

Consumer Capability and Sustainable Consumer Behavior: Applying the Transtheoretical Model of Behavior Change (TTM)

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Abstract

Consumer capability refers to the ability to apply relevant knowledge and perform desirable behavior for achieving wellbeing. Previous research reveals that consumer behavior is more important than knowledge to indicate consumer capability. How to motivate individual consumers to engage in consumption activities that contribute to sustainable development? This is the question this conceptual paper attempts to address. This paper proposes a definition of sustainable consumer behavior and applies a theory-based, conceptual framework to develop action-taking programs in sustainable consumption education. Sustainable consumer behavior is defined as consumer acts that consider current and future interests of themselves and others when they purchase and use market goods. The behavior change theory used here refers to the transtheoretical model of behavior change (TTM), a commonly used behavior change theory in health and finance. The paper demonstrates how to facilitate the development of sustainable consumer behavior in education intervention programs based on principles outlined in TTM with specific examples. Implications for policies and future research are also discussed.

Key words: consumer capability, sustainable consumer behavior, sustainable consumption, transtheoretical model of behavior change (TTM)

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1. Introduction

Sustainable consumption is an important component of sustainable development. The concept of sustainable consumption was originally proposed

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at an international symposium in Oslo in 1994 (“Oslo roundtable,” n.d.). Since then, scholars have discussed its implications for individual consumers and conducted empirical studies on sustainable consumption behaviors. In recent years, more specific implementation plans for sustainable consumption are proposed at the international level. Ensuring responsible consumption and product is the twelfth goal of sustainable development proposed by the United Nation and desirable consumer behaviors are encouraged to achieve this goal (United Nations, 2013, 2017). Specific sustainable consumption education goals and approaches are also proposed (Leicht et al., 2018; UNESCO, 2017). In this paper, we propose a novel definition of sustainable consumer behavior and discuss how to employ a behavior science theory, the transtheoretical model of behavior change (TTM) (Prochaska et al., 1992), to facilitate the development of sustainable consumer behavior in education programs. The literature on sustainable consumption education becomes extensive. Relevant to the topic discussed here, this paper makes contributions in three aspects: the definition of sustainable consumer behavior, applications of behavioral science theories, and developments of action-taking education programs.

Sustainable consumption behaviors may improve consumer wellbeing (Xiao, 2021; Xiao & Li, 2011; Xiao & Ying, 2008). Desirable behaviors contributing to sustainable consumption can be conceptually formulated from a very broad level such as ethical behavior (Carrington et al., 2010), pro-environment behavior (Blankenberg & Alhusen, 2018; Duroy, 2005; Gifford & Nilsson, 2014), to a more specific level such as sustainable consumption behavior (Fischer et al., 2017; Geiger et al., 2017). For example, sustainable consumption behavior is defined as acts of people living today to satisfy their needs without compromising the ecological and socio-economic conditions for the satisfaction of needs of other people and future generations (Geiger et al., 2017), which is consistent with the spirit of the 1994 Oslo definition. Unlike the

definition of sustainable consumption behavior, this paper proposes a slightly different, narrower concept, sustainable consumer behavior. This definition covers consumer acts only relevant to the purchase and use of market goods. This paper uses a narrower definition to specify behavior types, behavioral domains and behavior change stages to facilitate the development of desirable behaviors in sustainable consumption education.

In the research literature, several behavioral theories are applied to sustainable consumption research and education. For example, the theory of planned behavior is used to identify factors associated sustainable consumption behaviors (Bauer et al., 2018). The theory of mindfulness is used to examine factors associated with sustainable consumption behaviors and explore its effects on sustainable consumption education in school settings (Fischer et al., 2017; Hunecke & Richter, 2017). On the other hand, while TTM is widely applied in health and finance education programs (Xiao, 2008), little research is found to apply the TTM to sustainable consumption education except for one that has applied TTM to study sustainable travel behavior (Mair & Laing, 2013).

The literature of sustainable consumption education is growing. Several papers conceptually discussed how to implement sustainable consumption education (Leicht et al., 2018; Marouli, 2002; McGregor, 2005). Research is emerging in exploring factors that promote sustainable consumption education in school settings (Gisslevik et al., 2018; Pipjelinck, 2011; Rafael et al., 2016; Sharma & Kelly, 2014) and lifelong learning (Naroş & Simionescu, 2018). On the other hand, there is a gap between knowledge and behavior which is found in sustainable consumption (Carrington et al., 2010; Thøgersen & Schrader, 2012). The knowledge-behavior gap is an issue in sustainable consumption as well as in other areas such as consumer finance and thus action-taking oriented education programs are called for (Xiao et al., 2004c). Action-taking

as a research focus is found in the literatures of management (Khewsonboon et al., 2017; Sabourin, 2015) and health (Folker & Lauridsen, 2017; Smith et al., 2018). Action-taking focused education programs are proposed in other domains such as consumer finance (Fernandes et al., 2014; Xiao & Porto, 2017). To our knowledge, the discussion of action-taking oriented education programs for sustainable consumption is limited.

In sum, this paper contributes to the literature in three aspects, proposing a new definition of sustainable consumer behavior, applying the transtheoretical model of behavior change (TTM) to sustainable consumption education, and proposing a framework of action-taking oriented education programs for sustainable consumption with specific examples.

The remainder of the paper is organized as follows. Section two presents a definition of sustainable consumer behavior and specifies activities that are considered to be sustainable consumer behavior. Section three demonstrates how to apply TTM to develop sustainable consumer behaviors. The final section discusses policy implications and future research directions.

2. Definition of Sustainable Consumer Behavior

2.1 *Defining Sustainable Consumer Behavior*

A working definition of sustainable consumption, proposed at the Oslo Symposium in 1994 is “the use of goods and services that respond to basic needs and bring a better quality of life, while minimizing the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardize the needs of future generations” (Oslo roundtable, no date). For the purpose of developing a working definition of sustainable consumer behavior, this definition is too broad because it aims at both producers and users of market goods. To motivate individual consumers to engage in sustainable consumption practices, a definition relevant to individual consumers

is needed. Based on the Oslo definition, sustainable consumption should be activities that meet needs of the current generation while simultaneously do not impede on future generations' needs. This definition emphasizes sustainability and development and covers topics of environmental protection and poverty reduction. This definition is used among scholars when sustainable consumption is discussed and studied, but it is too abstract. To help promote sustainable consumer behavior, we need a more specific and straightforward definition that can be easily measured, observed, and communicated. In recent years, definitions of sustainable consumption behaviors are developed that are consistent with the spirit of the Oslo definition and focusing on individual consumer behaviors (Fischer et al., 2017; Geiger et al., 2017).

In this paper, we define consumers as those who use market goods and services. Then sustainable consumer behavior is defined as any consumer act that directly or indirectly contributes to consumer welfare and environmental protection. Our definition is consistent with the Oslo definition in terms of meeting developmental needs of both current and future generations. But our definition is narrower than the Oslo definition because ours uses a more specific definition of consumer. In our definition, we focus on consumer welfare and environmental protection. We believe poverty reduction is important for the sustainable development of an economy, but we exclude it from our definition of sustainable consumer behavior because we use a narrower definition of consumer. Poverty reduction practices could be included in sustainable citizen behavior or sustainable consumption behavior (Fischer et al., 2017; Geiger et al., 2017). Using a narrow definition can help us define specific sustainable consumer behaviors and then develop specific strategies to promote sustainable consumption behaviors in education programs.

2.2 Specifying Sustainable Consumer Behaviors with 6Rs

All sustainable consumer behaviors should help promote consumer

welfare and protect environment directly and indirectly. These activities should help promote consumer health, save resources such as energy and water, avoid polluting resources such as water and air, and avoid producing environment hazards such as noise and trash. In the literature of environmental protection, an effective communication approach is to use Rs to promote desirable behaviors. For example, in an environmental protection program promoted by Brother Canada (2006), 5Rs (refuse, reuse, reduce, reform, and recycle) are encouraged. A waste reduction program calls for a different set of 5Rs (reuse, reduce, recycle, rethink, and respect) (Sasma.org, 2008). An environment friendly supermarket shopping program encourages consumers to use yet another set of 5Rs (reduce, reuse, recycle, refuse, and react) (Passaic County, 2008). Based on our definition of sustainable consumer behavior and review of Rs used in various programs, we propose 6Rs to specify sustainable consumer behaviors: reach, refuse, reduce, reuse, recycle, and respond.

Reach: reach and buy green products whenever possible. Green products are those that are made by green production with government certifications and those that can be reused and recycled.

Refuse: do not buy and use products that will harm consumer health, the environment, or both. Do not do things that will harm consumers and environment.

Reduce: reduce the quantity of products purchased and used whenever possible.

Reuse: reuse products in their original function or reformed functions whenever possible. Re-gift whenever is possible.

Recycle: recycle anything if possible. Actively participate in any recycling programs available in communities.

Respond: respond to the alarming signs of environmental deterioration and actively participate in public policy making processes and community

activities to promote consumer welfare and environmental protection.

Sustainable Consumer Behaviors, Purchase Stages and Product Categories

Sustainable consumer behavior can be further specified when product categories are considered. Table 1 demonstrates how sustainable consumer behaviors are specified for food and cars. In addition, sustainable consumer behavior can be developed in more specific forms when the purchase stage is considered. Sustainable consumer behavior should be promoted at all stages of one’s purchases. Before the purchase, consumers should have a positive attitude and adequate knowledge to identify green products and services. They should also know which products not to purchase if they have adverse impacts on the environment. During the purchase, they should practice

Table 1 Sustainable Consumption Behaviors and Product Categories

Key Behavior	Example
<i>Food</i>	
Reach	Prefer green food product.
Refuse	Don’t buy food products that harm health (cigarettes), the environment (over-packaged), or both.
Reduce	Buy less. Don’t buy unnecessary quantities.
Reuse	Bring own reusable containers when buying foods.
Recycle	Buy food products that use recyclable containers.
Respond	Support green agriculture that produces green food products. Participate in activities that promote green food production and consumption.
<i>Car</i>	
Reach	Prefer green car.
Refuse	Don’t buy cars that significantly pollute air, use gas, or both.
Reduce	Don’t buy or drive any car if using public transportation or other transportation is possible. Drive less. Use carpool.
Reuse	Buy used cars. Give used cars to friends or family members.
Recycle	Recycle car batteries and other parts.
Respond	Support auto industry to produce green cars. Support government to expand public transportation. Participate in activities that promote green auto production and green transportation.

selectivity and only buy environment friendly products. For example, they should prefer green food, green cars, and greenhouses when shopping. For the same type of product, they should not buy over-packaged products. They should prefer reusable goods to disposable goods. After the purchase, they should use the goods at a modest level and should not use them for purposes of showing off. Also, they should reuse and recycle the goods. They should

Table 2 Sustainable Consumption Behaviors and Purchase Processes

Key Behavior	Example
<i>Pre-purchase</i>	
Reach	Learn information about green products. Learn green product labels.
Refuse	Learn information about products that harm health, environment or both. Learn how to identify fake green products.
Reduce	Learn alternatives of products intended to buy.
Reuse	Learn reusability of products intended to buy.
Recycle	Learn recyclability of products intended to buy.
Respond	Learn organizations and agencies that promote green production and consumption.
<i>During Purchase</i>	
Reach	Prefer green product.
Refuse	Don't buy products that harm health, the environment, or both. Don't buy over-packaged products. Don't buy fake green products.
Reduce	Decide not to buy or buy less.
Reuse	Prefer products that can be reused.
Recycle	Prefer products that can be recycled or partially recycled.
Respond	Complain to manufacturers and regulators if green products cannot be bought or fake green products are seen.
<i>Post Purchase</i>	
Reach	Evaluate green products and decide if it should be bought again.
Refuse	Evaluate the decision of refused buying.
Reduce	Evaluate the decision of buying less or not buying. Use less.
Reuse	Reuse all products if possible.
Recycle	Recycle all products or parts of some products if possible.
Respond	Participate in activities to promote green production and consumption. Support public policies to promote green production and consumption.

minimize the quantity of trash that cannot be recycled. Table 2 presents more specific sustainable consumer behaviors in terms of 6Rs by purchase stages.

Based on the above discussion, we can develop specific sustainable consumer behaviors in terms of purchase stages and product categories. These behaviors can be used to develop education programs that focus on modifying undesirable behaviors and developing positive behaviors to achieve the goal of sustainable consumption. In the following, we demonstrate how to systematically promote sustainable consumer behaviors through a behavior change theory, the transtheoretical model of behavior change (TTM), in education programs.

3. Applying TTM to Promote Sustainable Consumer Behavior

3.1 Background Information About TTM

TTM refers to the transtheoretical model of change, developed in the 1970s by James Prochaska and his colleagues (Prochaska et al., 1992, 1996). The theory is formed by highlighting major psychological theories in a uniform framework for the purpose of helping people change their undesirable behaviors and develop positive behaviors. “Transtheoretical” in the title means to transform theories into applications, which implies that this model is developed for application purposes. The framework was first used in cigarette smoking cessation and has since been used in many other areas to promote positive health behaviors. According to a well-known social marketing scholar, TTM is one of a few effective approaches to motivate individuals to change their behaviors for positive social changes (Andreasen, 2006). TTM has been applied to topics in consumer finance, such as family financial therapy (Kerkmann, 1998), financial education (Shockey & Seiling, 2004; Xiao et al., 2004), and credit counseling (Xiao et al., 2004a, 2004b).

TTM has unique features compared to other behavior theories: (1) it

integrates essentials of major psychological theories to form a framework to offer effective interventions; (2) it refines the stages of behavior change, which is an advance from the traditional behavior change theory and has the potential to reach more consumers regarding the targeted behavior; (3) it matches intervention strategies to different stages of behavior change, which makes it more effective compared to other intervention programs; and (4) it focuses on enhancing self-control (Prochaska et al., 1996). According to a review of various behavior theories, among five multi-stage theories, TTM is the one supported by most empirical studies (Armitage & Conner, 2000).

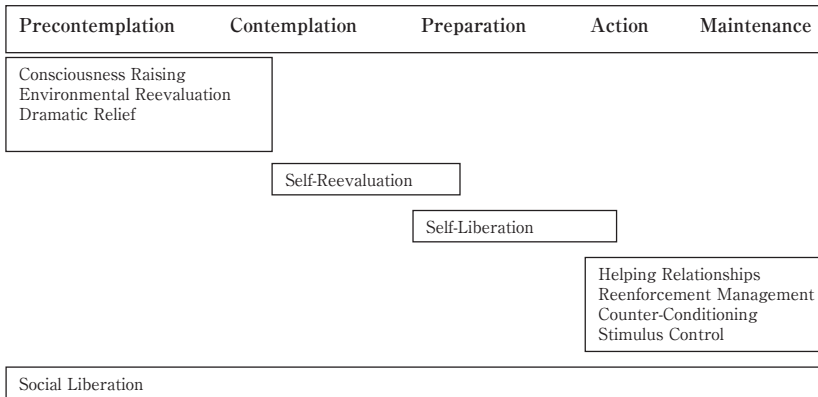
Major concepts of TTM include stage of change, process of change, confidence, and decisional balance. TTM identifies five stages of behavior change: precontemplation, contemplation, preparation, action, and maintenance. In general, stage durations are defined below. If a person is not willing to change in six months, s/he is in precontemplation. If a person is willing to change in six months, s/he is in contemplation. If s/he is willing to change in 30 days, s/he is in preparation. If s/he has started to change for less than six months, s/he is in action. If s/he has been changing for over six months but less than 18 months, s/he is in maintenance. If s/he has changed the behavior for more than 18 months, we consider that her/his behavior has been changed. But some people may relapse to previous stages. For some people, behavior change may take several cycles. We should note that the definition of stage duration is based on clinic experiences and lacks theoretical foundations. The stage durations may be different when different behaviors are under consideration (Prochaska et al., 1992, 1996).

TTM also identifies ten processes of change, in which “processes” mean strategies or interventions for encouraging people to change. Table 3 presents definitions of the change processes and examples of tactics for behavior change. These processes will be specified when specific sustainable consumer behaviors

Table 3 Change Strategies and Tactics that Match Change Stages (Source: [6])

Change Stage	Change Strategy	Change Tactics
Precontemplation	<i>Consciousness raising</i> : Finding and learning new facts, ideas, and tips that support the healthy behavior change	observations, confrontations, interpretations, bibliotherapy
	<i>Dramatic relief</i> : Experiencing the negative emotions that go along with unhealthy behavior risks	psychodrama, grieving losses, role playing
	<i>Environmental reevaluation</i> : Realizing the negative impact of the unhealthy behavior or the positive impact of the healthy behavior on one's proximal social and physical environment	empathy training, documentaries
Contemplation	<i>Self-reevaluation</i> : Realizing that the behavior change is an important part of one's identity as a person	value clarification, imagery, corrective emotional experience
Preparation	<i>Self-liberation</i> : Making a firm commitment to change	decision-making therapy, New Year's resolution, logotherapy techniques, commitment enhancing techniques
Action/Maintenance	<i>Reinforcement management</i> : Increasing the rewards for the positive behavior change and decreasing the rewards of the unhealthy behavior	contingency contracts, overt and covert reinforcement, self-reward
	<i>Helping relationships</i> : Seeking and using social support for the healthy behavior change	therapeutic alliance, social support, self-help groups
	<i>Counterconditioning</i> : Substituting healthy alternative behaviors and thoughts for the unhealthy behaviors	relaxation, desensitization, assertion, positive self-statements
	<i>Stimulus control</i> : Removing reminders or cues to engage in the unhealthy behavior and adding cues or reminders to engage in the healthy behavior	restructuring one's environment, avoiding high risk cues, fading techniques
All stages	<i>Social liberation</i> : Realizing that the social norms are changing in the direction of supporting the healthy behavior change	advocating for rights of repressed, empowering, policy interventions

Figure 1 Stages by Processes of Change



are discussed in the sections later on. According to TTM, these strategies are more effective if they are matched with appropriate stages of behavior change as demonstrated in Figure 1 (Pro-Change Behavior Systems, 2002).

Two indicators of success of behavior change are decisional balance (pros and cons of the target behavior) and self-efficacy (or confidence of performing the target behavior). When people are at a later stage, they would perceive more benefits and fewer costs of the behavior change. They would also be more confident in their ability to avoid the undesirable behavior or to perform the positive behavior when they face difficult situations (Prochaska et al., 1996). We may consider decisional balance and confidence as two factors that facilitate the behavior change and develop strategies to assist consumers in developing sustainable behaviors faster and more smoothly.

Various strategies can be used to enhance pros and reduce cons in order to move the decision balance favorably to positive behavior change. Pros and cons of a target behavior can be considered from a perspective of the self or of others. Then we have four types of behaviors, those that benefit both the self and others (stopping smoking), benefit the self but cost others (littering), benefit

others but cost the self (buying more expensive green products), and cost both (buying more expensive over-packaged products). To encourage sustainable consumer behaviors, we need to specify relevant behaviors in terms of these types and then develop strategic plans to promote different types of behaviors with different strategies.

In addition, benefits and costs can be considered from multiple perspectives, such as economic, physical, psychological, social, legal, and utilitarian. Some examples of these multiple perspectives are presented in Table 4. These multiple views could cause differences in perceived pros and cons of a target behavior and result in different decisional balances for different consumers.

The confidence to perform the target behavior can also be considered

Table 4 Sustainable Consumption Behaviors, Decisional Balance and Confidence

Key Construct	Example
<i>Benefits and Costs</i>	
Economic	Green products are more or less expensive.
Physical	Green products will benefit or harm health.
Psychological	Using green products will make me feel better or worse.
Social	Using green product will make me more or less socially acceptable.
Legal	Using green products are encouraged or discouraged by law.
Utilitarian	Using green products will meet my needs better or worse.
<i>Confidence</i>	
Economic	Should I buy green products if they are more expensive?
Physical	Should I buy green products if they are less helpful in improving my health?
Psychological	Should I buy green products if they need more time to find and more efforts to identify?
Social	Should I buy green products if my friends are not buying them?
Legal	Should I buy green products if no law requires it?
Utilitarian	Should I buy green products if they are not much better in terms of utility compared to non-green products?

from multiple perspectives. Hypothetical dilemmas can be created for consumers to test their intention to perform sustainable behaviors. Potential dilemmas can result from various sources. For example, “I support the production of green products that will protect the environment, but I am also very price sensitive; should I purchase more expensive green products?” Another example is eating out: “I believe we need to consume less of everything, which would not only save money but also benefit the environment, but should I persuade my guests to eat more to show my hospitality?” More examples are presented in Table 4.

3.2 Example: Applying TTM to One Key Behavior - Reaching (Selective Buying)

TTM can be applied to all activities of sustainable consumer behavior defined in this paper, such as reach, refuse, reduce, reuse, recycle, and respond. For each activity, we can assess at what stage a group of consumers is and then develop strategies to assist them to move to a later stage by using the matching diagram presented in Figure 1. Let us use the first activity, reaching, as an example. We may initially find which stage that most consumers in a population are in through surveys or other research methods. We can then develop strategies to encourage consumers to engage in reaching behavior in terms of processes of change (Table 5). Then these strategies can be used to educate consumers at different stages and help them move toward a later stage of behavior change. Educators can also use strategies discussed in the above section to formulate strategies to increase pros, decrease cons, and enhance confidence of performing the reaching behavior. These consumers should be at the first stage of the behavior change in terms of reaching. To help these consumers engage in reaching, we need to use strategies appropriate for this stage of change. We need to raise the consciousness of these consumers in terms of reaching (selective buying) by providing them information on the significance of green products to environmental protection, labels for

Table 5 Change Strategies and Tactics that Match Change Stages: Reach - Selective Buying

Change Stage	Change Strategy	Reach - Selective buying
Precontemplation	Consciousness raising	Know facts showing significances of green products to environment protection. Know how to identify green products. Know when, where and how to buy green products.
	Dramatic relief	Know dramatic examples of harmful products on health and environment.
	Environmental reevaluation	Recognize positive impacts of selective buying on environment.
Contemplation	Self-reevaluation	Recognize being a green buyer as a new identity.
Preparation	Self-liberation	Make a commitment to be a green buyer.
Action/Maintenance	Reinforcement management	Reward selective buying in financial and other terms.
	Helping relationships	Encourage family members and close friends to monitor selective buying behavior. Join groups or clubs that promote selective buying.
	Counterconditioning	Use green products to substitute for other products to meet needs.
	Stimulus control	Go to markets that promote selective buying. Avoid going to markets that discourage selective buying.
All stages	Social liberation	Recognize that selective buying is socially desirable. Seek social mechanism and take advantage of social institutions that promote selective buying.

identifying legitimate green products and tips on where, when, and how to find green products to purchase. Also, we need to provide them significant facts that will shock them emotionally and cause them to recognize benefits of green products for improving their living environment. We also need to help them understand that if all consumers prefer green products, our living environments will improve drastically, which would benefit both themselves and other people in the community. In a similar manner, strategies of behavior change in Table 6 can be adapted to help consumers who are at other stages

of behavior change move toward the next stage for developing the reaching behavior. Strategies for developing other behaviors in 6Rs can be formulated in the similar fashion.

4. Conclusion

In this paper, we have defined sustainable consumer behavior and its specifications in terms of purchase stages and product categories. Then, we have demonstrated how to apply a widely used behavior change theory, the transtheoretical model of change (TTM), to promote sustainable consumer behavior in education programs. In the following, we will discuss what education policy makers and researchers could do to help develop sustainable consumer behaviors.

4.1 Implications for Education Policies

TTM provides a systematic way to motive individuals to change undesirable behaviors and develop positive behaviors to achieve desirable social goals. Education policies can be used to provide a better social environment that encourages consumers to engage in sustainable behaviors. Based on the TTM, policy makers can consider following strategies.

Individual consumers need to be considered as active players in sustainable consumption. Currently, many countries are promoting the development of circular economy. Circular economy is applied in the principle of reduction, reusing, recycling, and environmentally sound treatment and disposal. It aims to adjust the methods and efficiency of material and energy flows in the process of consumption and production activities by relying on science and technology, policy measures, and market-based mechanisms. The government needs to realize the power of individual consumers and encourage them to actively participate in the development of circular economy. To involve consumers in circular economy, several activities can be encouraged. We can

encourage producers to use certification, eco-labeling and sustainable labeling of products, such as organic food, energy-saving products, environment friendly products, and fair-trade products. We can involve consumers in decisions on the construction of ecological, energy-saving buildings and the establishment of green communities. We can encourage consumers to engage in sustainable household consumption through economic instruments of finance and taxation, such as beneficial tax treatment for the consumption and production of green products and levying a high tax on products with resource wastes and environmental damages. To achieve these goals, systematic approaches should be used to facilitate consumers to develop sustainable behaviors. TTM is one of such approaches that need to be endorsed and encouraged by the government. The government needs to provide moral and financial support to develop effective social lifespan learning programs for consumers to develop sustainable behaviors.

The government needs to provide a supportive social environment to encourage sustainable consumer behaviors. For example, the government should use its authorities to reduce the costs and increase the benefits of performing sustainable consumer behavior. The costs and benefits should not be measured only financially but also legally and socially. In many current green consumer behavior studies, researchers asked if consumers are willing to pay higher prices for green products. In the long run, the government should encourage manufacturers to produce green products that are less expensive than regular products. Also, the government needs to provide incentives or encourage sellers to provide incentives for consumers who engage in sustainable behaviors. New laws and regulations should be created to encourage sustainable consumer behaviors and punish behaviors that will hurt consumers and the environment. Special agencies should be created or assigned so that consumers have places to go to get reliable information on

green products and services, and complain and report fake green products and services.

Education on sustainable consumption needs to be implemented systematically through the formal educational system. Young generations are the future of the country. Ideas of sustainable consumption should be integrated into various subjects of formal education material and delivered to students when they are young. Publications on sustainable consumption sponsored by the United Nations and other organizations can be used as supplemental material for students in schools. The government should develop and promote TTM measures specifically targeting youth.

Adult education on sustainable consumption should be conducted through the workplace and mass media. Learning how to contribute to sustainable consumption takes a life-long process. The government should encourage employers to offer environmental education to their employees, help employees understand the importance of sustainable consumption, and promote the practice of desirable activities that benefit the environment and also their own well-being. Mass media should produce programs that educate and encourage sustainable consumer behavior. The government should encourage the development of public education programs that use effective behavior change frameworks such as the one developed here to achieve these goals.

4.2 Future Research Directions

To effectively apply TTM to promote sustainable consumer behavior through school and community education programs, more research needs to be conducted. For a specific country, we need to conduct a national assessment to measure the extent to which consumers engage in sustainable consumer behavior. Also, we need to develop specific measures to apply TTM to various products, topics, and populations.

National surveys. For a specific country, to develop a national promotion

program under the framework discussed in this paper, we need a national assessment of consumers in terms of their stages of behavior change. How many of them are at each stage of behavior change? The answer to this question will allow us to determine the focus and strategies to encourage consumers in the country to engage in sustainable consumer behaviors. In addition, we need to develop measures for other key constructs of TTM, such as pros and cons, confidence, and processes of behavior change based on research of consumers.

Product specific categories. Different product categories would require different emphases of sustainable consumer behavior. For example, for food, reaching or selective buying may be the most important aspect. But for cars, both reaching and reducing are important. Another example is the difference between products and services. The emphases of buying and consuming products will be different from those of services. Systematic research is needed to identify and classify product categories that are significant in terms of sustainable consumer behavior and then develop innovative sustainable consumer practices and promotion strategies based on the framework of TTM.

Topic areas. Topic areas such as consuming water, air, and energy would require different combinations of products and services. To focus on these topics, research is needed to identify typical combinations and characteristics of sustainable consumer behavior in terms of reservation and reducing usage levels of these resources. After identifying these categories, TTM can be used then to develop specific sustainable behaviors that promote sustainable consumption.

Specific populations. Various populations would have various needs and views in terms of sustainable consumption and need differentiated treatments. For example, the old and the young would have different thoughts on sustainable consumption. Strategies to help them develop sustainable consumer

behavior may be different. Another example is different demands between consumers in rural and urban areas. Their needs and thoughts would be different and strategies to help them develop sustainable consumer behavior under TTM would need to be differentiated. Researchers need to first identify meaningful classifications of populations in terms of sustainable consumer behavior and then develop differentiated strategies under TTM to facilitate the development of sustainable consumer behavior among diverse populations in various education programs.

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