

# The Use of Social Media for Engaging People with Environmentally Friendly Lifestyle: A Conceptual Model

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## Abstract

Some recent research has investigated factors affecting household recycling and waste reduction behavior (Ho and So, 2017; Nishio and Takeuchi, 2005) in traditional media platforms like newspaper, radio, and television, but scant related to social media. In this study, we develop a conceptual model for comparing how traditional media and social media can be used as platforms for promoting and engaging young people in adopting an environmentally friendly lifestyle. We are particularly interested in the impact of social media on the engaging young people because: (i) there is huge population of young and active users on social media; and (ii) prior research reports that social media may contribute for value co-creation (See-To and Ho, 2014) in a marketing campaign through the interactions among the users and the owner of the social media, thus affecting the users' behavior accordingly.

## Keywords

Social media, value co-creation, sustainability, waste management, traditional media, environmentally friendly lifestyle.

## Introduction

The handling of municipal wastes has become a major environmental problem in society, given these wastes have created problems in public health and resource management (such as to allocate resources to dispose of wastes in the landfill or burn the waste in incinerators, both will produce negative environmental impacts). Researchers in environmental management (for example, Barr (2007)), marketing (for example, Gatersleben, Steg and Vlek (2002), Jasson, Marell and Nordlund (2010), and Ölander and Thøgersen (1995)), supply chain management (for example, Walton, Handfield and Melnyk (1998)), and communication (Obermiller, 1995) have been studying different ways of promoting environmental awareness and a more environmentally friendly life to the public, in particular, by reducing the generation of municipal waste, such as embedding household recycling and waste reduction behavior in their daily routines.

Prior research has highlighted the role of media in fostering green living style (Ho and So, 2017; Nishio and Takeuchi, 2005), but these findings may not be fully applicable in social media considering its difference from traditional media (Zhang and Tam, 2012). Additionally, a recent report has identified a research gap resulted from the huge population (more 2 billion users on Facebook, and 600 million users on Instagram), the differences between traditional and social media, and the importance of a more environmentally friendly lifestyle (Cowling, 2017). Accordingly, the research questions that we address are (i) to investigate how environmentally friendly information is communicated to society through social media compared to

traditional media; and (ii) to investigate if the value of environmentally friendly lifestyle can be co-created by the information senders and receivers through social media as a platform (See-To and Ho, 2014). We would like to fill in the research gap by suggesting the role of social media in enhancing a more environmentally friendly lifestyle, and thus contribute to the development of smarter cities (Ho and So, 2017).

## Literature Review

### *The Growth of Social Media*

Social Media is a group of Internet-based applications built on the Web 2.0, which allow the creation and exchange of user-generated contents (Kaplan and Haenlein, 2010; See-To and Ho, 2014). We can see its impact in different sectors, including education (Au and He, 2014; Mathiyalakan et al., 2017; Rueda, Benitez and Braojos, 2017; Zhang et al., 2017), healthcare (Gordon, 2016; Tricco et al., 2017), politics (Au and Ho, In Press; Hellman and Wagnsson, 2015), tourism (Gong et al., 2017; Ho and See-To, 2018), etc. Most of these studies have investigated social media as a new technology to facilitate information exchange and create user-generated contents. Due to the huge population of users of social media (Cowling, 2017; Tricco et al., 2017), research from different domains (such as information systems, marketing, communication, etc.) has been conducted on the drives and impact of social media usage (See Table 1).

Reference	Findings/Arguments
<b>Drivers</b>	
Bolton et al. (2013)	The adoption of social media of generation Y are influenced by environmental factors (economics, technological, cultural, and legal/political) and individual-level factors, such as personal values, emotions, norms, and identity.
Ma and Chan (2014)	Perceived online attachment motivation and perceived online relationship commitment have a positive, direct, and significant effects on online knowledge sharing, and thus the overall usage of social media platforms.
Ranuiar et al. (2014)	Users' capability, perceived ease of use and playfulness has an impact on the perceived usefulness of the social media, and thus, the intention and actual usage. Besides, the perceived usefulness will also increase if the social media platform has developed a critical mass of users.
<b>Impacts</b>	
Au and Ho (In Press)	Social media may attract more participants in different social actions, which has a significant group of stakeholders. It also helps users to exchange their points of view, and thus to reach a consensus.
Bolton et al. (2013)	The usage of social media has an impact on personal well-being (psychological, emotional, and physical), behavior outcome, and thus, civic and political engagement.
Ellison, Steinfield and Lampe (2007)	Young users can build social capital and relationship using Facebook. Facebook may also provide greater benefits for users experiencing low self-esteem and low life satisfaction.
Wikstrom and Ellonen (2012)	Social media has changed the traditional mechanism of information distribution. Rather than traditional one-way distribution, the audience may also provide feedback.

**Table 1. Examples of Drivers and Impacts of Social Media Usage**

While some research suggests using the theories developed for studying traditional media as a yardstick for studying and predicting the impact of social media to society, others have highlighted that these theories applicable to traditional media or information systems may not be equally applicable in social media (Zhang and Tam, 2012).

### **Value Co-creation and Social Media**

Value co-creation is a concept developed by Prahalad and Ramaswamy (2004), which suggests that the value of a service is created together by the service supplier and the users. In recent years, research has been developed using this concept to study various topics in marketing, service science, engineering, etc (See-To and Ho, 2014). In particular, the core concept applies to value co-creation is that “the customer is always a co-creator of value” (Vargo, Maglio and Akaka, 2008). In the context of social media, See-To and Ho (2014) suggest that social media can be a suitable platform for value co-creation by allowing its users (i.e., customer) and stakeholders to co-create value of a brand through the amalgamation of trust and electronic word-of-mouth (eWOM), and thus can lead to purchasing of products and services. In addition, See-To and Ho (2014) suggest that *Behavioral Alignment* and *Empowerment and Control* are two possible value co-creation constructs (Ng et al., 2010), which have particular associations with the value co-creation formation in social media platform.

### **Factors Influencing Environmentally Friendly Lifestyle**

Environmentally friendly lifestyle is a type of lifestyle that adopts or fosters goods, services, laws, guidelines, and policies that bring no or minimized harm to ecosystems or the environment (Hounsham, 2006). Prior research has a lot of fruitful discussions and develops different definitions. For example, Librova (2008) suggests simplicity as an important characteristic of such lifestyle, whereas Black and Cherrier (2010) suggest the concept of sustainable consumption as part of the lifestyle. In general, to live an environmentally friendly lifestyle can involve different green activities, including but limited to active waste reduction, reuse and recycling (Barr, 2007), domestic water and energy conservation (Whitmarsh and O’Neill, 2010), reduction of carbon dioxide emission (Au et al., 2018), sustainable wastewater treatment (Rouse, 2013), the purchase of more green products and services (Gilg, Barr and Ford, 2005; Leonidou et al., 2015), to name a few.

As more people are now aware of the importance of practicing an environmentally friendly lifestyle and its impact on the sustainable (and responsible) lifestyle, researchers from different disciplines and governments are interested in studying the drivers and impacts of a more environmentally friendly lifestyle (See Table 2), as it helps address different environmental issues, such as extending the landfill lifespan (Ho and So, 2017) and reducing the effect of greenhouse warming (Barr, 2007). This is particularly important for cities and municipalities with limited land for handling wastes, such as Hong Kong (Wan, Shen and Yu, 2014) and Guam (Ho and So, 2017).

It is observed that social norms (which includes attitudes, beliefs, feelings, and behaviors) and perceived benefits have significant roles in building up the adoption of environmentally friendly lifestyle, such as practicing recycling and waste reduction in the household. However, prior studies are focusing on studying how the traditional media (such as TV, radio, newspaper, etc.) influence or communicate with the public to practice such lifestyles. Social media, as a new kind of media, have seldom been studied as the media for disseminating such information to the public. Therefore, we propose to investigate this topic and develop a conceptual model for further exploring how social media can be used as a platform for promoting environmentally friendly lifestyle.

Reference	Findings/Arguments
<b>Drivers</b>	
Abdul–Muhmin (2007)	Environmental knowledge, perceived issue seriousness, and past green behavior have significant roles on the overall willingness on environmentally friendly behavior.
Barr (2007)	The underlying values, knowledge, and concerns on environmental issues have a role in encouraging reduction and reuse, while recycling behavior is characterized as highly normative behavior.
Han, Hsu and Sheu (2010)	In hospitality context, attitude, subjective norm, and perceived behavioral control positively affected intention to stay at a hotel that is more environmental-friendly and follows ecologically sound programs/practices.
Ho and So (2017)	The media campaign is useful for promoting the benefit of living an environmentally friendly lifestyle, and social norm can also be used for developing this type of lifestyle. Culture also plays a role in the adoption of environmentally friendly lifestyle.
Jansson, Marell and Nordlund (2010)	Values, beliefs, norms, and habit strength determine the willingness to curtail and willingness for eco-innovation adoption. Personal norms have a strong positive influence on the willingness for the behaviors, while habit strength has a negative influence.
Mancha, Muniz and Yoder (2014)	In the business context, the green behavioral intention is driven by attitude, subject norm, and perceived behavioral control.
Mancha and Toder (2015)	Self-construal positively influences the green social norms, preservation attitude, green perceived behavioral control, and thus the overall green behavioral intention.
Nishio and Takeuchi (2005)	The attitude toward waste reduction is an important factor affecting water reduction behavior, whereas the recycling rules are important for the adoption of recycling behavior in Japan.
<b>Impacts</b>	
Gilg, Barr and Ford (2005)	Green consumption or sustainable lifestyles have a positive impact on purchase decisions. The adopters of such living style are more likely to buy organic, fair-trade, and recycle products.
Leonidou et al. (2015)	In tourism context, an eco-friendly attitude can motivate eco-friendly behavior, and thus tourist satisfaction.
Leonidou, Leonidou and Kvasova (2010)	Inward environmental attitude was found to be conducive to green purchasing behavior, while outward environmental attitude facilitates the adoption of a general environmental behavior, which is responsible for greater satisfaction with life.

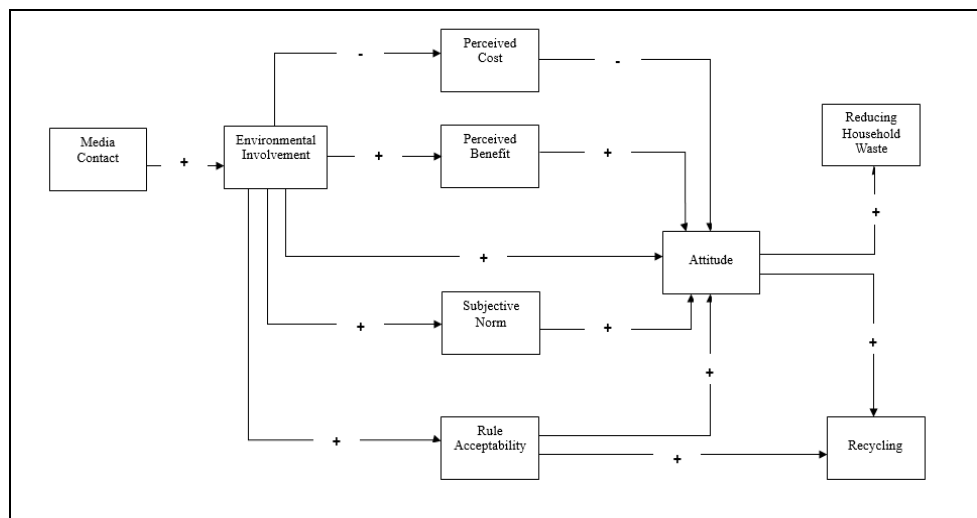
**Table 2. Examples of Drivers and Impact of Environmentally Friendly Lifestyle**

## Research Model Development

Nishio and Takeuchi (2005) propose the Integrated Waste Reduction Model (Figure 1) to explain how the *media contact* influences *attitude towards waste reduction* through *environmental involvement* and other factors (*perceived cost*, *perceived benefit*, *rule acceptability*, and *subjective norm*) in Japan. Since the model was proposed, it has been cited and re-used by different studies related to waste management and recycling (Ho and So, 2017; Ohira et al., 2013). In this proposed study, we build our model based on that of Nishio and Takeuchi (2005) by including the impact of social media and value co-creation (See-To and Ho, 2014).

Social media has been seen as a useful tool for creating social capital and allowing people to have civic engagement in social issues (de Zúñiga et al., 2012). As the promotion of environmentally friendly lifestyle would need civic engagement (Kashima, et al., 2014), we anticipate that social media would play an important role in promoting green messages to the public, just like traditional media (Nishio and Takeuchi, 2005). However, as reported by prior research, we note that social media would provide different effects

compared with traditional media (Zhang and Tam, 2012). In this study, the use of traditional media and social media are considered as earned media (for publicity), while prior research suggests that the two types of media play different roles in creating publicity and, in commercial setting, different impacts on sales (Caldieraro et al., 2018). In particular, Caldieraro et al. (2018) suggest that social earned media would be able to contribute to drive traditional earned media activity. On the other hand, Bruhn et al. (2012) research into the brand equity creation and note that social media and traditional media have different types of impact on the brand equity: traditional media and social media would have stronger impact on brand awareness and brand image, respectively. Putting this into of environmentally friendly lifestyle (as a kind of “brand equity”), we conjecture traditional media would be more impactful on making people aware of the importance of living a more environmentally friendly lifestyle (such as more aware of the benefits and costs, as well as the subjective norms and rule acceptability) than social media. Prior research also suggests that social media and traditional media are competing with each other. For example, Meraz (2009) suggests that the agenda setting power of traditional media (in particular, newspapers) has been reduced due to the increasing presence of social media, which empowers the public to present their own ideas or voices. Therefore, it is worthy to study how social media and traditional media would act (differently) in promoting the environmentally friendly lifestyle messages.



**Figure 1. Research Model Proposed by Nishio and Takeuchi (2005)**

Therefore, based on the above reasons, we conjecture the social media would have a positive impact on *environmental involvement*. In this research context, environmental involvement is defined as “a user’s involvement in making an environmentally friendlier life” (Aoki et al, 1988; Nishio and Takeuchi, 2005). From Nishio and Takeuchi (2005) and Ho and So (2017), we note that traditional media has a positive direct impact on *environmental involvement*. Thus, when social media being used as a promotion channel for environmentally friendly lifestyle, it should act similar to traditional media, though it may have a competition (Meraz, 2009) or synergy effects (Caldieraro et al., 2018). Therefore, we have our first proposition as follows:

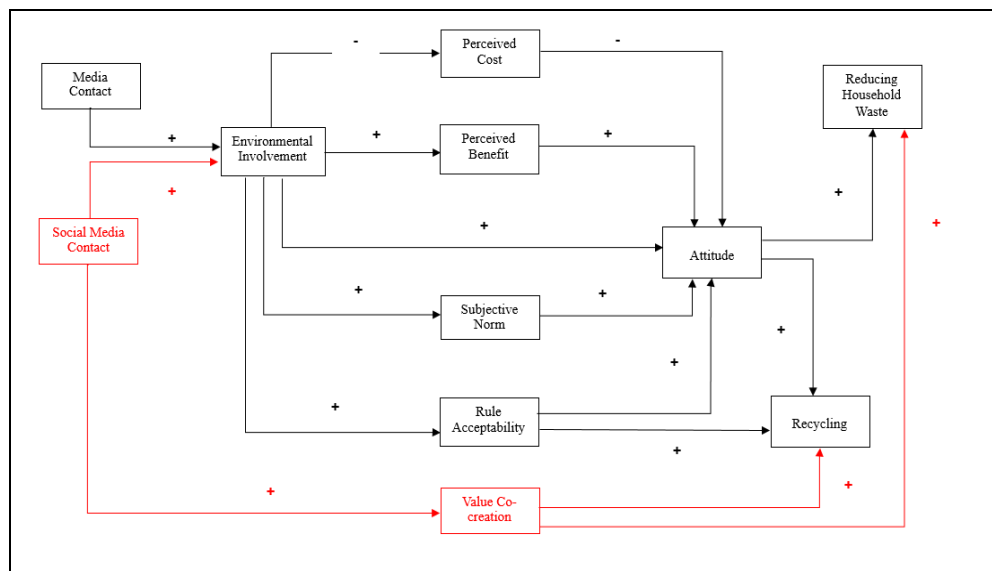
**Proposition 1:** Similar to traditional media, social media would be a useful tool in engaging people in participating in environmentally friendly lifestyle. Therefore, the environmentally friendly lifestyle information sending to the young people though the social media (i.e., social media contact, SMC) will increase their environmental involvement.

Yet, as prior research (Bruhn et al., 2012; Caldieraro et al., 2018) also suggests that social media and traditional media would have different types of impact on a (promotion, which can also be applicable to an environmentally friendly lifestyle) campaign, it is possible that social media contact will have different degree of interactions with other constructs (such as perceived cost and benefits, subjective norms, and rules acceptability) compared with traditional media do. Indeed, Ho and So (2017) propose that traditional media contact has direct impact on the perceived cost using data collected from Guam, instead of having *environmental involvement* as the mediator in the Nishio and Takeuchi’s Model (2005). Therefore, we have our second propositions as follows:

**Proposition 2:** Social media contact may have direct interactions with perceived benefits, perceived cost, subjective norms, and rules acceptability.

One of the major differences of using social media as the platform for promotion is that users/customers can interact with the firm and thus would be more active compared with the conventional platform (Hanna et al., 2011). Further, both Hann et al. (2011) and See-To and Ho (2014) propose that social media is a suitable platform for value co-creation. Therefore, when we use social media platforms to contact the young people for disseminating environmentally friendly lifestyle information, social media used can act as a platform for the co-creation of environmentally friendly lifestyle value. In other words, the messages transmitted through social media would provide the information and suggestions for possible value of environmentally friendly lifestyle, and the actual value of the lifestyle is to be co-created by the users (through participating environmentally friendly lifestyle practices, as well as the interactions between other users who are actively interacting and engaging with one another). As the co-creation process is only available on social media platforms (See-To and Ho, 2014), it would be considered as a construct connecting the social media contact and the actual behaviors (i.e., reducing household waste, and practicing recycling), i.e., as a mediator between the social media and the environmentally friendly outcomes of recycling and household waste reduction (see Figure 2). Therefore, our third proposition is as follows:

**Proposition 3:** Social media is a suitable platform for value co-creation and will act as the mediator between the social media contact and environmentally friendly behavior (reducing household waste and practicing recycling).



**Figure 2. Research Model**

## Data Collection

While this project is still in the pipeline, we have collected some data from a public university on Guam to perform the initial validation of the research model via correlation analysis. 153 students, of which 96 are female, participated in this survey, with an average age of 23.2. The survey items (7-point Likert Scale) are attached at Appendix A. Table 3 below shows the correlation matrix of the constructs.

From the correlation matrix, we can obtain some basic ideas about our model. First, the social media contact (SMC) has strong correlations with the two value co-creation constructs, i.e., *behavioral alignment* (BA) and *empowerment and control* (EC), whereas *media contact* (MC) only has correlation with BA. In addition, BA and EC are having strong correlations with the environmentally friendly behaviors, i.e., reducing household waste (RHW) and practicing recycling (R). These results provide us with some early insights on how these constructs are interacting with one another.

	MC	EI	PC	PB	RA	SN	ATT	R	RHW	SMC	BA	EC
MC	1											
EI	0.53**	1										
PC	(0.01)	(0.19) *	1									
PB	0.09	0.28 **	(0.46) **	1								
RA	0.31 **	0.39 **	(0.47) **	0.46 **	1							
SN	0.29 **	0.48 **	(0.25) **	0.34 **	0.51 **	1						
ATT	0.33 **	0.60 **	(0.35) **	0.43 **	0.43 **	0.54 **	1					
R	0.36 **	0.40 **	(0.23) **	0.24 **	0.42 **	0.49 **	0.41 **	1				
RHW	0.43 **	0.41 **	(0.20) *	0.24 **	0.34 **	0.48 **	0.42 **	0.49 **	1			
SMC	0.38 **	0.40 **	(0.08)	0.11	0.17 *	0.27 **	0.36 **	0.32 **	0.36 **	1		
BA	0.19 *	0.37 **	(0.04)	0.13	0.22 **	0.19 *	0.24 **	0.18 *	0.30 **	0.54 **	1	
EC	0.10	0.31 **	(0.11)	0.25 **	0.17 *	0.21 **	0.25 **	0.16 *	0.29 **	0.36 **	0.45 **	1

Notes:

(1) MC = Traditional Media Contact; EI = Environmental Involvement; PC = Perceived Cost; PB = Perceived Benefit; RA = Rules Acceptability; SN = Subjective Norms; ATT = Attitude towards Waste Reduction; R = Recycling; RHW = Reducing Household Waste; SMC = Social Media Contact; BA = Behavioral Alignment; and EC = Empowerment and Control

(2) \*\*  $p < 0.01$ ; \*  $p < 0.05$

**Table 3. Correlation Matrix**

## Discussion

In this study, we propose to investigate the role of social media in engaging young people in adopting an environmentally friendly lifestyle. The research model is built by amalgamating an existing model developed by Nishio and Takeuchi (2005), which is developed for studying the impact of traditional media on *living an environmentally friendly lifestyle through taking a more positive attitude toward waste reduction (reducing household waste and practicing recycling)*, with social media as a platform for value co-creation. The proposed model is presented in Figure 2, and up till now, we have been collecting our data from Guam. In our full study, we will also collect data from two other countries, i.e., Hong Kong and Japan. As reported by Ho and So (2017), a study also grounded on the Nishio and Takeuchi's Model (2005), the original Nishio and Takeuchi's Model (2005) cannot explain the waste management behavior on Guam well, and adjustment is required to consider also the cultural differences between Japanese and Guamanian by the Hofstede Cultural Dimensions (Hofstede, 2001). As shown in Table 4 below, the Hofstede Cultural Dimensions of Hong Kong, Guam and Japan are different.

	Power Distance	Individualism	Masculinity	Uncertainty Avoidance	Long-term Orientation
Hong Kong	68	25	57	29	61
Guam	11	86.5	25.9	55.4	39.8
Japan	54	46	95	92	88

Note: Score for Hong Kong and Japan are obtained from <https://www.hofstede-insights.com>. Score for Guam is obtained from Perez et al. (n.d.).

**Table 4. Hofstede Cultural Dimensions Score of Hong Kong, Guam and Japan**

Therefore, we posit this research with an exploratory element, as it is not easy to predict the finding outcomes of the model due to the influence of culture. Also, as our model aims to clarify the impacts of traditional media and social media to *environmental involvement*, we will compare which media will be a more effective tool for disseminating to the general public. Different from our reference model (Nishio and

Takeuchi, 2005), as our current research is focused on studying the impacts of traditional media and social media in a general terms, we do not study the impact of *different* types of traditional media (i.e., newspaper, TV, radio, etc.) and social media (i.e., social network sites, blogs, Twitter, etc.). Thus, a possible future extension of the study is to investigate the impact of individual kinds of social media as a follow-up study.

As a result, this research will have theoretical contributions to both information systems (to allow us to have a chance to compare the effectiveness of traditional and social media in information dissemination) and environmental management (to understand how environmentally friendly lifestyle information be disseminated). Finally, the findings will also have significant practical implication to the environmental protection practitioners, as they can learn from our findings to fine-tune their strategies in promoting the environmentally friendly messages to the public.

## Conclusion

Social media as a platform for value co-creation is a relatively new concept (See-To and Ho, 2014), which scant research has been performed. In this study, we plan to explore how it moderates the effect of the information presented in social media with the behavior to be practiced by people (i.e., recycling and house waste reduction) through co-creation of value. While the environmentally friendly values and living-style are created by the actions of the public, such living style and value can be fostered by social media. Thus, this will be one of the possible studies to probe into such co-creation activities happened in social media.

In conclusion, this study extends the research of information systems and environmental management through developing a new research model to study how social media is a value co-creation platform for creating environmentally friendly lifestyle value. It will also provide us with an opportunity to compare how the effectiveness of traditional and social media in promoting environmentally friendly lifestyles. This research will provide us with an opportunity for us to further explore this interdisciplinary subject (the application of social media in environmental management).

## REFERENCES

- Abdul-Muhmin, A. G. 2007. "Explaining Consumers' Willingness to be Environmentally Friendly," *International Journal of Consumer Studies* (31:3), pp. 237–247.
- Aoki, Y., Saito, M., Sugimoto, T., and Moriguchi, T. 1988. "Conceptualizing and Measuring the Consumer Involvement Construct," In *Proceedings of Japan Society of Marketing and Distribution 1988*, pp. 157–162.
- Au, C. H., and He, W. 2014. "Using Wiki for Project Collaboration-with Comparison on Facebook," In *Proceedings of the World Congress on Engineering and Computer Science*, pp. 358–363.
- Au, C. H., and Ho, K. K. W. In Press. "Deliberation in Mobile Messaging Application: A Case in Hong Kong," *Communications of the Association for Information Systems*.
- Au, C. H., Yiu, W. K., and Fung, W. S. 2018. "Emerging Simulation and VR for Green Innovations: A Case Study on Promoting a Zero-carbon Emission Platform in Hong Kong," In *Proceedings of 2018 IEEE International Conference on Industrial Engineering and Engineering Management*, pp. 1841–1845.
- Barr, S. 2007. "Factors Influencing Environmental Attitudes and Behaviors – A U.K. Case Study of Household Waste Management," *Environmental and Behavior* (39:4), pp. 435–473.
- Black, I. R., and Cherrier, H. 2010. "Anti-consumption as Part of Living a Sustainable Lifestyle: Daily Practices, Contextual Motivations and Subjective Values," *Journal of Consumer Behaviour* (9:6), pp. 437–453.
- Bolton, R. N., Parasuraman, A., Hoefnagels, A., Migchels, N., Kabadayi, S., Gruber, T., Loureiro, Y. K., and Solnet, D. 2013. "Understanding Generation Y and their Use of Social Media: A Review and Research Agenda," *Journal of Service Management* (24:3), pp. 245–267.
- Bruhn, M., Schoenmueller, V., and Schäfer, D. B. 2012. "Are Social Media Replacing Traditional Media in terms of Brand Equity Creation?" *Management Research Review* (35:9), pp. 770–790.
- Caldieraro, F., Zhang, J. Z., Cunha, M. Jr., and Shulman, J. D. 2018. "Strategic Information Transmission in Peer-to-Peer Lending Markets," *Journal of Marketing* (82:2), pp. 42–63.



- Cowling, D. 2017. "Social Media Statistics Australia – July 2017," Available at <https://www.socialmedianews.com.au/social-media-statistics-australia-july-2017> (Retrieved February 12, 2018).
- Ellison, N. B., Steinfield, C., and Lampe, C. 2007. "The Benefits of Facebook "Friends:" Social Capital and College Students' Use of Online Social Network Sites," *Journal of Computer-Mediated Communication* (12:4), pp. 1143–1168.
- Gatersleben, B., Steg, L., and Vlek, C. 2002. "Measurement and Determinants of Environmentally Significant Consumer Behavior," *Environment and Behavior* (34:3), pp. 335–362.
- Gilg, A., Barr, S., and Ford, N. 2005. "Green Consumption or Sustainable Lifestyles? Identifying the Sustainable Consumer," *Futures* (37:6), pp. 481–504.
- Gong, J. Y., Schumann, F., Chiu, D. K. W., and Ho, K. K. W. 2017. "Tourists' Mobile Information Seeking Behavior: An Investigation on China's Youth," *International Journal of Systems and Service-Oriented Engineering* (7:1), pp. 58–76.
- Gordon, S. 2016. "Prospects for Case-based Research on Social Media," *Journal of Information Technology Case and Application Research* (18: 4), pp. 193–199.
- Han, H., Hsu, L.-T., and Sheu, C. 2010. "Application of the Theory of Planned Behavior to Green Hotel Choice: Testing the Effect of Environmental Friendly Activities," *Tourism Management* (31:3), pp. 325–334.
- Hanna, R., Rohm, A., and Cittenden, V. L. 2011. "We're all Connected: The Power of the Social Media Ecosystem," *Business Horizons* (54:3), pp. 265–273.
- Hellman, M., and Wagnsson, C. 2015. "New Media and the War in Afghanistan: The Significance of Blogging for the Swedish Strategic Narrative," *New Media and Society* (17:1), pp. 6–23.
- Ho, K. K. W., and See-To, E. W. K. 2018. "The Impact of the Uses and Gratifications of Tourist Attraction Fan Page," *Internet Research* (28:3), pp. 587–603.
- Ho, K. K. W., and So, S. 2017. "Towards a Smart City through Household Recycling and Waste Management: A Study on the Factors Affecting Environmental Friendliness Lifestyle of Guamanian," *International Journal of Sustainable Real Estate and Construction Economics* (1:1), pp. 89–108.
- Hofstede, G. H. 2001. *Culture's Consequences: Comparing Values, Behaviors, Institutes, and Organizations across Nations*, 2nd ed., Thousand Oaks, CA: Sage Publications, Inc.
- Hounsham, S. 2006. *Painting the Town Green: How to Persuade People to be Environmentally Friendly – A Report for Everyone Involved in Promoting Greener Lifestyle to the Public*, London, UK: Green-Engage.
- Jansson, J., Marell, A., and Nordlund, A. "Green Consumer Behavior: Determinants of Curtailment and Eco-innovation Adoption," *Journal of Consumer Marketing* (27:4), pp. 358–370.
- Kaplan, A., & Haenlein, M. 2010. "Users of the World, Unite! The Challenges and Opportunities of Social Media," *Business Horizons* (53:1), pp. 59–68.
- Kashima, Y., Paladino, A., and Margetts, E. A. 2014. "Environmentalist Identity and Environmental Striving", *Journal of Environmental Psychology* (38), pp., 64–75.
- Leonidou, L. C., Coudounaris, D. N., Kvasova, O., and Christodoulides, P. 2015. "Drivers and Outcomes of Green Tourist Attitudes and Behavior: Sociodemographic Moderating Effects," *Psychology & Marketing* (32:6), pp. 635–650.
- Leonidou, L. C., Leonidou, C. N., and Kvasova, O. 2010. "Antecedents and Outcomes of Consumer Environmentally Friendly Attitudes and Behaviour," *Journal of Marketing Management* (26:13–14), pp. 1319–1344.
- Librova, H. 2008. "The Environmentally Friendly Lifestyle: Simple or Complicated?" *Czech Sociological Review* (44:6), pp. 1111–1112.
- Lossin, F., Kozlovskiy, I., Sodenkamp, M., and Staake, T. 2016. "*Incentives to Go Green: An Empirical Investigation of Monetary and Symbolic Rewards to Motivate Energy Savings*," In *Proceedings of 24<sup>th</sup> European Conference on Information Systems*.
- Ma, W. M. K., and Chan, A. 2014. "Knowledge Sharing and Social Media: Altruism, Perceived Online Attachment Motivation, and Perceived Online Relationship Commitment," *Computers in Human Behavior* (39), pp. 51–58.

- Mancha, R., Muniz, K., and Yoder, C. Y. 2014. "Studying Executives' Green Behaviors: An Environmental Theory of Planned Behavior," In Proceedings of 20th Americas Conference on Information System.
- Mancha, R. M., and Yoder, C. Y. 2015. "Cultural Antecedents of Green Behavioral Intent: An Environmental Theory of Planned Behavior," *Journal of Environmental Psychology* (43), pp. 145–154.
- Mathiyalakan, S., Ho, K. K. W., Heilman, G. E., and Law, W. 2017. "An Investigation into the Impact of Ethnicity and Culture on the Motivation for Using Facebook for Academic and Socialization in Guam," *International Journal of Systems and Service-Oriented Engineering* (7:4), pp. 1–21.
- Meraz, S. 2009. "Is there an Elite hold? Traditional Media to Social Media Agenda Setting Influence in Blog Networks," *Journal of Computer-Mediated Communication* (14:3), pp. 682–707.
- Ng, I. C. L., Nudurupati, S. S., and Tasker, P. 2010. "Value Co-creation in the Delivery of Outcome-based Contracts for Business-to-Business Service," AIM Research Working Paper Series, London, UK: Advanced Institute of Management Research.
- Nishio, C., and Takeuchi, T. 2005. "Factors of Household Recycling and Waste Reduction Behavior," in AP - Asia Pacific Advances in Consumer Research Volume 6, Y.-U. Ha and Y. Yi (eds.), Duluth, MN: Association for Consumer Research, pp. 46–51.
- Oakley, R. L., and Salam, A. F. 2014. "Examining the Impact of Computer-mediated Social Networks on Individual Consumerism Environmental Behaviors," *Computers in Human Behavior* (35), pp. 516–526.
- Ohira, S., Stanislawski, S., and Sonobe, Y. 2013. "Green Consumption and the Theory of Planned Behavior in the Context of Post-Megaquake Behaviors in Japan", *ACR North American Advances* (41), pp. 321–325.
- Obermiller, C. 1995. "The Baby is Sick/The Baby is Well: A Test of Environmental Communication Appeals," *Journal of Advertising* (24:2), pp. 55–70.
- Ölander, F., and Thøgersen, J. 1995. "Understanding of Consumer Behaviour as a Prerequisite for Environmental Protection," *Journal of Consumer Policy* (18:4), pp. 345–385.
- Perez, K., Dote, K., Damian, J., Taylor, M., and Dickens, A. n.d. "Guam and Saipan's Business Culture: Deriving Hofstede's Score," Pacific Center for Economic Initiatives.
- Rouse, D. J. 2013. "Sustainability of Wastewater Treatment and Excess Sludge Handling Practices in the Federal States of Micronesia," *Sustainability* (5:10), 4183–4194.
- Prahalad, C. K., and Ramaswamy, V. 2004. "Co-creating unique value with customers," *Strategy & Leadership* (36:3), pp. 4–9.
- Rauniar, R., Rawski, G., Yang, J., and Johnson, B. 2014. "Technology Acceptance Model (TAM) and Social Media Usage: An Empirical Study on Facebook," *Journal of Enterprise Information Management* (27:1), pp. 6–30.
- Rueda, L., Benitez, J., and Braojos, J. 2017. "From Traditional Education Technologies to Student Satisfaction in Management Education: A Theory of the Role of Social Media Applications," *Information & Management* (54:8), pp. 1059–1071.
- See-To, E. W. K., and Ho, K. K. W. 2014. "Value Co-creation and Purchase Intention in Social Network Sites: The Role of Electronic Word-of-Mouth and Trust - A Theoretical Analysis," *Computers in Human Behavior* (31), pp. 182–189.
- Tricco, A. C., Zarin, W., Lillie, E., Pham, B., and Straus, S. E. 2017. "Utility of Social Media and Crowd-sourced Data for Pharmacovigilance: A Scoping Review Protocol," *BMJ Open* (7:1).
- Vargo, S. L., Maglio, P. P., and Akaka, M. A. 2008. "On Value and Value Co-creation: A Service Systems and Service Logic Perspective," *European Management Journal* (26:3), pp. 145–152.
- Walton, S. V., Handfield, R. B., and Melnyk, S. A. 1998. "The Green Supply Chain: Integrating Suppliers into Environmental Management Processes," *Journal of Supply Chain Management* (34:1), pp. 2–11.
- Wan, C., Shen, G. Q., and Yu, A. 2014. "The Role of Perceived Effectiveness of Policy Measures in Predicting Recycling Behaviour in Hong Kong," *Resources, Conservation and Recycling* (83), pp. 141–151.
- Whitmarsh, L., and O'Neill, S. 2010. "Green Identity, Green Living? The Role of Pro-environmental Self-identity in Determining Consistency across Diverse Pro-environmental Behaviours," *Journal of Environmental Psychology* (30:3), pp. 305–314.
- Wikstrom, P., and Ellonen, H. 2012. "The Impact of Social Media Features on Print Media Firms' Online Business Models," *Journal of Media Business Studies* (9:3), pp. 63–80.

- Zhang, Q., Huang, B., Chiu, D.K.W., and Ho, K.K.W. 2017. Learning Japanese through social network sites: A case study of Chinese learners' perceptions. *Micronesian Educators* (21), pp. 55-71.
- Zhang, S Y., and Tam, K. Y. 2012. "Technology Features, Empowering Perceptions, and Voicing Behavior on Microblog," In *Proceedings of 18th Americas Conference on Information System*.
- de Zúñiga, H. G., Jung, N., and Valenzuela, S. 2012. "Social Media Use for News and Individuals' Social Capital, Civil Engagement and Political Participation," *Journal of Computer-Mediated Communication* (17:3), 319–336.

## Appendix A: Survey Items

### Traditional Media Contact (MC)

- MC1 I usually watch TV programs and read newspaper articles about environmental problems.
- MC2 I usually read books about environmental problems.
- MC3 I usually read advertisements and pamphlets from the government and know our environmental policy and strategy.
- MC4 I usually visit the environment related corner at industrial exhibitions.
- MC5 I usually read environmental-related articles and pamphlets of corporations and know their environmental policy and strategy.

### Environmental Involvement (EI)

- EI1 I try various innovations in leading an environmental friendlier life.
- EI2 When I buy products, I usually think about the effect those products will have on the environment.
- EI3 I have a special interest in waste problem within all the various environmental problems.
- EI4 I think I have an in-depth knowledge on recycling.

### Perceived Cost (PC)

- PR1 I feel that reducing waste and recycling is time-consuming.
- PR2 I believe that waste management and recycling is ineffective in relation to the efforts and cost incurred.
- PR3 I think that waste reduction and recycling is difficult while maintaining a convenient and comfortable lifestyle.

### Perceived Benefit (PB)

- PB1 I believe that the effort to reduce waste reduces wastefulness, and leads to a quality lifestyle.
- PB2 I believe that the effort to reduce waste is related to controlling household budget expenses, and is rational behavior.

### Rule Acceptability (RA)

- RA1 Since waste reduction and recycling can be done at one's own pace, it is easy.
- RA2 It is easy to understand the city's waste separation and recycling rules.
- RA3 Waste reduction and recycling has become a custom.

### Subjective Norm (SN)

- SN1 My family has a positive attitude to waste reduction and recycling.
- SN2 My friends and acquaintances have a positive attitude to waste reduction and recycling.
- SN3 My living area has a positive attitude to waste reduction and recycling.

### Attitude Towards Waste Reduction (ATT)

- ATT1 I like recycling and waste reduction.
- ATT2 I intend to participate in area recycle and environmental cleanup activities.
- ATT3 I communicate the importance of and recommend cooperation with recycling and waste reduction to those around me.

### Recycling (R)

- R1 I don't use the disposable products such as paper cup and chopsticks.
- R2 I thoroughly separate waste to make recycling easy.
- R3 I consider empty bottle and cans not as waste but as recyclable products.
- R4 I take rinsed PET bottles and disposable plastic tray to the appointed waste collection area.
- R5 I use broken products for a long time by repairing them.

### Reducing Household Waste (RHW)

- RHW1 I take a shopping bag when I go shopping.
- RHW2 I make a shopping list so that I won't buy unnecessary products.
- RHW3 I choose products that come in a reusable container.

- RHW4 I choose perishable foods not contained in disposable plastic tray
- RHW5 I choose products that come in reusable containers (e.g., bottled milk, soft drinks, etc.)
- RHW6 I choose recycled products such as toilet paper made from waste paper.

**Social Media Contact (SMC)**

SMC1 I usually watch information and articles about environmental problems from social media.

SMC2 I usually read information about environmental problems from social media.

SMC3 I usually read advertisements and pamphlets from the government and know our environmental policy and strategy at social media.

SMC4 I usually read the environment-related information from social media.

SMC5 I usually read environmental-related articles and pamphlets of corporations from social media and know their environmental policy and strategy.

**Value Co-Creation – Behavioral Alignment (BA)**

BA1 I interact with social media to take the time needed to discuss new ideas.

BA2 I interact with social media to co-operate in order to apply new ideas.

BA3 I interact with social media site to share resource to help in my decision-making process.

**Value Co-Creation – Empowerment and Control (EC)**

EC1 I feel that I have control over the decision that affects my decision.

EC2: When interacting with social media, I feel I can use my personal judgment to make a decision.

EC3: When interacting with social media, I feel I have significant autonomy in that interaction.