

Pro-Environmental Behavior Decisions in Face Mask Usage: A Pilot Study

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Abstract: Human behavior and interaction with their surroundings vary from one another. Different people may engage and behave pro-environmental based on their beliefs and understanding of the consequences of environmental problems for themselves. The theory of planned behavior (TPB) and value belief norm theory (VBN) suggest that an individual perceives environmental pollution effects could influence their decision-making in daily activities. This study aimed to examine people's behavior in using face masks and their perception of environmental consequences by integrating the TPB and VBN into a single conceptual framework. This study confirms that sub-factors, including biosphere, altruism, egoistic, awareness of consequences, and personal norms, are among the predictors that explain pro-environmental behavior in Malaysia. Additionally, the cultural factor significantly mediates the behavior. A questionnaire pilot survey was conducted among 50 visitors in a coastal area in Peninsular Malaysia. The Cronbach alpha test and descriptive analysis confirm the direct and mediatory effect of the causal of the variables in the TPB and VBN theory of pro-environmental behavior when making decisions in face mask usage. The research results validate the proposed TPB and VBN theory model linkages to clarify pro-environmental behavior.

Keywords: *COVID-19, face mask, pro-environmental, waste, behavior.*

1. Introduction and Background

The emergence of the global spread of the coronavirus disease (COVID-19) pandemic has attracted global attention to the danger of the virus. The World Health Organization (WHO), the National Centers for Disease Control, governments, and relevant authorities have announced various guidelines, including using face masks to reduce the disease associated with COVID-19. During the COVID-19 pandemic, these institutions have also suggested using either surgical face masks or non-medical face masks, which are commercial masks of cloth or cotton, as a preventive measure when an active individual is in risk areas such as in close or confined places. In January 2020, Malaysia had its first case acquired from a traveller. Subsequently, from three cases that occurred in the earlier year, the number of cases due to the outbreak has increased. As of October 11, 2022, there are 4,856,217 cases, and 36,403 deaths (KKMNOW, 2022). Since then, all Malaysians have been obligated to use face masks and gloves, while many countries were temporarily banned from exporting protective masks due to the COVID-19 pandemic. During this critical situation, the Malaysian government demanded that face mask manufacturers focus their production of protective masks for the local market.

While the consumption of face masks in society is imperative for health reasons, at the same time it has resulted in various environmental issues such as the increase in waste generation. Global warming, urban water, and air pollution, as well as loss of biodiversity, are among the threats to sustainable development (Parkinson, 2020; Arkorful et al., 2021). Malaysia has reported that as of July 13, 2022, 84% of Malaysians claimed they wore facemasks, particularly in public places during the COVID-19 outbreak.

According to the Department of Statistics Malaysia (2022), clinical waste increased to 43.9 percent in 2021 to 57,400 tonnes compared to 39,900 tonnes in 2020 (see Figure 1). The report also showed that three states had recorded the largest amount of clinical waste, namely Selangor (13,000 tonnes), Sarawak (8,300 tonnes) and Kuala Lumpur, amounting to 5,900 tonnes. One of the reasons for the spike in clinical waste is the use of personal protective equipment (PPE) such as face masks. This report indicates that society's extensive use of clinical waste, including face masks, leads to a massive amount of waste that causes environmental damage.

Ariffin and Zakili (2019) highlighted households' use and consumption of clinical waste as contributing to hazardous environmental and human health risks. Additionally, Sullivan et al. (2021) study reported that

improper and unregulated disposal of surgical face masks could not only transmit disease but also adversely impact the environment and potentially human health because of the material compound of the masks' waste. Little is known about the number of face mask disposals. Sangkham (2020) reported that an estimation of daily face masks in Malaysia amounts to 7,049,901 pieces, contributing to 35.41 tons per day. As shown in Figure 1, the statistic refers to clinical waste, including face masks.

Figure 1: Total and Growth Rate of Clinical Waste in Malaysia from 2002- 2021



(Source: DOSM, 2022)

As waste and environmental pollution is one of the concerning issues globally, face mask waste can profoundly affect the status of society's behavior. Nevertheless, we know little about face mask usage and pro-environmental behavior among Malaysians. This missing information could help government agencies and society to improve the level of environmental awareness culture and elevate the environmental best practices among societies in Malaysia. This study could help health and waste management agencies implement policies and standards regulating face masks in the country.

2. Literature Review

Improper handling of clinical or surgical waste can increase the risks of disease transmission directly or indirectly in the environment. Sullivan et al. (2021) study reported that improper and unregulated disposal of surgical face masks cannot only transmit disease but also harm the environment and potentially human health because of the material compound of the masks' waste. Any reactive residues attached to the masks' waste may dissolve with surroundings, moisture droplets or chemical elements, leading to severe health hazards. A recent study by Kampf et al. (2020) found that the coronavirus can survive on material surfaces such as metals, glass, and plastic for a maximum of 9 days. The study indicates that the threats can significantly affect lives, particularly in developing countries with poor waste management (i.e. face mask disposal, and management strategies).

According to Arkorful et al. (2021), discarding face masks could lead to cost implications and increase environmental waste. Considering the need for environmental sustainability and the need to promote health and well-being during the pandemic times, individual willingness to wear a surgical face mask or washable face mask is pertinent to ensure the success of a country in sustaining the environment and social well-being whilst combating COVID-19 virus that can be transmitted by the microorganism on the face mask waste. Some face mask waste can be littered in our surroundings without considering the pile of other waste simultaneously.

People's behavior in weighing the predicted costs and advantages has a common influence on their decisions. It concerns people's intents and behavioral characteristics throughout transitions. The cost or financial impact of one's decision to utilize a face mask is crucial. Economic losses resulting from the choice of product type and quality throughout this phase are frequent. Similarly, it has been discovered that in the case of face masks, cost considerations are one of the variables that can affect how much the users are willing to spend. Face masks are now voluntary when engaging in everyday outdoor activities. According to Hartanto and Mayasari (2002), the association between high face mask expenses and unfavorable user behavior (i.e., frequent face mask replacement, use of high-quality face masks, or use of washable/cloth masks) may result

in face mask usage not being adhered to. As a result, the public's decision regarding the type of face mask depends on norms (i.e., social conventions and behavior) and commitments (i.e., self-principles for individual acts) regarding choices that could impact environmental and health issues.

Environmental sustainability may be hampered by a number of issues, including social culture. The nature and background of society can vary, resulting in various beliefs and behaviors regarding maintaining a safe and clean environment. According to Patwary, Omar and Tahir (2020) and Azlan et al. (2020), Malaysia has been described as a collectivist society, which suggests that Malaysians are concerned with protecting the interests of the group in exchange for loyalty and that belonging to the group is more important than standing alone (i.e., individualist). Since society may be worried about the environment and cost, will imply to them, this collectivism-individualism component may also impact society's behavior. According to a study by Allison et al. (2021), culture can influence the use of face masks. People who reside in a nation with strict cleanliness regulations, such as many Asian nations, will probably think about using a high-quality face mask (such as a surgical mask, N95, or comparable) to stop the virus from spreading. On the other hand, people in nations with poorer face mask compliance might have distinct attitudes and behaviors about using face masks.

3. Research Methodology

To determine the underlying theories that support the direct relationship between the variables of the study, and the moderating effect of culture on the relationship between the predictor variables—attitude, environmental consciousness, social norm—and the criterion variable—the perceived behavioral intention of Malaysian society in deciding against the use of face masks—this study uses a compilation of literature review papers. To address bigger issues and offer solutions, this study maps the body of research on using face masks and environmental worries. The literature review-identified constructs were created for each variable group. Figure 2 depicts the theoretical framework of the current study.

This research was conducted as a pilot survey study using a questionnaire as the primary form of data collection. The survey was performed on a community in a coastal area of Peninsular Malaysia. The data were collected through individual meetings and online platform survey questionnaires. A random sampling technique was used to approach the respondents. All respondents must be above 18 years old. The minimum age criteria are required to ensure the ability of the respondents to purchase a face mask and self-assessments in making a decision. For sampling, the researchers randomly select a subset of the community in the coastal area from the population. A total of fifty questionnaires were filled and completed during the session.

A two-section questionnaire was developed based on literature and a theoretical framework for pro-environmental face mask usage decisions. The first section is on the participants' demographic information, such as age, gender, educational level, occupation and state. The second section illustrated items that are applied to measure the variables of the theoretical models. Before this pilot study, a group of panel experts was approached to assess the proposed list of items. The panel of experts is among the executives of environmental agencies in Malaysia. The questionnaires were completed and validated by the panel experts without comments. A pilot study test was conducted further to check the validity and reliability of the questionnaire. Statistical Package for Social Sciences (SPSS) version 28.0 was used for the reported statistical analyses.

4. Results

To test for significant variations caused by various demographic factors, we employed one-way ANOVA and bivariate correlation between attitude, environmental consciousness, social norm, perceived behavior, and culture with the decision to wear face masks. The statistical significance was set at $P < 0.05$ for all analyses.

Table 1: A Summary of the Constructs Observed in the Pilot Test

Construct	N	Mean	Standard deviation
Attitude	50	4.2350	0.61943
Environmental consciousness	50	4.1660	0.57057
Social Norm	50	3.7100	1.00216
Perceived behaviour	50	4.2527	0.51106
Culture	50	4.2440	0.84275

Table 1 results indicate that the primary influence in the decision to use a face mask is 'perceived behavior', which indicates that the construct plays a vital role in influencing an individual decision to use a face mask. This is followed by 'culture' and 'attitude'. To determine whether the respondents are pro-environmental, the study shows that 'environment consciousness' scores higher than the 'social norms' factor.

Results in this study showed, as hypothesized that environmental concern for self, others and the environment were related to self-awareness and consequences belief. Additionally, as hypothesized, each TPB construct corresponds to the environmental values postulated in VBN. Also, consistently, cultural factor mediates individual attitude, consciousness, social norms and self-perceptions towards environmental concern.

H1: Attitude influence towards an individual decision on face mask usage.

An individual attitude has been indicated as a positive influence by the respondents. Eighty-two percent of the respondents perceived attitude in promoting face masks should be encouraged in Malaysia. They believe that the attitude of wearing a face mask can mitigate the risk of health disease and benefit society.

H2: Environmental consciousness influences individual decisions on face mask usage.

Regarding environmental consciousness, eighty percent of the respondents know that face masks can contribute to the increasing amount of waste in Malaysia. This finding shows that the respondents acknowledge that most face mask use in the country is non-biodegradable. This finding is interesting is because only half of the respondents willing to use reusable face masks. Nevertheless, the finding shows that the respondents agree that having an appropriate way for facemask waste disposal is essential. In addition, the respondents believe educating society about face mask repurpose is good. Based on this understanding, further study should be undertaken.

H3: Social norms influence individual decisions on face mask usage.

As discussed in this paper, social norms have been perceived as one of the factors that can influence the decision of an individual to use a face mask. This finding, however, does not consider social norms to have a significant impact on individual decision-making. Therefore, to provide more substantial evidence, further investigation should be conducted.

H4: Perceived behavior influence individual decision on facemask usage.

Perceived behavior regarding air pollution and effective measurement for the disease has become the primary reason for an individual to use face masks. The finding reveals that the use of face masks includes the hygienic factor. Nevertheless, a minority of the respondents feel that the frequent face mask change does not guarantee the reduction of unhealthy air. This might be due to the cost of purchasing the face mask.

H5: Culture can moderate a positive influence between attitude, social norms, environmental consciousness and perceived behavioral control factors toward individual decisions on face mask usage.

Findings from this pilot study reveal that the majority of the respondents believe that culture can affect and influence an individual decision to wear a face mask. They believe continuous reminders from the authorities, persistence in sharing beliefs and values about wearing face masks, and internalization of the consequences can create a more excellent civic orientation and efficient self-monitoring culture.

Discussion: Findings from this analysis indicate that the constructs developed from the TPB and VBN theory are relevant. This shows that the decision on face mask type to use and environmental consciousness exist in society. Most respondents have a positive attitude towards face mask usage and pro-environmental behavior.

This means that despite the cost of buying a face mask, which can be an additional burden to the users, a face mask remains one of the best ways to curb the spread of contagious diseases. This is because face masks are handy and easily kept in their bags. The respondents agreed that the attitude of using face masks should consider its consequences on the environment whilst protecting their health. Regarding choice, reusable or disposable face masks, only half of the respondents are willing to use reusable face masks, while others prefer to use disposable face masks. Additionally, many of the respondents recognize the need to understand more about repurposed and biodegradable face masks so that they are aware of the impact of it.

The results obtained from these tests are consistent with previous studies such as Lee et al. (2022) and Stern (2000), which confirm that the TPB and VBN theory model can be integrated into a single theoretical framework to predict an individual attitude and behavior towards pro-environmental. By integrating these two models, this study enables us to determine the value that initiates the causal chain of the decision to use the face mask. This study reveals that individuals are more likely to be environmentally-behavior if society is continuously educated with updated information about environmental damages due to people's behavior. In the analysis, the pivotal role of attitude, social norms and perceived behavior links with environmental consciousness. In other words, this study indicates the importance of promoting environmental consciousness in the TPB model and demonstrates its significant role in determining the type of face mask use. From the VBN lens, an individual might form a strong belief and positive attitude towards sustainable actions and explain a strong belief that they can respond with a pro-environmental attitude. Additionally, the moderating role of culture in the values-intention relation described the individual to validate the biosphere, orientation and altruism values in promoting pro-environmental behavior (Barbarossa et al., 2017).

5. Managerial Implications and Recommendations

This study reveals that face mask waste contributes to the increase in waste in Malaysia, and all face mask material is non-biodegradable. To create a higher level of civic values among Malaysians, three recommendations can be identified here. First, to elevate education and awareness about the impact of face mask waste on environmental damage. This study suggests that promoting messages about responsibility to nature is crucial to improving the use of face masks. Secondly, further initiatives must be taken by the relevant authorities to improvise the material components used in making the face masks, and finally, face mask waste disposal management should be considered.

The limitation of this paper is that the focus is on the usage of face mask behavior. This could have been widened to include other one-time clinical equipment waste, given that individuals could have used other personal protection equipment (PPE) as part of their household waste, such as disposal gloves, syringes, or needles, and electronic waste such as batteries, gadgets or electric sockets. Second, this study is limited to one of the coastal areas in Malaysia; thus, the variation of results is limited. In terms of the implication, this study suggests that the social norm towards pro-environmental face mask usage decisions is still low in Malaysia.

Conclusion: This study aims to examine the factors that contribute to the pro-environmental behavior of an individual in making decisions about face mask usage in a coastal area of peninsular Malaysia. A theoretical model was developed to test the reliability and validity of the construct measurement to identify the relationships. Significant findings were revealed in this study of which the external environment, culture, plays a crucial role in influencing individual behavior. This paper concludes that an individual decision to use a face mask is subject to their awareness regarding the dangers of the disease in a given circumstance. An individual tends to use a face mask when surrounded by people or peers wearing a face mask (i.e., social norm). Cultural factor behavior, such as continuous reminders from authorities and persistent beliefs and values about wearing face masks, can also shape the individual behavior and perceived use of face masks.

Interestingly, the study reveals that surgical and washable face masks are essential and can be used alternately; however, knowledge about the proper disposal of surgical face masks and hygienic reusable face masks must be emphasized in society. The result from a review of previous literature regarding waste disposal and environmental pollution allowed us to achieve the first objective of the study: to identify the internal factors that can influence the public decision on the use of face masks in response to COVID-19 endemic settings through the integration of TPB and VBN lens. This enables us to unveil how the TPB and

VBN are used in studies on pro-environmental individual actions and to develop a fundamental theoretical framework as a recommendation to help researchers use this theory in the psychological aspect. The second objective of this paper is to identify whether culture is a moderating factor that can be used in exploring further insight as reasoning on the similarities and differences in pro-environmental behavior and to understand whether the theories predict intention and behavior.

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