

Barriers to Mitigate Carbon Footprint in a Selected Academic Institution in Bacoor City, Cavite, Philippines

Jonathan R. Adanza^a

^aSt. Dominic College of Asia, Bacoor, PHILIPPINES

ABSTRACT

Carbon footprint is an environmental menace that needs to be addressed at once. Various mitigating measures were proposed and yet manifestations of its proliferation are very much observable. This study seeks to determine primarily the barriers of non-adherence to identified measures to mitigate carbon footprint in the environment. Using the mixed method, 612 respondents from the academe were recruited to participate in the study, using the proportionate stratified random sampling, lottery method. The results show high adherence to measures to mitigate carbon footprint ($M=3.60/5$, $SD=.80$). Moreover, results show that to an extent, there are barriers for those in the academe to adhere completely to mitigating measures and even to adopt an advocacy that advances the ideology of saving the earth from suffocation because of carbon footprints. In the order of importance, they are social barriers ($M=2.98$, $SD=.99$), political barriers ($M=2.91$, $SD=.96$), and psychological-cognitive barriers ($M=2.87$, $SD=1.05$). Moreover, those in the academe believe that they cannot completely adhere to measures to mitigate carbon footprint because of reasons such as lack of knowledge about these measures and even the concept itself; Filipino concept about laws and legalities; and the lack of enforcement of relevant laws..

KEYWORDS

Carbon footprint, measures, adherence, climate change, global warming

ARTICLE HISTORY

Received 07 April 2016
Revised 07 June 2016
Accepted 17 June 2016

Introduction

Climate change is the gradual and progressive warming of the earth's atmosphere which is caused by billion of tons of carbon dioxide, methane, fluorocarbons or chloroflouro carbon, nitrous oxides or also known as greenhouse gases. Although these greenhouse gases make up only about one percent of the earth's atmosphere, as the Earth's atmosphere is composed of 78% nitrogen and 21% oxygen (Maslin, 2004), they regulate our climate by trapping heat and

CORRESPONDENCE Jonathan R Adanza ✉ j.adanza@outlook.com

© 2016 Adanza. Open Access terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>) apply. The license permits unrestricted use, distribution, and reproduction in any medium, on the condition that users give exact credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if they made any changes.

holding it in a kind of warm-air blanket that surrounds the planet (Retrieved from www.climate.nasa.gov on March 11, 2012). Without the natural greenhouse effects that carbon dioxide and water vapor, which are the two most important greenhouse gases, the Earth's average temperature would be roughly -20 degree centigrade. A study of the earth's past climate shows how atmospheric carbon dioxide control global climate. Evidence of this comes from ice cores drilled in both Antarctica and Greenland. By examining the oxygen and hydrogen isotopes in the ice core, it was made possible to estimate the temperature at which the ice was formed. Results show that as greenhouse gases such as atmospheric carbon dioxide (CO₂) and methane (CH₄) co-vary with temperature over the last 400,000 years. This corroborates the idea that the carbon dioxide content in the atmosphere and global temperature are closely linked, i.e. when CO₂ and CH₄ increase, the temperature is found to increase and vice versa. Thus, if levels of greenhouse gases continue to rise, so will the temperature of our atmosphere (Maslin, 2004). This leads to the phenomenon called global warming.

Carbon Footprint

Carbon footprint has become a widely used term and concept in the public debate on responsibility and abatement action against the threat of global climate change. It had a tremendous increase in public appearance over the last few months and years and is now a buzzword widely used across the media, the government and in the business world (Wiedmann and Minx, 2008).

Gases, which are emitted by human activities directly or indirectly, are known as the carbon footprint. It is a measure of the impact our activities have on the environment and in particular climate change. It relates to the amount of greenhouse gases produced in our day-to-day lives through burning fossil fuels for electricity, heating, transport and etc. (Retrieved from www.paperrep.com on January 7, 2012). In addition, Bishop (2007) and ETAP (2007) define Carbon Footprint as the sum total of greenhouse gases emitted by a person or group of people expressed in equivalent tons of carbon dioxide (CO₂). It was also defined by Bishop (2007) as "the measurement of [people's] impact on earth and its environment".

Grub and Ellis (2007) identify carbon footprint as "a measure of the amount of carbon dioxide emitted through the combustion of fossil fuels." In the case of a business organization, it is the amount of CO₂ emitted either directly or indirectly as a result of its everyday operations. It also might reflect the fossil energy represented in a product or commodity reaching market." There are two types of Carbon Footprint, the primary and secondary. Primary Carbon Footprint is caused by direct activity of human that burn fossil fuels directly such as driving a car, using electrical devices or electricity while the Secondary Carbon Footprint refers to the product purchased. The issue here is not directly the product being purchased but the way it is manufactured, transported and the amount of time it takes to break down and degrade (Retrieved from www.carbonfootprint.com on February 8, 2012).

Furthermore, efforts have been made to address this issue. The most logical approach to this problem would seem to be to cut emissions significantly up to 60% to contain global warming and its deleterious effects. However, it has also its economic implications for the world economy. The United Nations Framework Convention of Climate Change (UNFCCC) was created at the Rio earth Summit

in 1992 to try to negotiate a worldwide agreement in reducing greenhouse gases and limiting the impact of global warming. The Kyoto Protocol in 1997 was formed and stated the general principles for a worldwide treaty on cutting greenhouse emissions and that all developed nations would aim to cut their emission by 5.2% on their 1990 levels by 2008-12. A number of initiatives like this were formed, with one purpose and that is to mitigate carbon footprint.

Climate Change and Carbon Footprint in the Philippines

Nocum (2012) stated that Philippines is listed as seventh out of 233 nations ranked most vulnerable to the impact of extreme weather conditions that high level of carbon footprint and climate change may bring about by 2015. This is based on the study conducted by World Bank. Sabater (2008) added that it also amplifies the different socioeconomic burdens already shouldered by Filipino families such as hunger and water scarcity. Moreover, risks associated with the projected spread of vector-based and insect-borne diseases such as malaria and dengue (De Guzman, 2008). More frequent, El Niño and La Niña events, as well as deadly and damaging typhoons and other severe storms, floods and flash flood in the Philippines are likely the manifestation of global climate trends (Amadore, et al., 2008). Different parts of the country such as Albay, Ifugao, Sorsogon and Biliran that were identified by Manila Observatory (2008) as areas that are most at risk from climate and weather-related changes are noticeably areas with high Poverty Incidence Rating. The Puerto Princesa subterranean river national park, the most recent announced as part of 7 wonders of nature is one of the areas vulnerable to sea level rise. Our country is among the countries that are losing their forest cover fast, which put us in fourth in the world's top 10 most threatened forest hotspots. The area lost to deforestation every year is twice the land of Metro Manila a major reason why we feel the drastic effect of climate change (Nocum, 2012).

The province of Cavite is a coastal province situated approximately 30 kilometers south of Manila. The geography of the province varies differently, from flat and coastal in the north and west to mountainous and hilly in the south and east (Retrieved from www.tourism-philippines.com on March 12, 2012). Coastal communities have been adversely affected by climate variability and sea-level rise to varying degrees and are highly vulnerable to long-term climate change. Impacts of climate variability and sea-level rise on us include: coastal erosion, siltation and sedimentation, storm surges and flooding of urban areas, saltwater intrusion into groundwater resources and existing waterworks, degradation of water quality, and inundation of brackish water in estuarine areas (Amadore et al., 2008). Due to those changes, the impacts of climate change on education and study habits of students have caught attention of the concerned sectors of the government in every country (Retrieved from www.unicef-irc.org on December 08, 2011). These natural calamity occurrences are also the main reason for the consecutive cancellation of classes during the month of July to August in the Philippines. In response to this climate problem, many lawmakers are proposing that the opening of the school classes will be moved to September instead of June (Retrieved from www.abs-cbnnews.com on December 15, 2011).

Consequently, this study seeks to determine primarily the barriers of non-adherence to identified measures to mitigate carbon footprint in the environment. In the process, the following questions will be answered:

1. What is the level of adherence of the academic community in a selected academic institution to measures to mitigate carbon footprint?
2. What are the barriers that affect adherence of the academic community to measures in mitigating carbon footprint?
3. Why does the academic community fail to adhere completely to these measures?

Methodology

The method utilized in this study was mixed method (quantitative-qualitative designs). This was conducted in a selected educational institution in Cavite, which has been offering different programs for more than 10 years. The 612 respondents were proportionately selected using the stratified random sampling, lottery method. The study utilized 30% of the total population (2039) of the selected educational institution in Cavite. The population was divided into three strata: students who were presently enrolled in A.Y. 2012-2013; administrative staff and faculty members. There were 38 faculty members, 27 administrative staff and 547 students. The self-made questionnaire ($\alpha=.947$) served as the main instrument for data gathering. The questionnaire has three parts. The first part was the type of affiliation; the second and third parts were Likert-scale type of questions about the extent of adherence to measures that curb carbon footprint and barriers to adherence. After the quantitative part of the study, ten participants were further interviewed to answer the question of why the academic community failed to adhere completely with the mitigating measures. Answers to these interviews were embedded in the discussion.

Results and Discussion

On the extent of adherence to measures to curb Carbon Footprint

The table shows that the overall mean which is 3.60 is interpreted as high adherence. Further, the highest mean is the adherence of the community in turning off appliances, lights or other gadgets when not in use ($M=4.03$, high adherence). The community believed that turning off the appliances and other gadgets helps them to reduce carbon footprint and even cuts off their electricity bill. Jefferson (2012) highly suggests that turning off appliances or any gadgets when not in use may help in reducing carbon emission. On the other hand, Frischmann (2012) asserted that appliances excrete a high amount of carbon footprint into the environment. This simple commitment could spell the difference. Evans (2012) and Fenn (2012) added that saving energy is well established as one of the most effective ways people can do to reduce carbon footprint. This is followed by other measures that were also interpreted as "high adherence" such as changing incandescent to fluorescent lamp (3.61); washing clothes alternatively (3.61); using bicycle or just walking for short journey (3.53); utilizing public transport vehicle instead of own (3.59); minimizing use of warm water in taking shower (3.55); buying local products than imported ones (3.49); using reusable tote-style bag rather than plastic bags (3.59); selecting energy-efficient ones when purchasing appliances, gadgets that require use of energy (3.64); avoid purchase of useless products (3.67); supporting forestation/ earth hour (3.75); recycling papers and other scraps (3.63); decomposing biodegradable wastes (3.42); not throwing trash anywhere (3.57); bringing reusable lunch bag in school (3.40); not buying excess food (3.63); and segregating waste and proper disposal (3.53).

Table 1. Extent of Level of Adherence taken in Reducing Carbon Footprint

	Measures to Reduce Carbon Footprint	Mean	Q.I.
1	I turn off appliances, lights or other gadgets when not in use.	4.03	HA
2	I change incandescent lamp to fluorescent to save more energy.	3.61	HA
3	I wash clothes alternatively if clothes to be washed are not many.	3.61	HA
4	I use bicycle or just walk for short journey.	3.53	HA
5	If the use of vehicle cannot be avoided, I utilize public transportation vehicle instead of using my own (if applies)	3.59	HA
6	I minimize use of warm water in taking shower.	3.55	HA
7	I prefer to buy local products rather than imported ones.	3.49	HA
8	I use reusable cloth tote-style bag rather than plastic bags.	3.59	HA
9	I prefer to select energy-efficient one when purchasing appliances, gadgets that require or use energy.	3.64	HA
10	I avoid purchasing useless products.	3.67	HA
11	I support forestation/earth hour.	3.75	HA
12	I recycle papers and other scraps.	3.63	HA
13	I practice decomposing biodegradable wastes.	3.42	HA
14	I do not throw trash anywhere.	3.57	HA
15	I bring reusable lunch bag at school.	3.40	HA
16	I do not buy excess food to avoid throwing away food or extra condiments.	3.63	HA
17	When throwing garbage, I segregate waste and dispose it properly.	3.53	HA
18	I encourage my fellow classmates, students, faculty, staff/administrator to re-use papers or spoilage when printing	3.38	MA
18	Overall Level of Adherence Taken	3.60	HA

Legend:

4:20-5.00 - very high adherence (VHA)

3.40-4.19- high adherence (HA)

2.60-3.39- moderate adherence (MA)

1.80-2.59- low adherence (LA)

1.00-1.79- no adherence (NA)

It is interesting to note that the lowest mean acquired is question number 18 with 3.38 (moderate adherence). It reads "I encourage my fellow classmates, students, faculty, and staff/administrator to re-use papers or spoilage when printing." It is hard to encourage other people in adhering to reduce carbon footprint. Schiller (2010) states that the reason why people do not recycle or reusing is inconvenience. The storage is also a big problem for the people does not have enough space in their house and they have a hard time to recycle and re-use. However, despite high adherence, there are still reservations made by respondents, considering that the composite mean is only 3.6 out of 5. There are still barriers why the respondents cannot adhere 100% to these measures.

On the extent of barriers to adherence to measures that curb carbon footprint

As to Psychological-Cognitive Barriers

Table 2 reflects how the respondents struggle with the psychological-cognitive barriers. It shows that to an extent they experience these barriers (M=2.87, SD=1.05). Specifically, they believe that there are more important issues

that need to be given attention than carbon footprint ($M=3.00$). In a third world country like the Philippines, reducing carbon footprint takes the backseat as there are really more issues and challenges that need to be given solution such as poverty, graft and corruption, prostitution among others.

Table 2. Extent of Psychological-Cognitive Barriers to Adherence to Measures that Curb Carbon Footprint

	Psychological-Cognitive	Mea n	S.D.	Q.I.
1.	I agree that:			
1.1.	There is no threat of carbon footprint (i.e. increase methane gas in the air/atmosphere) because it will not happen here in the Philippines	2.95	1.24	E
1.2.	The results of carbon footprint will not happen in my lifetime.	2.81	1.15	E
1.3.	The effects of this carbon footprint will just disappear naturally.	2.81	1.16	E
1.4.	The effects of this carbon footprint will be solved on its own.	2.70	1.19	E
1.5.	There are more important issues than reduction of carbon footprint.	3.00	1.13	E
1.6.	There is nothing I can do to reduce carbon footprint because it is too serious to handle.	2.85	1.17	E
	OVERALL	2.87	1.05	E

Legend:

4:20-5.00 - to the highest extent (HTE)

3.40-4.19- to a high extent (HE)

2.60-3.39- to an extent (E)

1.80-2.59- to a lesser extent (LE)

1.00-1.79- never a barrier (NB)

They also believe that carbon footprint is not a threat in the Philippines ($M=2.95$, to an extent). This is polemical but the respondents believe that the Philippines is not primarily affected by carbon footprint. The next item may be could explain this as they also believe that results of carbon footprint will not happen in their lifetime and the effects of carbon footprint will just disappear naturally ($M=2.81$, to an extent). A sense of surrender is reflected when the respondents answered that they cannot do something about this phenomenon ($M=2.85$) because it is too big and it is very serious to handle. They also believe that this phenomenon will be solved on its own ($M=2.70$).

As to Social Barriers

It can also be gleaned from Table 3 that the respondents to an extent are also affected by social barriers ($M=2.98$, $s=.99$). To an extent, they agree that this issue about carbon footprint is not appropriate and relevant with their status in the society ($M=2.95$). They look at themselves as not the right people to confront this issue head on. Moreover, to an extent they do not want to be labelled as activist or radical ($M=3.00$). This is understandable in the Philippines which have experienced many pickets and rallies from militant groups and some concerned citizens. The respondents look at their participation in issues like reduction of carbon footprint not suitable for them to be involved with. Among the social barriers at $M=3.06$, the respondents look at the issue as a waste of their time, money and effort considering the demands of their work and activities in the

academe. It is also alarming to note that to some extent, they look at what is going on in their environment is normal result of rapid industrialization, which is good for the economy ($M=2.91$).

Table 3. Extent of Social Barriers to Adherence to Measures that Curb Carbon Footprint

Social		Mean	S.D.	Q.I.
1.	I agree that:			
1.1.	This issue of reducing carbon footprint is not appropriate and relevant for my status in the society.	2.95	1.20	E
1.2.	If I do something regarding this issue of reducing carbon footprint, the society will brand me as an activist or radical.	3.00	1.12	E
1.3.	Acting/Responding to this issue of reducing carbon footprint will demand much of my time, money and effort considering the demands of my work or activities.	3.06	1.10	E
1.4.	There is nothing wrong with what is going in our environment nowadays as this is normal result of rapid industrialization which is good for our economy.	2.91	1.18	E
OVERALL		2.98	.99	E

As to Political Barriers

Table 4. Extent of Political Barriers to Adherence to Measures that Curb Carbon Footprint

Political		Mean	S.D.	Q.I.
1.	I agree that:			
1.1.	This issue of carbon footprint is a political matter.	3.07	1.24	E
1.2.	This issue of carbon footprint is used by politicians because of their political ambitions; therefore, it is not my concern.	2.87	1.17	E
1.3.	The government and other institutions are very much capable on their own to address the situation.	3.05	1.15	E
1.4.	It is not my problem but it is the government's and authorities' fault why this become a problem, so let them handle it.	2.75	1.18	E
OVERALL		2.91	.96	E

Political barriers were agreed to be influential to an extent ($M=2.91$, $SD=.96$). The respondents agree that this issue of carbon footprint is just political matter and people like them have no business about ($M=3.07$). In the same manner, they also believe that the government and other institutions can readily handle this situation ($M=3.05$), which may mean they should not meddle with this issue as there are concerned people to solve and address this carbon footprint challenge. Moreover, they also agreed to an extent that this issue is not just used by politicians for their political ambitions, therefore, why should they be concerned? ($M=2.87$). In other words, they believe that it is not their problem anymore but the government ($M=2.75$, to some extent) because in the first place this is their fault.

Furthermore, the qualitative phase of this research revealed three reasons why those in the academe failed to adhere completely to measures that mitigate carbon footprint, aside from the barriers that probably could result to failure. These are lack of knowledge about carbon footprint, how Filipinos look at laws and legalities, and lack of laws enforcement.

People Lack Knowledge about Carbon Footprint

In a related study conducted in 2013, it was shown that those in the academe moderately know that concept and the measures in mitigating carbon footprint (Gan, et.al, 2013). This finding is corroborated in the present study as participants shared that people do not really know the concept about carbon footprint and that includes the measures to mitigate it.

Filipino Concept about Laws and Legalities

Mitigating measures embodied in various laws in the country become less relevant in the Philippine society because of several reasons. First is the Filipino concept about laws and legalities. One participant argues that Filipinos only look at laws to be real and operational, if they affect them personally. He even cited the example of jaywalking during his times. People were just ignoring an ordinance about this misdemeanour as they would continue to violate it. However, when they were caught and penalized by singing the national anthem in front of several people, they would then realize they commit a grievous mistake and become remorseful.

Mitigating Measures Lack Enforcement

Moreover, another participant noted that there are existing laws that could address this issue but the government lacks enforcement of these. He even cited several cities with strict implementation of ordinances like Germany and Singapore. Good examples are P.D. 825 (Improper Garbage Disposal Law) and R.A. 9003 (Ecological Solid Waste Management Act). These laws have potentials to mitigate carbon footprint but obedience to these is not completely observed in the country for obvious reasons. Garbage can be seen everywhere. Political will is necessary to implement these laws that can mitigate carbon footprint in the country.

Conclusions

Several conclusions drawn by the researcher are as follows:

1. There is high adherence among the academic community in mitigating carbon emissions and eventually carbon footprint. However, there is still room for those in the academe to improve adherence to a “very high extent.” This is very important because the academe is supposed to be a place of change as its community is exposed to knowledge about global issues like this. This knowledge, then, can be cascaded down to the society, until it reaches the grassroots.
2. To an extent, there are barriers for those in the academe to adhere to mitigating measures and even to adopt an advocacy that advances the ideology of saving the earth from suffocation because of carbon footprints. In the order of importance, they are the social barriers, political barriers, and the psychological barriers.
3. In addition to the barriers, the specific perceived reasons why people in the academe fail to adhere completely to measures that mitigate carbon footprint are: lack of knowledge about these measures and even the concept itself; Filipino concept about laws and legalities; and the lack of enforcement of relevant laws.

Recommendations

1. Enforce green management for the academic community to be more aware about the issue on carbon footprint. Aside from this, the school may promote and maintain advocacies that could mitigate carbon footprint.
2. Awareness campaigns towards the entire academic community can be started which can be part of the green management and carbon footprint advocacy.

References

- Amadore, L., Perez, R., Feir, R., 2008. Climate change impacts and responses in the Philippines coastal sector. *Climate Research Journal*, 12: 97-107.
- Bishop M., 2008. *Home to reduce Carbon Footprint*. Crabtree Publishing Company. Canada.
- BP (2007). *What is a Carbon Footprint?*, Retrieved October 20, 2012, from www.bp.com/liveassets/bp_internet/globalbp/STAGING/global_assets/downloadsA/ABP_ADV_what_on_earth_is_a_carbon_footprint.pdf.
- ETAP, 2007. *The Carbon trust helps UK businesses reduce their environmental impact*, Press Release. Retrieved February 08, 2012 from http://ec.europa.eu/environment/etap/_pdfs/jan07_carbon_trust_initiative.pdf.
- Grubb and Ellis, 2007. *Meeting the Carbon challenge: The role of commercial real estate owners*. Users & Managers, Chicago.
- Hunt, G., 2007. *Global warming and the future of healthcare and nursing*. Royal College of Nurses Annual Congress. abs-cbnnews
- Maslin, M., 2004. *Global warming*. Oxford: Oxford University Press.
- Nocum, A. D (2012). *RP 7th among 233 nations most affected by climate change; Kris declares war on illegal loggers!*. Retrieved November 8, 2012, from <http://www.krislibrary.com/1/post/2012/08/rp-7th-among-233-nations-most-affected-by-climate-change-kris-declares-war-on-illegal-loggers.html>
- Sabater, M. (2008, May 20). The Philippines: Climate hotspot. *Manila Bulletin*.
- World Health Organization. (2005) Climate and health: Fact sheet. Geneva.
- Wiedmann, T. and Minx, J. (2008). *A definition of 'Carbon Footprint'*. In: C. C. Pertsova, Ecological Economics Research Trends: Chapter 1, pp. 1-11, Nova Science Publishers, Hauppauge NY, USA. Retrieved November 08, 2012, from https://www.novapublishers.com/catalog/product_info.php?products_id=5999
- Www.carbonfootprint.com on February 8, 2012
- Www.climate.nasa.gov on March 11, 2012
- Www.paperrep.com on January 7, 2012
- Www.unicef-irc.org on December 08, 2011