasing use of plastics has had a profound effect on the environment. Thailand occupies an important position in the global plastics industry. Thailand's plastic industry is growing and many items are made from plastic. Today, Thailand is the 8th largest plastic producer in the world. As the production of plastic increases, so does its use. In 2019, Thai manufactures produced 9 million tonnes of plastic. Therefore, the total value of the Thai plastic market is estimated to be 900 million baht. And, plastics pollute the ocean, affect biodiversity and affect human health. Plastics can be affected many pollutions in our environment. We cannot stop the daily production and use of plastics, but we can reduce it.

The Objectives of the Study

The aim of this study was to investigate the factors influencing the application of the 3R concept in the use of plastics. General research objectives were narrowed down to the following specific research objectives:

1. To investigate the relationship between attitude and SU students' 3Rs behavioral intention in plastic usage.
2. To investigate the relationship between subjective norm and SU students' 3Rs behavioral intention in plastic usage.
3. To investigate the relationship between subjective norm and SU students' 3Rs behavioral intention in plastic usage.
4. To investigate the relationship between subjective norm and SU students' 3Rs behavioral intention in plastic usage.
5. To investigate the relationship between subjective norm and SU students' 3Rs behavioral intention in plastic usage.

LITERATURE REVIEW

Global Plastic Usage

Plastics are a variety of synthetic or semi-synthetic materials based on polymers. Plastics are also considered organic materials such as wood, paper and wool. Their plasticity makes them to be molded, extruded or pressed into solid objects of various shapes. Plastics are usually manufactured through human industrial system. Most modern plastics are made from fossil fuel-based chemicals such as natural gas and petroleum. Plastics are widely used due to their

ISBN (e-book)

flexibility, lightness, durability and other properties. (Wikipedia, n.d.). Plastics are becoming more and more prevalent today. Many types of plastics are being produced. Plastics have recyclable plastics and non-recyclable plastics. In 1988, the Plastics Industry Association launched the Resin Identification Code (RIC) system, which classified plastic resins into seven categories. The seven types of plastics are Polyethylene Terephthalate (PET or PETE), High-Density Polyethylene (HDPE), Polyvinyl Chloride (PVC or LDPE), Polypropylene (PP), Polystyrene (PS or Styrofoam) and other. (Plastics for change, 2021).

Globally, more than 380 million tons of plastics are produced annually. Plastics is being used in many fields around the world. (Roser, n.d.) Plastics are clearly an important part of various materials used in modern society. Packaging, Construction, Textiles, Consumer and institutional product industry is one of the most widely used in the world. Plastics are the choices of this industries because of their easy to use and low cost. It is also used in other sector of industries. Packaging is the largest end-use market segment, accounting for over 40% of total plastic usage in the worldwide. About 50% of plastics are manufactured for single use. People are increasingly using disposable plastics more easily (Ritchie, n.d.). The most common areas for using disposal plastics are packaging, convenience store, restaurant, supermarket, fast-food shop, grocery bags, cup, food packaging, containers and cutlery. About 500 billion plastic bags are used every year around the world. Over 1million bags are used every minute. In addition to plastic bags, disposable soft drink, plastics water bottle and cans are becoming more convenient around worldwide. People buy a total of 1 million plastic bottles per minutes around the world. It's about 1.5 billion plastics bottles every day. (Lavit, 2019). Many types of plastics are used in many different ways, for a variety of reasons, and around the world. For many of us, they become an integral part of our daily lives.

Figure 1-Type of Plastics

Negative Impact of Plastics in Environment, human and animal

Plastics can be pollution our environment. They can be air pollution, land pollution, water pollution and littering pollution. And, other effects can be caused by plastics. Different sizes and types of plastics affect our environment. When people use a lot of plastic for easy to use. Most of our plastics ends up in landfills, oceans, waterways and the environment. This is cause of negative impacts of environment, human and animals.

ISBN (e-book)

Land pollution and Air pollution

Plastics are difficult to decompose. Plastics can take 20 to 500 years to disassemble, depending on the material of the structure. Plastics bags and plastics bottles are most commonly found in the environment. Plastics can cause serious harm to the environment. In addition, when plastic bags decompose in the sun, toxic substances are released into the soil. A number of chemicals found in plastics can be damaged plants.

Climate Change

Plastics are produced from fossil fuels and the process of extracting and making these plastics releases a lot of greenhouse gas. The main driver of climate change is the greenhouse gas effect. And, if plastics bags are burned, they release a toxic substance into the air causing ambient air pollution. These impacts cause land pollution, air pollution and climate change. (International bar association the global voice of the legal profession), (Environmental Center).

Marine Pollution and Animal extinction

Plastics is present throughout the environment everywhere on earth. Rivers brings many types of plastic wastes from depths of land into the ocean, making them a major source of marine pollution. A staggering 8 million tons of plastics eventually flow into the world's oceans every year. This is cause water pollution and harm to marine life. (Jambeck, n.d.). The effects of marine plastics are on the swallowing, respiration, and attachment of hundreds of species. Marine wildlife, such as seabirds, whales, fish and turtles, prey on plastic wastes, and they often starve to death when their stomachs fill with plastic wastes. Marines' species are still extinct due to plastics. (IUNC, n.d.) . Not only marine life, but also wildlife and other animals are affected by plastic. Chlorinated plastics release harmful chemicals into the surrounding soil, leading to infiltration of groundwater and other nearby water sources and eco systems. This can cause effects in the species of animals that drink water. Animals eat many of plastics and they face death. Plastics pollution has a directly and death effect on animals. (UN environment, n.d.).

Human Heath

Today, plastics is the universal flagship material of the modern economy because they are low cost and diverse function properties. They are posing serious threat to environment and consumer's health in many direct and indirect ways. Human health problems are like irritation in the eye, vision failure, breathing difficulties, respiratory problems, liver dysfunction, cancers, skin diseases, lungs problems, headache, dizziness, birth hard effect, reproductive, cardiovascular, genotoxic and gastrointestinal causes for using toxic plastics. (kumar, 2018 january), (Ram Proshad, 2018).

Plastic Usage in Thailand

Thailand occupies an important position in the global plastic industry. Thailand plastics industry is growing and many accessories are also being made from plastics. Currently, Thailand is the eight largest plastics producers in the world. As plastics production expands, so does its use. In 2019, Thai manufactures produced 9 million tons of plastics. Therefore, the

ISBN (e-book)

total value of the Thai plastics market is estimated to be 900 million baht. The most widely used plastics industry in Thailand is the packaging industry, food industry, electrical and electronic industry. (Khanunthong, 2021)

According to the Thai plastics Association, amounts for packaging is about 31% of the country's plastic exports, with packaging companies consuming about US$3.42 billion annually. From ingredients and vegetables to snacks and meal, milk and juice, food goes through 60% all plastics packaging in the country. With the increasing demand for the packaging sector in the ASEAN region, Thailand remains as the right destination for building entrepreneurs to indulge in eco-friendly plastics, particularly for the packaging industry.

To meet the growing demand for attractive, flexible and economical individual packaging for ready-to-eat meals and heat-resistant bags for cooking vegetables in the microwave, opportunities exist for people with busy lifestyles. As a result, more and more disposable plastics are being used. Other solid plastics are used in electrical industries and manufacture of consumer goods. Plastics are widely used in various display products, audio equipment, cables and wires, circuit breakers and switches, fuse boxes, switches and buttons, transformers, food processing units, electric kettles, refrigerators, microwave grills, and numerous other electronic goods. Plastics are widely used in this field because of their safety, durability, efficiency, and resistance to power and mechanical shocks. In Thailand, these industries are the largest users of plastics. Plastics bags, single use plastics are easy to use and affordable. So, they are widely use in the Thai business market but also in many people. Thailand use 70 billion plastics bags a year. And, Thai people use 4000 million water bottle per year. (Thailand, 2020).

Theory of Planned Behavior (TPB)

Theory of planned Behavior (TPB) show that our behavior is determined by intention, and intention is predicted by attitudes towards behavior, subjective norms and perceived behavioral control. TPB includes three socio-psychological and behavior-specific factors; attitudes, subjective norms, and perceived behavior control to predict the intentions and intentions of actual behaviors. TPB is an important and frequently cited model for predicting individuals' social behavior. (Loh Chun T'ing,Krishna Moorthy,Chin Yoon Mei,Foo Pik Yin,Wong Zhi Ying,Chin Wei Khong,Gan Zhao Chern, Thong Zin Lin, 2020). Nowadays, all people mostly use plastics bags, single use plastics. When it's come to using plastics, people have their own attitude. For different aspects of the plastics waste problem have different concepts of planned behavioral theory. Plastics, plastics bags, single use plastics are lightweight, easy to use and have a comfortable attitude. There are people who use it with that attitude. And they are other side effects. There are people who have an attitude that they don't want to use. Plastics can be many risks of our environments and our life. For more than years, plastic wastes have been one of the main environmental problems because its affects environmental sustainability. Plastics waste is deeply affected by pollution and economic development, climate change and social behaviors. So, there are people who want to reduce the use of plastics. On those factors, social behavior is the most important aspect of plastics waste production, as human are consumers of plastics in our daily life. (Sharifah Nur Munirah Syed Hasan,Rosta Harun,Kuang Hock Lim, 2015). Empirical results show that consumer attitudes toward plastics bag use, subjective norms, perceived behavioral control, and convenience are all positively correlated with willingness to use plastics bags.

On the other hand, environmental considerations and moral beliefs have a significant but negative impact on the attitudes and intentions of consumers who use plastics bags. Consumers' concerns about the environment and the influence of their moral beliefs about the

ISBN (e-book)

intention to use plastic bags have partly affected their attitudes towards the use of plastics bags. Furthermore, the applicability of the theory of planned behavior model shows that the extended theory of planned behavior model has excellent predictive power in understanding consumers' intentions to use plastics bags. (Ying Sun, Shanyong Wang, Jun Li, Dingtao Zhao & Jin Fan, 2017).

3Rs Behaviors

The 3Rs behaviors are Reduce, Reuse and Recycle. As the use of plastics increase, so does increase waste and the risks. These 3Rs help reduce the amount of waste we throw away. They also protect natural resources, human health, pollution, animals' extinction, landfill space and energy. The best way to manage waste is to generate. However, due to the high volume of plastics usage, 3Rs need to be use.

Reduce, Reuse and Recycle of Plastics

Plastics pollution is caused by the cumulate of plastics waste in the environment. This plastics pollution not only affects wildlife and habitats, but also affects human health, leading to adverse effects on land and rivers. Plastic has changed our daily lives. But the amount of plastic and its longevity make it one of our biggest waste problems. Consumers can make a big impact by making small changes to the way plastics are used. So, we need to prevent plastics waste pollution. We need to reduce and reuse of using plastics.

The first and best option to reduce plastics waste is to minimize disposable plastics in our daily life. The most common uses of disposal plastics are in packaging and food industry. So, single use plastics is mostly use in our environments. We should stop using plastics straws even in restaurants. Plastics substitutes used in food packing, such as papers, thick paper food boxes can be reduced single use plastics. Avoid using disposable coffee cups, disposable cups, disposable tools, straws and napkins as much as possible. Store a complete set of silverware with plates, bowls and cups that can be washed and reused. And, shopping at the local farmer's market is good for both parties. First, support local farmers while obtaining the freshest ingredients in most major grocery stores. It can be good our health. And then, should use with containers or thick paper box to reduce plastics packaging. We can use cloth bags too. It's can be reuse. By shopping at stores that sell bulk food or other accessories, packaging plastics wastes is primarily reduced, but require to prepare own containers or reusable bags. These ways can be reducing our plastics pollution. (The Nature Conservancy, 2018). To reduce it, we need to reuse things. Reusing products are economic and environmental benefit. Sometimes creativity is needed.

- Firstly, use reusable bags when shopping to reduce the use of disposable shopping bags.
- The product is reused for the same purpose. Save paper and plastic bags and repair broken items, furniture and toys.
- Sell or donate used clothing, electric appliances, toys and furniture to garages or commercial sales offices.
- Use reusable bottles
- Use reusable Utensils, Straws and plates
- Use reusable containers instead of plastics packaging
- Use reusable produce bags
- Use ceramic coffee cups instead of plastics cups/bottles.

We can control these ways for plastics pollution. (Sustainable SA.com, n.d.). Many of the things we use today are reusable. There are many simple and creative ways to reuse some of

ISBN (e-book)

the plastics products. Some plastic containers are so durable that they can refilled and reused 25 times, and then, they will be so damaged that they cannot be reused. By refilling reusing plastics containers, can directly reduce the need for single-use plastics. Therefore, reducing the demand for disposable containers can reduce waste and energy consumption. (REUSING PLASTIC CONTAINERS).

Recycling is the process of collection and reusing waste materials. The elements in the waste are separated and reused as raw materials for new products. Recycling refers to waste that is suitable for use after treatment and classification. Traditional elements that can be recycled and reused include metals, paper, glass and batteries. Plastic recycling is the most important things in the world today. Plastic is a non-biodegradable material and it takes decades to decompose enough to used again. Recycling, chemical treatment and reuse of plastics is a better way to save the environment from plastic pollution that pollutes the planet. We can see that plastic bags, bottles, containers etc. pollute the world's oceans and cause serious damage to ecosystems.

By recycling the plastics, we use every day, we can spread awareness and manage plastic landfills and environmental issues. The more people actively using recycled plastics products, the better for the world. And, recycling plastic waste helps reduce the pressure on the planet's finite resources, such as natural gas, oil, coal, wood, and water. By reusing plastic instead of producing the same quality of material every time, we are effectively reducing the plastic footprint in landfills around the world. Resources can be saved by recycling existing waste. The plastic manufacturing process uses a lot of natural resources and wastes energy, water and oil. Recycling and reusing plastics ultimately mean producing more non-biodegradable plastics to protect these natural resources which are harmful to the environment in the future. As mentioned earlier, plastics take decades to completely decompose. No matter where put the plastic, it takes a long time to deteriorate. By recycling and reusing plastic raw materials into other products, we can effectively reduce the plastic space in landfills that can be used as biodegradable materials for environmental protection.

Theoretically, 1 ton of recycled plastic can save about 7 cubic yards of landfill space. Due to the limited space and the huge amount of landfill, landfills can lead to disasters. Recycling plastics helps keep plastic away from landfills and also helps protect the environment. Reducing, reusing and recycling plastic is a reliable way to protect natural resource es. However, the reuse of plastics also means that there is less plastic in landfills, rivers, deserts, forests and oceans around the world. (Fun-stuff, Main, 2018). From water bottles and milk cans to cleaning product containers and shampoo bottles, plastic packaging is everywhere in our homes, and ultimately makes our lives more convenient. It's no exaggeration. However, many of us often unknowingly throw away these easily reusable or recyclable plastic products. Recycling and reusing everyday plastic materials is much easier and saves a lot of money than many people understand. In addition, proper recycling of these plastics will ultimately reduce the need for landfills, save energy and thereby benefit the environment. There are many simple and creative ways to reduce, reuse and recycle plastics product. (Kielman, 2018).

Attitude

Attitude refers to a set of feelings, beliefs and actions about a particular thing, person, object or event. Attitudes are usually the result of experience and education and can have a significant impact on behavior. Attitude is long lasting, but it can be changed. (Cherry, 2021)**.** If people are attitude about an action, they are more likely to perform a particular action. Behavior are actions and reactions that occur in response to events and internal stimuli from the mind. There

ISBN (e-book)

is a complex relationship between people's attitudes and behavior, and the social factors influencing them complicate this relationship. Behavior usually reflects established beliefs and attitudes. Ideally, a positive attitude reveals well-coordinated behavior. However, in some cases, healthy behavior can lead to harmful behavior. Behavior can be influenced by many factors' other behavior, such as prejudices towards self and others, financial factors, social influences, and convenience. (Ford-Martin, n.d.).

Attitude have positive and negative attitudes. Manufactures and consumers also have different attitudes. Although some of the disadvantages of plastics are known, there are some components that must be used. There is a significant positive correlation between attitudes and behavioral intent to reduce plastic use, but it is weak. Positive attitudes also include the ease-of-use plastics, low cost and others. The plastics industry adheres to this consumer attitude towards the plastic products it produces. Products can be divided into two categories; durable and disposable. People like plastic products, but not all products. In fact, the attitude of anti-plastic bags and disposable plastics is clearly very negative. Much academic research has been done on plastic bags, packaging and disposable containers, but little has been done on durable plastic products that can be used for many years. Although disposable plastics are known to accumulate in landfills, there is a tendency to use more disposable plastics. People's intentions depend on their comfort. Plastics have bad effect on environment, people and animals. We invented plastics that was low cost, durable and durable, but since then, with limited consideration for disposal, it has been used everywhere. There are many types of plastics, all with different properties and uses. However, the three factors of "cheap, durable, and long-lasting' usually apply to all of these products. People also know that it is difficult to reduce the use of plastics with different attitudes. And, there are many attitudes for 3Rs. The most common reaction is to avoid plastics and look for alternatives. Paper shopping bags are a typical example. Everyone knows that paper can be recycled, but few know that making paper bags will result in greater resource use and greenhouse gas emissions than plastic. Given that climate change is the biggest threat we face today, it is important to consider not only the use and disposal of products, but also the emissions during their production. Paper wins in terms of speed and severity of decomposition in the environment. So if the paper eventually becomes garbage, the effect is not like that of plastic. The impact of objects becoming garbage is important to consider, but it is not only one factor to consider. The answer is not to stop producing plastic. After all, the world is completely dependent on plastic, making it a better place in many ways. Instead, you should stop treating plastic product as disposable products. This attitude goes against the design. You need to be aware of its legitimate use and take advantages of its potential make it a reusable product. In particular, plastics can reduce waste by extending the shelf life of the food. Plastic not only keeps food fresh for a long time, but also ensures food safety.

Resolving the overuse problem is an important factor in considering long-term use of plastics and recycling and proper disposal at all stages of the product life cycle. Extra packages are a good example. Consumers can influence change through purchasing power, and product designers can do so in front of the saying coal. There are many perceptions of plastic as disposable. One of the great advantages of plastic is that it is cheap. This is also one of the biggest problems. It is nature of human beings that allows the monetary value of something to largely determine the physical value we assign to it. Cheap ones may not be good or last long, so we will gladly throw them away. Plastics are unlikely to suddenly become a premium product, but they are not required. From a circular economy perspective, we need to change our attitude towards it. In the circular economy, known as the "future economy', resources are maximum from plastic products and use it as a way to reduce waste. Factor analysis is the

ISBN (e-book)

determination of the most important general views on plastic waste and its management, which are most likely to influence people's attitudes towards plastics waste management. To implement 3Rs, we need to replace plastic disposable bags with something else. Our attitudes toward plastic may differ. We need to change our view of plastic. (Natalie Martin, 2019).

Subjective Norms

The subjective norm is the belief that an important person or group of people approves of and supports a specific behavior. Subjective norms are determined by the social pressure that other people on a person's behavior in a specific way and their motivation to follow their views. That subjective norms correlated positively and significantly with family's willingness to recycle, and that the support of family, friends and society affects the level of willingness to recycle. In addition, the subjective norms. There is a significant positive correlation with the desire to save energy. One possible reason for the different of subjective normative variables is that some of the information contained in the variables already exists in the desire to identify specific behavioral variables. The theory of planned behavior explains the fact that intentions are largely influenced by personal factors, such as attitudes and perceived behavior control. The narrow concept of subjective normative variables leads to a weak relationship between ideals, beliefs and intentions. Descriptive norms are the actual activities and behaviors of others. In contrast, social norms refer to the perception of others' views on how one should behave. (Marina Jeger &Anita Frajman Ivković , 2015). Subjective norms have positive effect on sustainable waste management behavior.

Plastic pollution is an important issue for global sustainable development, but social norms related to disposable plastics are changing. A representative study (n = 1,001) was used to measure consumer behavior on four disposable plastic items. They are plastics bags, straws, coffee cups, takeaway containers. Descriptive standards proved to be the strongest predictor of plastic avoidance, and most of the remaining variables control the norm-behavior relationship. However, the relative importance of each variable depends on the specific object and behavior. These findings indicate that there is an opportunity to use social norm information to bridge the gap between consumer perception and behavior to address global sustainability issues. (Kim Borg,Jim Curtis,Jo Lindsay, 2020). Subjective norms refer to, people's opinions of how others view their behavior, and coworkers' opinions refer to waste management activities in the workplace. The relationship between subjective expectations and environmental sustainability is relatively strong. There are important subjective criteria regarding recycling. Influencing the recycling behavior of individuals that they believe to be valid by social groups or others belonging to them. Similarly, the association between behavioral and subjective norms is statistically significant. This suggests that most people expect to behave in certain behaviors, indicating that family, peers and communities have a significant impact on sustainable waste management behaviors. (Gangga Muniandy,, Marhana Mohamed Anuar, Bob Foster, Jumadil Saputra , Muhamad Deni Johansyah, Tran Tien Khoa and Zafar U. Ahmed, 2021).

Perceived Behavioral Control

Perceived behavioral control refers to people's perception of their ability to perform certain behaviors. The analogy to the expected value model of the approach is that perceived behavioral control is determined by the entire set of the accessible control beliefs. That is beliefs about the existence of factors that may promote or interfere with behavioral performance is believed. Specifically, the strength of each control belief is weighted by the perceptual potential of the control factor, and the product is aggregated, as shown in the

ISBN (e-book)

following equation. To some extent, it is an accurate reflection of actual behavioral control, and perceived behavioral control can be used with the intention of predicting behavior. (Wallston, 2001). The ongoing challenges of implementing waste sorting operations around the world still require a comprehensive and clear overview of the current scenario in order to improve the efficiency and effectiveness of the policy. Therefore, it is necessary to investigate the effects of perceptual behavioral control on the segregation behavior of waste sources worldwide. The key is to control our behavior. One of the behavioral areas that has received the most research attention is household waste management. In developing and developed countries, the generation of household waste has attracted more and more attention. More importantly, personal beliefs and concepts will affect the response, cultural value and success of the municipal solid waste management system. There is also the influence of community behavior control on the behavior of garbage source classification to improve the management of, municipal solid waste to manage, reduce and prevent excessive garbage. It is undeniable that this is indispensable. In the landfill, thereby extending the life of the landfill. The degree to which current waste issues are considered a specific threat to individual well-being is recognized as an important determinant of environmental and waste management behavior. Environmental issues should be considered threats to health and well-being, as they take precedence over many traditional predictors of environmental behavior.

Individually, there is a real relationship between the extent to which the waste problem is significant and the subsequent behavioral response. This can be a location or a personal experience, such as living near an area or landfill that refuses to pose a risk to public health, as it may encourage more careful management of waste. Many people believe that their individual actions do not have a significant impact on a particular problem or task. This condition can usually be associated with any area of social behavior, but is more pronounced environmentally. From an environmental point of view, global warming is associated with individual actions to reduce vehicle use, save energy and reduce waste. The range of specific actions actually taken to influence. Citizens who believe that their actions have a significant impact on waste issues are the ones most likely to take action. Therefore, from an individualist point of view, the effectiveness of this reaction may have crucial importance in promoting environmental hygiene behavior. In short, perceptual behavioral control refers to people's perception of whether a particular action can be performance and how easy it is in life. Therefore, they have the right opportunities, resources, and skills to classify waste and need to be motivated. Perceived behavioral control has a positive effect on consumers' behavioral intent to reduce plastic waste. Increasing use of plastics causing environmental damage. So, consumers need to control the use of plastics. (Cheng, 2020).

3Rs behavioral Intentions

Behavioral intentions refer to the motivational factors that influence a specific behavior. The stronger the intention to take action, the more likely it is to take action. Intentions and behavior are definitely associated. There is a positive correlation between 3Rs behavioral intention and 3Rs behavior. Behavior intention related attitude, subjective norms, perceived behavioral control. Nowadays, with the increasing use of plastics and the increase in plastics pollution, 3Rs (Reduce, Reuse, Recycle) need to be implemented. Intention to 3Rs (Reduce, Reuse, Recycle) is required to implement 3Rs (Reduce, Reuse, Recycle) behavior. Worldwide needs to develop 3Rs program to increase community participation. The purpose of behavior intention of 3Rs is strongly and significantly related to the behavior of 3Rs. Government needs to campaign for 3R so that people with negative attitude towards 3R can become aware and adopt more positive attitude. This is allowing to set a subjective standard for 3R behavior. In

ISBN (e-book)

addition, consumers and producers need to provide training for waste reduce, reuse and recycling. (Novie Susanto1,a), Lyra Davidesyta1, Denny Nurkertamanda1, and Thomas Triadi Putranto2, 2019). This study aims to reduce the concept of the 3Rs. The basic method is to analyze behavior and manage waste through reuse, reduce and recycling. Indicates that we are refraining from overusing. Due to impact of plastics, 3Rs have been educated and mobilized in every country to reduce the use of plastics for 3Rs, to consume less waste products. And, schools are also campaigning for 3Rs. For example, use bottled water for beverages instead of buying a new bottle, use reusable cups instead of disposable cups, reuse plastic bags for garbage collection. These campaigns are underway. Instead of disposable bags, they are advocating the use of cloth bags, paper bags, and straw bags. In addition, the behavior of consumers who want to use cloth bags has been found to influence the behavior of small disposable bags. Therefore, more people should be encouraged to take implement on 3Rs. We can see about of 3Rs campaigns on television, newspaper, social media, environment. Recycling includes waste collection, segregation and disposal. Paper, plastic, metal and glass are recyclable materials. Environmental activists have shown that the behavior of the 3Rs a positive effect on solving environmental problems. Therefore, it is necessary to stimulate interest in 3Rs campaigns in order to get more people interested in the 3Rs process. (Loh Chun T'ing,a Krishna Moorthy,b,∗ Chin Yoon Mei,a Foo Pik Yin,a Wong Zhi Ying,a Chin Wei Khong,a Gan Zhao Chern,a and Thong Zin Lin, 2020).

Habit

Habit is a relatively stable behavior pattern. It can be done in the past without intensified scrutiny, thus forming an automated process rather than a controlled process like deliberate decision-making. Habit and past behaviors are important for shaping behavior that are routine. (Loh Chun T'ing,Krishna Moorthy, Chin Yoon Mei, Foo Pik Yin , Wong Zhi Ying,Chin Wei Khong, Gan Zhao Chern , Thong Zin Lin, 2020). On the relationship between attitude and behavior, habits are often regarded as building marginal profits. This is of no value, especially given the current interest in the principles of automation in social psychology. The basis characteristics of habits, such as goal-oriented automation, dependence on homeostasis and functionally of the situation, and measurement of habit strength. From the aspects of planned behavior theory, voluntary counter-intention attitude-behavior process, implementation intention theory and decision-making model, this is comparing intentional behavior and habit. Therefore, habit manifests itself as the boundary between the planned behavior model and the effectiveness of rational decision-making. Habits seem to have a lasting cognitive orientation, which we call “habitual mentality”. This helps individuals shift their attention to new information and behavioral policies, and helps maintain habitual behavior. By focusing on habitual mindsets and automatic prompt response links, rather than statistical relationships between past and future behaviors, habit becomes an interesting part of future research. (Bas Verplanken & Henk Aarts, 2011). In the past 60 years, we have changed our behavior to use new synthetic materials produced from fossil fuels. We have integrated it into almost every aspect of our lives, which makes us more comfortable. The production of plastic materials is growing at an alarming rate, and a large amount of non-biodegradable waste is causing a major global problem. To overcome this problem, we need to consider both explicit and innovative behavior changes and product development. When we start to remove plastic products from the environment, we have a responsibility to reduce the amount of new plastic materials entering the waste stream. To achieve this goal, it is necessary to explore all options related to product design, production and consumption methods, and determine what constitutes acceptable waste. This series of articles solves this problem by discussing various topics such

ISBN (e-book)

as the use of plastic materials, behavior changes, and the development of new environmentally friendly products and their impact on the environment. (Paterson, 2019).

Facilitating Conditions

Facilitating conditions is a situational factor or opportunity encouraging a person from a particular action. Due to the effects of plastics mentioned above, organizations are still trying to implement 3Rs process. Most of people gave positive feedback for plastics recycling movements, if the facility is easy to access. Other than this, easy access to recycling facilities will reduce the cost of action and motivate the society to follow the trends. Facilitating conditions is positively and significantly affect 3Rs behavior. The coefficient correlation of promotion status for 3Rs behavior is lowest compared to intentions and habits of 3Rs behavior, but it has been concluded that there is a significant positive association with 3Rs behavior, so careful attention still be paid. (Loh Chun T'ing,Krishna Moorthy, Chin Yoon Mei, Foo Pik Yin , Wong Zhi Ying,Chin Wei Khong, Gan Zhao Chern , Thong Zin Lin, 2020).

Proposed Hypothesis

H01: Attitude is positively related to 3Rs behavioral intention
H02: Subjective Norm is positively related to 3Rs behavioral intention
H03: Perceived Behavioral Control is positively related to 3Rs behavioral intention
H04: Intention is positively related to 3Rs behavior
H05: Habit is positively related to 3Rs behavior
H06: Facilitating conditions variable is positively related to 3Rs behavior

Proposed Conceptual Framework

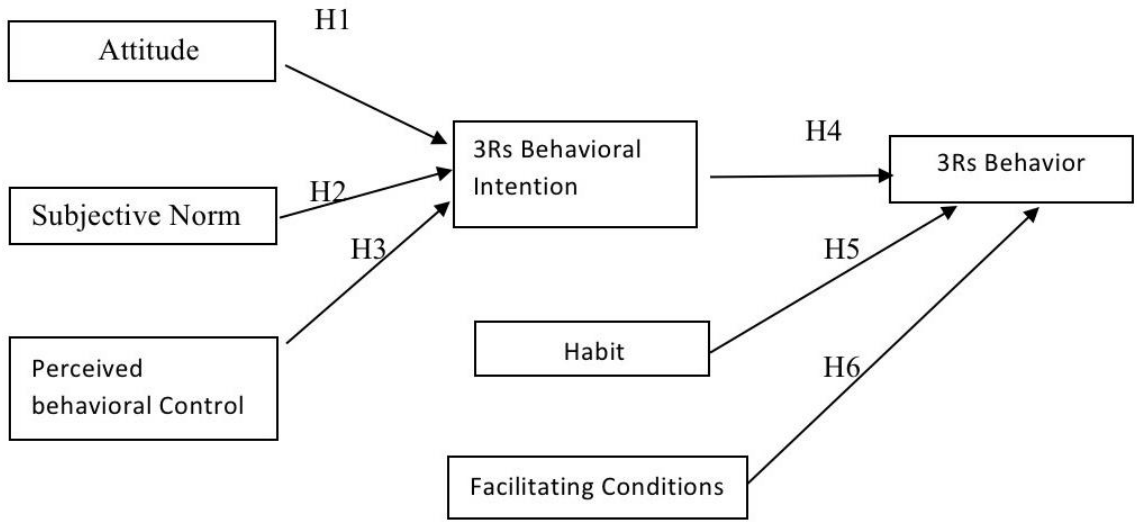

Figure 1: Proposed Conceptual framework

ISBN (e-book)

METHODOLOGY

Research design

To operationalize the variables related to 3Rs behavior of plastics usage by international students, an online survey was conducted to obtain quantitative data to be able to examine the recommend hypotheses. To measure of plastics usage and intention to 3Rs process, usually, an online survey is often by the researchers. An empirical study was adopted to reduce the use of plastics, and whether or not there is an improvement in the 3Rs of plastics, and to accept different attitudes and intentions about plastics. And, this study adopted to understand plastics usage between consumer, attitudes, perceived behavior control, and consumer intention to 3Rs among international students studying in aboard. The questionnaire for this study was considered from the previous literature. The instrument comprised of the following; independent variables i.e., perceived behavior control, attitudes to usage of plastics, intention of 3Rs is the dependent variable and demographic information like gender, age, nationality, plastics usage of consumer. The data will be analyzed to draw the inference and recommend ways forward for additional improvement. As the researcher is also an international student in Thailand that created the motivation to conduct this study. Further study is suggested on the issue with a broader purview to recognize pertinent issues in order to obtain in-depth outcomes and draw insightful interference.

Sample and Participants

An online survey was conducted at the International Colleges in a public and a private university located in Bangkok, Thailand, International students studying undergraduate, masters and doctoral level courses in English were considered as the sampling frame. The participants hailed from several Asian, European, and African countries (Bangladesh, China, Germany, India, Myanmar, Nepal, Nigeria, Pakistan, and Turkmenistan). International students inevitably use disposable or other plastics in their daily lives when living in Thailand. Therefore, international students are considered qualified for this study, as they understand the desire to preserve the environment as much as possible while trying to perform 3Rs functions in discarding plastics. Because of examining the certain population, purposive convenient sampling was used, and other international students who study in the Thai Faculty program (Thai students) were excluded. To get the maximum participation snowball sampling method was adopted. 120 questionnaires were sent via email, line, Facebook. WhatsApp, and a total number of 90 international students from private and public universities participated in this survey. The participants from the Bachelor of Business Administration program were from the first, second, third and fourth year and Masters of Business Administration and Doctoral program in Management respectively.

Scale Management

The scales use in this survey were adopted from pervious literature. TPB social-psychological earlier used for the measurement. (1) Attitude was measured by using 5 items, which adopted by Loh Chun T'ing, Krishna Moorthy, Chin Yoon Mei, Foo Pik Yin, Wong Zhi Ying, Chin Wei Khong, Gan Zhao Chern and Thong Zin Lin (2020). (2) Subjective Norm was measured by using 4 items, which adopted by Loh Chun T'ing, Krishna Moorthy, Chin Yoon Mei, Foo Pik Yin, Wong Zhi Ying, Chin Wei Khong, Gan Zhao Chern and Thong Zin Lin (2020). (3)

ISBN (e-book)

Perceived Behavioral Control was measured by using 6 items, which adopted by Loh Chun T'ing, Krishna Moorthy, Chin Yoon Mei, Foo Pik Yin, Wong Zhi Ying, Chin Wei Khong, Gan Zhao Chern and Thong Zin Lin (2020). (4) Behaviours Intention was measured by using 5 items, which adopted by Loh Chun T'ing, Krishna Moorthy, Chin Yoon Mei, Foo Pik Yin, Wong Zhi Ying, Chin Wei Khong, Gan Zhao Chern and Thong Zin Lin (2020). (5) Habit was measured by using 4 items, which adopted by Loh Chun T'ing, Kishana Moorthy, Chin Yoon Mei, Foo Pik Yin, Wong Zhi Ying, Chin Wei Khong, Gan Zhao Chern and Thong Zin Lin (2020). (6) Facilitating Conditions was measured by using 4 items, which adopted by Loh Chun T'ing, Krishna Moorthy, Chin Yoon Mei, Foo Pik Yin, Wong Zhi Ying, Chin Wei Khong, Gan Zhao Chern and Thong Zin Lin (2020). (7) Behaviours was measured by using 6 items, which adopted by Loh Chun T'ing, Krishna Moorthy, Chin Yoon Mei, Foo Pik Yin, Wong Zhi Ying, Chin Wei Khong, Gan Zhao Chern and Thong Zin Lin (2020). 3Rs behavioral plastic usage was measured using following 7-points Likert-type items which was also adopted by Loh Chun T'ing, Krishna Moorthy, Chin Yoon Mei, Foo Pik Yin, Wong Zhi Ying, Chin Wei Khlong, Gan Zhao Chern and Thong Zin Lin (2020). The Likert scale is widely used to measure the opinions and behavior of respondents. The demographic questionnaire includes age, gender, marriage status, nationality, educational background, employment status and family income of international students.

Data Collection

To conduct the survey online questionnaire was being adopted. The survey was carried out in English as the respondents chosen for this study are studying in an international program under international college at international university students in Thailand. Before taking the survey, the participants were asked whether they using 3Rs process in Thailand or not. Cross-section data were collected via an online questionnaire through Google Form during the month of December to January 2022. The link of Google form was sent via email, Line, and Facebook to the target population. To keep the confidentiality no personal data like names, email addresses were collected and participants were told that at any point, they can withdraw from the survey. Primary data was obtained from the international students who are currently studying in universities in Thailand. No financial incentives were given to the participants during the survey.

Operationalization of Variables

In the research, there are seven independent variables i.e., Attitude, Subjective Norm, Perceived Behavioral Control, Behaviours Intention, Habit and Facilitating Conditions from theory of planned behaviors. 3Rs behavior is dependent variable in the research. At first, Exploratory Factor Analysis (EFA) was carried out the find out the validity of the variables by SPSS followed by Reliability test of each variable. To authenticate the internal consistency, Cronbach's alpha coefficient was examined. For testing the hypotheses, regression analysis was computed. Control variables were added for model fit. After that, all the variables were computed to get the mean score and mean comparison was also calculated to understand the validity of the concept.

Data Analysis Technique

We examined the data using the Social Science Statistics Package (SPSS) version 25. The response is cast and saved in (.sav) format for SPSS calculations. After that, the mean

ISBN (e-book)

comparison was carried out using SPSS between demographic information, and comparison of the online shopping intention. Pearson's bivariate correlation was also carried out to find the association between the independent, and dependent variables. Adding some control variable, the result was analyzed to draw the interference for testing the proposed hypothesis

RESULTS AND DISCUSSION

Demographic Information

The respondents (n=50) who participated in the survey. Among the respondents there were 22 (44%) female and 28 (56%) are male international students. Mean age of the student's group is 24.18 with the standard deviation (SD) of 6.14 with the minimum and maximum age of the students' group of 16 and 45 respectively. The majority of participants 20 (40%) were from below Bachelor's program, 26 (52%) were from Bachelor program, followed by 1 (2%) and 3 (6%) were from Masters and Doctoral program respectively. Among the participants, 4 (8%) were students, 4(8%) were employed full time, 42 (84%) were unemployed. And, the participants were from 16(32%) of Buddhism, 7 (14%) of Christianity, 9 (18%) of Catholic, 4 (8%) of Islam, 5 (10%) of Hindu and 9 (18%) of Atheist.

Table1: Demographic Characteristics

Aspects	Statistics
Gender	Male:22 (44%) Female:28 (56%)
Age (in years)	Mean:24.18; Std. Deviation:6.14
Educational Level	Below Bachelor's Degree:20 (40%) Bachelor's Degree:26 (52%) Master Degree:1 (2%) Doctoral Degree:3 (6%)
Employment	Students:4 (8%) Unemployed:42 (84%) Government employer:4 (8%)
Marital Status	Single:45 (90%) Married:5 (10%)
Religion	Buddhism:16 (32%) Christianity:7 (14%) Catholic:9 (18%) Islam:4 (8%) Hindu:5 (10%) Atheist:9 (18%)

Analysis of the survey

The result obtained from the survey were compiled and calculated. Step by step was documented and all the sub-factors were duly measured.

Mean and standard deviation

Table 2 exhibits the variable's mean and standard deviation used in this study.

ISBN (e-book)

Table 2: Mean and Standard deviation

Descriptive Statistics

	N	Mean	Std. Deviation
Attitude	50	4.2520	.60313
Subjective_Norm	50	3.8650	.70749
Perceived_Behavioral_Control	50	3.8933	.44767
Behavioral_Intention	50	4.1120	.51928
Habit	50	3.4800	.66785
Facilitating_Conditions	50	3.7000	.65465
Behavior	50	3.8667	.46413
Valid N (listwise)	50		

Table 2 shows that, attitude (Mean= 4.2520, SD= .60) and behavior intention (Mean= 4.1120, SD=.51) have higher means compared with other variables.

Subjective Norm (Mean= 3.8650, SD=.70), perceived behavioral control (Mean=3.8933, SD= .44), habit (Mean= 3.4800, SD=.66), Facilitating conditions (Mean= 3.7000, SD=.65) and Behavior (Mean= 3.8667, SD=.46) have almost similar means.

Correlation Analysis

Bivariate correlation was calculated between attitude, subjective norm, perceived behavioral control, behavioral intention, habit, facilitating conditions and behavior. It was observed that perceived behavioral control ($r= 0.481$, $p<0.05$) was positively correlated with behavior. And attitude ($r= 0.424$, $p<0.05$), subjective norm ($r=0.415$, $p=0.05$), behavioral intention ($r= 0.379$, $p<0.05$) were also positively correlated with behavior. Habit ($r = 0.142$, $p>0.05$) and Facilitating conditions ($r=0.048$, $p>0.05$) has almost no relationship with behavior and the correlation is not statistically significant.

ISBN (e-book)

Table 3: Correlations among variables

Correlations

		Attitude	Subjective_Norm	Perceived_Behavioral_Control	Behavioral_Intention	Habit	Facilitating_Conditions	Behavior
Attitude	Pearson Correlation	1	.517**	.286*	.302*	.215	-.115	.424**
	Sig. (2-tailed)		<.001	.044	.033	.133	.428	.002
	N	50	50	50	50	50	50	50
Subjective_Norm	Pearson Correlation	.517**	1	.552**	.514**	.569**	.120	.415**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001	.406	.003
	N	50	50	50	50	50	50	50
Perceived_Behavioral_Control	Pearson Correlation	.286*	.552**	1	.699**	.485**	.150	.481**
	Sig. (2-tailed)	.044	<.001		<.001	<.001	.299	<.001
	N	50	50	50	50	50	50	50
Behavioral_Intention	Pearson Correlation	.302*	.514**	.699**	1	.286*	-.130	.379**
	Sig. (2-tailed)	.033	<.001	<.001		.044	.367	.007
	N	50	50	50	50	50	50	50
Habit	Pearson Correlation	.215	.569**	.485**	.286*	1	.447**	.142
	Sig. (2-tailed)	.133	<.001	<.001	.044		.001	.325
	N	50	50	50	50	50	50	50
Facilitating_Conditions	Pearson Correlation	-.115	.120	.150	-.130	.447**	1	.048
	Sig. (2-tailed)	.428	.406	.299	.367	.001		.743
	N	50	50	50	50	50	50	50
Behavior	Pearson Correlation	.424**	.415**	.481**	.379**	.142	.048	1
	Sig. (2-tailed)	.002	.003	<.001	.007	.325	.743	
	N	50	50	50	50	50	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Multiple Linear Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.602[a]	.363	.274	.39545

a. Predictors: (Constant), Facilitating_Conditions, Attitude, Behavioral_Intention, Habit, Subjective_Norm, Perceived_Behavioral_Control

ISBN (e-book)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.831	6	.639	4.083	.003[b]
	Residual	6.724	43	.156		
	Total	10.556	49			

a. Dependent Variable: Behavior

b. Predictors: (Constant), Facilitating_Conditions, Attitude, Behavioral_Intention, Habit, Subjective_Norm, Perceived_Behavioral_Control

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	1.138	.696		1.635	.109		
	Attitude	.219	.112	.285	1.957	.057	.701	1.427
	Subjective_Norm	.119	.121	.181	.977	.334	.433	2.309
	Perceived_Behavioral_Control	.425	.199	.410	2.140	.038	.403	2.481
	Behavioral_Intention	.008	.167	.009	.051	.960	.427	2.343
	Habit	-.194	.119	-.279	-1.621	.112	.502	1.994
	Facilitating_Conditions	.087	.104	.123	.834	.409	.683	1.465

a. Dependent Variable: Behavior

The multiple linear regression analysis was performed to determine the effect of attitude, subjective norm, perceived behavioral control, behavioral intention, habit, and facilitating conditions on behavior. The results showed that the model was statistically significant ($F=21.19$, $p<0.05$) and accounted for 63% of the variance in behavior.

The results indicated that attitude ($\beta=0.346$, $p<0.05$), subjective norm ($\beta=0.235$, $p<0.05$), and perceived behavioral control ($\beta=0.357$, $p<0.05$) had a significant positive effect on behavior, whereas habit ($\beta=0.088$, $p>0.05$) and facilitating conditions ($\beta=0.047$, $p>0.05$) had no significant effect on behavior.

CONCLUSION & RECOMMENDATIONS

Conclusions

The present study explored the factors influencing the application of the Reduce, Reuse, and Recycle (3Rs) concept in plastic usage among international university students in Thailand. The study employed the Theory of Planned Behavior (TPB) and added two more independent variables, habit and facilitating conditions, to examine plastic usage behavior. The results showed that all variables - attitude, subjective norm, perceived behavioral control, habit, and facilitating conditions - significantly influenced the 3Rs behavior intention among the participants.

The findings of the study are consistent with previous research that demonstrated the effectiveness of the TPB in predicting various environmental behaviors. The present study's results contribute to a better understanding of the factors influencing the adoption of 3Rs behavior among international university students in Thailand. The study provides valuable insights for policymakers and educators to promote environmentally friendly behaviors among

ISBN (e-book)

students and reduce plastic waste pollution in Thailand.

The present study also highlights the critical role of habit and facilitating conditions in shaping 3Rs behavior intention. Therefore, policymakers and educators need to consider these factors when designing interventions to promote environmentally friendly behaviors. Furthermore, the study's results suggest that interventions should focus on promoting positive attitudes, encouraging social norms that support 3Rs behavior, and providing enabling conditions for students to reduce, reuse, and recycle plastic products.

In conclusion, the present study demonstrates that the TPB, along with habit and facilitating conditions, can effectively predict 3Rs behavior intention among international university students in Thailand. The findings suggest that interventions aimed at promoting 3Rs behavior should target multiple factors that influence behavior, including attitudes, social norms, perceived behavioral control, habit, and facilitating conditions. By taking a holistic approach to promoting environmentally friendly behaviors, policymakers and educators can effectively reduce plastic waste pollution and promote sustainable development in Thailand.

Limitations of the Study

There are some limitations to this study that should be acknowledged. Firstly, the study was conducted only among international university students in Thailand, which means that the findings may not be generalizable to other populations or contexts. Secondly, the study relied on self-reported data, which may be subject to social desirability bias or memory recall bias. Thirdly, the sample size was relatively small, which may affect the statistical power of the analysis and limit the generalizability of the findings. Finally, the study only examined the influence of a limited number of factors on 3Rs behavior in plastic usage, and there may be other relevant factors that were not included in the analysis.

REFERENCES

Bas Verplanken & Henk Aarts. (2011). Habit, Attitude, and Planned Behaviour: Is Habit an Empty Construct or an Interesting Case of Goal-directed Automaticity? *Taylor Francis Online*, 101-134.

Cheng, K. W. (2020). Attitude, Perceived Behavioral Control and Subjective Norms in Waste Segregation-at-Source Behavior: An Empirical Study. *Publishing.globalcsrc.organization*.

Cherry, K. (2021, february 20). *Verywellmind*. Retrieved from Verywellmind: https://www.verywellmind.com/attitudes-how-they-form-change-shape-behavior-2795897#attitudes-and-behavior

Environmental Center. (n.d.). Retrieved from Environmental Center: https://www.colorado.edu/ecenter/2021/02/25/climate-impact-single-use-plastics#:~:text=Because%20single%2Duse%20plastic%20is,metric%20tons%20of%20greenhouse%20gases.

Ford-Martin, P. (n.d.). *Encyclopedias*. Retrieved from Encyclopedia.com: https://www.encyclopedia.com/medicine/encyclopedias-almanacs-transcripts-and-maps/attitude-and-behavior

ISBN (e-book)

Fun-stuff, Main. (2018, 12 7). *Pupil Voice Wales*. Retrieved from Pupilvoicewales.com: http://www.pupilvoicewales.org.uk/the-importance-of-recycling-and-reusing-plastics/

Gangga Muniandy,, Marhana Mohamed Anuar, Bob Foster, Jumadil Saputra , Muhamad Deni Johansyah, Tran Tien Khoa and Zafar U. Ahmed. (2021). Determinants of Sustainable Waste Management Behavior of Malaysian Academics. *MDPI sustainabilty*, 14.

International bar association the global voice of the legal profession. (n.d.). Retrieved from International bar association the global voice of the legal profession: https://www.ibanet.org/article/76F8D2A9-1A1D-4A2F-8A6F-0A70149FD4D5

IUNC. (n.d.). Retrieved from IUNC issue brief: https://www.iucn.org/resources/issues-briefs/marine-plastics#:~:text=The%20most%20visible%20and%20disturbing,are%20filled%20with%20plastic%20debris.

Jambeck, J. (n.d.). *UN environment*. Retrieved from Beat plastic polloution: https://jambeck.engr.uga.edu/landplasticinput

Khanunthong, A. (2021, January 13). *Krungsri*. Retrieved from https://www.krungsri.com/en/research/industry/industry-outlook/Petrochemicals/Plastics/IO/io-plastics-21

Kielman, J. (2018, October 25). *Healthfully*. Retrieved from e how: https://healthfully.com/the-ultimate-guide-to-recycling-reusing-and-repurposing-plastic-items-13714021.html

Kim Borg,Jim Curtis,Jo Lindsay. (2020, June 21). *Wiley online library*. Retrieved from www.wileyonlinelibrary.com: https://onlinelibrary.wiley.com/doi/10.1002/cb.1842

kumar, P. (2018 january). Role of Plastics on human health. *The Indian Journal of Pediatrics*. Retrieved from https://link.springer.com/article/10.1007/s12098-017-2595-7

Lavit. (2019, Setpember 18). Retrieved from Lavit: https://www.drinklavit.com/blog/plastic-isnt-green

Loh Chun T'ing,a Krishna Moorthy,b,∗ Chin Yoon Mei,a Foo Pik Yin,a Wong Zhi Ying,a Chin Wei Khong,a Gan Zhao Chern,a and Thong Zin Lin. (2020). Determinants of 3Rs behaviour in plastic usage: A study among Malaysians. *Heliyon*. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7773869/

Loh Chun T'ing,Krishna Moorthy, Chin Yoon Mei, Foo Pik Yin , Wong Zhi Ying,Chin Wei Khong, Gan Zhao Chern , Thong Zin Lin. (2020). Determinants of 3Rs behaviour in plastic usage: A study among Malaysians. *Heliyon*, 6.

Loh Chun T'ing,Krishna Moorthy,Chin Yoon Mei,Foo Pik Yin,Wong Zhi Ying,Chin Wei Khong,Gan Zhao Chern, Thong Zin Lin. (2020). Research Artical. *Heliyon*, 6. Retrieved from Google Schalor.

Marina Jeger &Anita Frajman Ivković . (2015, October 9). *Taylor francis online*. Retrieved from Taylor francis online: https://www.tandfonline.com/doi/full/10.1080/1331677X.2015.1083875

ISBN (e-book)

Natalie Martin, 3. M. (2019, January 24). *3Rs group limited.* Retrieved from www.3Rgrouplimited.com: https://3r.co.nz/changing-our-attitude-to-plastic/

Novie Susanto1,a), Lyra Davidesyta1, Denny Nurkertamanda1, and Thomas Triadi Putranto2. (2019, June 26). *AIP conference scitation*. Retrieved from www.aip.scitation.com: https://aip.scitation.org/doi/10.1063/1.5112406

Paterson, H. (2019). Plastic habits – an overview for the collection 'Plastics and Sustainable Earth. *BMC Part of Springer nature*.

Plastics for change. (2021, April 6). Retrieved from Plastics for change: https://www.plasticsforchange.org/blog/different-types-of-plastic

Plastics make it possible. (n.d.). Retrieved from Plasticsmake it possible: https://www.plasticsmakeitpossible.com/plastics-at-home/the-ultimate-guide-to-recycling-reusing-and-repurposing-plastic-items/

Ram Proshad, T. K. (2018). Toxic effects of plastic on human health and environment : A consequences of health risk assessment in Bangladesh. *"sciencepubco-logo"Science Publishing CorporationPublisher of International Academic Journals*.

(n.d.). *REUSING PLASTIC CONTAINERS.* California: Ecology Center. Retrieved from Ecology Center: https://ecologycenter.org/plastics/ptf/report4/#:~:text=Some%20plastic%20containers%20can%20be,reduces%20waste%20and%20energy%20consumption.

Ritchie, H. (n.d.). *Our world data*. Retrieved from our world data: https://ourworldindata.org/plastic-pollution

Roser, H. R. (n.d.). *Our world data*. Retrieved from Our world data: https://ourworldindata.org/plastic-pollution#:~:text=The%20world%20now%20produces%20more,our%20natural%20environment%20and%20oceans.

Sharifah Nur Munirah Syed Hasan,Rosta Harun,Kuang Hock Lim. (2015, December 30). *Research gate.* Retrieved from Research gate: https://www.researchgate.net/publication/284114261_Application_of_Theory_of_Planned_Behavior_in_Measuring_the_Behavior_to_Reduce_Plastic_Consumption_Among_Students_at_Universiti_Putra_Malaysia_Malaysia

Sustainable SA.com. (n.d.). Retrieved from Sustainable SA.com: https://www.sustainablesanantonio.com/practices-technology/reduce-reuse-recycle/

Thailand, A. G. (2020). *Start up in thailand*. Retrieved from Start up in thailand: https://startupinthailand.com/thailand-industries/plastic-industry/

The Nature Conservancy. (2018, September 13). Retrieved from The Nature Conservancy: https://www.nature.org/en-us/about-us/where-we-work/united-states/delaware/stories-in-delaware/delaware-eight-ways-to-reduce-waste/

UN environment. (n.d.). Retrieved from UN environment: https://www.unep.org/news-and-stories/story/plastic-planet-how-tiny-plastic-particles-are-polluting-our-soil

Wakipedia. (n.d.). Retrieved from Wakipedia: https://en.wikipedia.org/wiki/Plastic

ISBN (e-book)

Wallston, K. (2001). *Science Direct*. Retrieved from www.sciencedirect.com: https://www.sciencedirect.com/topics/psychology/perceived-behavioral-control

Ying Sun, Shanyong Wang, Jun Li, Dingtao Zhao & Jin Fan. (2017, August 21). *SpringLink*. Retrieved from Google Scholar: https://link.springer.com/article/10.1007/s11069-017-3022-0#:~:text=Theory%20of%20planned%20behaviour,-Theory%20of%20planned&text=TPB%20suggests%20that%20behaviour%20is,behaviour%20control%20(Ajzen%201991).&text=In%20contrast%2C%20when%20individuals%20hol

Ying sun, Shanyong Wang, Jun Li, Dingtao Zhao & Jin Fan. (2017, August 21). *Springer* . Retrieved from Google scholar: https://link.springer.com/article/10.1007/s11069-017-3022-0#:~:text=Theory%20of%20planned%20behaviour,-Theory%20of%20planned&text=TPB%20suggests%20that%20behaviour%20is,behaviour%20control%20(Ajzen%201991).&text=In%20contrast%2C%20when%20individuals%20hol

Ying Sun, Shanyong Wang, Jun Li, Dingtao Zhao & Jin Fan. (2017, August 21). *SpringLink*. Retrieved from Google Scholar: https://link.springer.com/article/10.1007/s11069-017-3022-0#:~:text=Theory%20of%20planned%20behaviour,-Theory%20of%20planned&text=TPB%20suggests%20that%20behaviour%20is,behaviour%20control%20(Ajzen%201991).&text=In%20contrast%2C%20when%20individuals%20hol

ISBN (e-book)