# Consumer Approach to New Product Development Policies against Global Warming's Effects

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Abstract: Global warming and global problems caused by global warming is one of the most discussed issues in all over the world. Beside consumers accepting this problem as a serious threat, there are consumers who are insensitive and don't perceive it as a threat. From starting this point, main aim of this study is to determine how consumers perceive this issue and how these perceptions affect buying behavior of them. Especially to determine demand of goods which were developed against the effects of global warming. Study focused on two main research questions. First one is what is the level of consumers' global warming threat perception and second one is does this threat perception create an effect about products developed to decrease effects of global warming. By casting access, cost and time sample in this study was chosen from consumers living in Ankara and in this respect a survey was made to 388 consumers by using face to face interview technique. Data was evaluated by the help of SPSS program. In evaluation, frequency and chi-square tests were made. At the end of the analysis, while there is not any important relationship between consumers' global warming perception and consumers' demographic variables, there is a relationship between consciousness level of consumers on this subject and global warming threat perception. Additionally, a relationship between consumers' global warming perception and demand for the products in this area was found.

Key Words: Global Warming, Consumer Perception, Consumer Buying Behavior

### **1.** Introduction

The present study aims to evaluate a current universal issue, global climate change, or commonly referred to as global warming and its prospective effects in marketing from the consumers' standpoint. Marketing is an area to be considerably affected by the aforementioned warming, Marketing remains a field that may change depending on time, place, and conditions, and firmly sticks to social structures. Global warming also appears to be a development which can potentially transform the social structure and shape the future of the world. The goal of our study was to understand the viewpoint and sensitivity of the society as well as individuals who are also consumers towards global warming, and within this framework, to provide businesses with the gained perspective.

The world's social structures have undergone periodic transitions. Among stages of transitions in human history stand out the inhabitation of hunter-gatherer and nomadic societies, and formation of agricultural communities. Another key transition has been the shift from agricultural society to an industrial one, which still affects the modern life. With the advent of the Industrial Revolution, we witness many tasks, normally done with manual labor, being accomplished by machines. The onset of machinery and increase in emissions of carbon dioxide and similar gases into the nature and atmosphere in a way to interrupt natural cycle of climatic conditions have led to varying changes on earth.

## 2. Global Warming and Its Historical Development

Many factors add to global warming, but increase in the amount of greenhouse gases appears to be one of the most important. Carbon dioxide gases are of particular importance because while this gas is transparent to the incoming shortwave, solar radiation, it absorbs the outgoing longwave, infrared radiation. The most frequently cited abrupt cause for global warming is the increase of carbon emissions due to the burning of fossil fuels. (Dutta and Radner, 2008, p:3)

One must attribute the climatic changes which occurred between the appearance of humans on the scene and the Industrial Revolution to natural causes. From the latter half of the 19th century onwards, It stays certain that human intervention also contributed to these natural changes. (Öztürk, 2002, p:48–49) In the last 100-150 years, carbon dioxide (CO2) and other greenhouse gases, presumed culprits of global warming, have substantially modified the chemical composition of the earth's atmosphere. (Akbulut, 2000, p:25)

While some portion of the radiation from the Sun is reflected back into space by the earth's atmosphere, another portion is absorbed by the earth. A considerable amount of the longwave radiation emitted from the heated Earth is re-absorbed by the atmosphere. While atmospheric gases are very transparent to shortwave solar radiation, they prove to be less transparent to longwave terrestrial radiation as a result of the accumulated greenhouse gases. Thus, when the build-up of heat near a planet's surface is more than expected, the phenomenon is called atmospheric greenhouse effect. An elaborate explanation for the greenhouse effect might be: (Öztürk, 2002, p:53)

1. 51 % of the shortwave solar radiation remains trapped by the Earth: Through this energy, the Earth is heated.

2. A portion of the energy absorbed by the earth is redirected back to the atmosphere.

3. Some of the solar energy is re-radiated from the atmosphere into the space, without reaching the Earth.

4. Some energy from the warmed Earth is emitted to the atmosphere in longwave radiation. Some of this longwave energy is intercepted by atmospheric greenhouse gases. This trapped energy heats the lower layers of the atmosphere, which is the atmospheric greenhouse effect.

5. Some of the energy absorbed by greenhouse gases is emitted back to space.

6. Some of the energy emitted from the Earth directly escapes to space.

Global warming seems to be a process where heat in atmospheric layers near the Earth surface and on the Earth surface itself rises artificially as a result of various human activities which culminate in an increase in the concentration of greenhouse gases. (Doğan, 2005, p:58, Akbulut, 2000, p:25, Türkeş, 2001, p:1)

Warming which emerged on the Earth's surface in the latter half of the 19th century has markedly intensified after the 1980's, becoming warmer and warmer in the subsequent year, and warmest years on record have occurred globally. 1998 has been the warmest year in the historical record dating back to 1860, both in terms of global mean temperature and mean temperatures of the northern and southern hemispheres. Most sensitive climatic models which handle the impact of greenhouse gases and aerosols together suggest a 1–3.5 C° increase in global mean surface temperature and a 15–95 cm sea-level rise by 2100. (Türkeş, 2001, p:1)

Likewise, record-breaking warmest temperatures were observed across the globe in January, 2007, as announced by the Meteorology Agency of Japan. It was further noted by the authorities that the record temperatures were considered to be the impact of global warming, and temperatures across the planet were 0.45 degrees Celsius above average in January, the highest since figures were first compiled in 1891. (www.milliyet.com.tr)

With its prospective effects, global warming remains an issue capable of shaping not only our lifestyles but the future generations' as well. Though not yet fully experienced in every corner of the globe, global warming commits the earth irreversibly to further global climatic change and consequent ecological, economic and social disruption. (Doğan, 2005, p:59) All individuals, institutions and organizations must undertake the mission to mitigate the problems that are causing global warming around the world. With regard to design, planning, and construction phases of cities, and utilization of goods and services, utmost sensitivity on global warming must be a 'core criterion' for individuals and institutions alike.

Decreasing the use of fossil fuels by switching to renewable energy resources Advances in the technology of renewable energy sources, including wood-derived fuels, might reduce our reliance on fossil fuels and thus reduce global emissions of carbon dioxide significantly. If we are to avoid the effects of a global climate change triggered by global warming, we must develop new systems of renewable energy resources. To that end, new technologies have been devised which combine the utilization of heat and energy, reduce carbon emissions up to 60-80 %, and offer much more effective energy options. In particular, importance of policies which aim to rapidly introduce renewable energy resources and co-processing technologies into markets has been made clear. (Doğan, 2005, p:69)

# 3. Turkey's Approach to Global Warming

To better understand the reflections on global climate change in our country, a project entitled "Climate Change Scenarios for Turkey", sponsored by TÜBİTAK, is underway. During the simulations under the scheme, projections were achieved as to what kind of climate lies ahead of us in the 21st century. The results showed that most dramatic changes would occur in the summer in southern Turkey and in countries like Iraq, Syria, Iran, and Jordan. Naturally, most striking changes are expected to occur during the spring and summer, the two seasons when highest temperatures can be observed. Another projection is that in some regions 14-15 more days will be added to the number of hot days above 35 C° in the past 30 years. In a similar vein, amount of precipitation is

expected to change. Total mean precipitation falling in Turkey is predicted to decrease towards the end of the current century,

The Kyoto Protocol was signed under the United Nations Framework Convention on Climate Change to tackle the global climate change. Turkey signed the convention later than the other European countries with the stipulation that her industry would be adversely affected. It suffered long hesitation to sign the convention. Turkey later joined the Kyoto Protocol by passing a law on February 5, 2009. The core idea in the Kyoto Protocol is to gradually reduce world greenhouse gas emissions to slow the progress of global warming. For this purpose, it entails a set of preventive measures to reduce the amount of greenhouse gases such as methane, nitrous oxide, carbon dioxide in the atmosphere to such a level that will prevent dangerous anthropogenic interference with the climate system. (Akoğlu, 2009, p: 37)

From Turkey's viewpoint, many urgent investments must be made in industries like energy, automobile, logistics, and aviation. The protocol doesn't impose any limitation on greenhouse gas emissions on Turkey by the year 2013. From then onwards, however, Turkey will be subject to an addendum agreement to the protocol, not bypassing our country's interests. Kyoto Protocol stipulates the following sanctions on the topics below: (Akoğlu, 2009, p: 37)

- Legislation will be introduced to reduce the emission of greenhouse gases resulting from various industrial activities, vehicles, and heating.
- Energy efficiency must be enhanced by means of mechanisms such as heating with less energy, using vehicles burning less gas, and utilizing technological systems consuming less energy.
- Wastes will be recycled to the maximum extent possible. When they are dumped to a landfill, they must be rendered harmless. To this end, modern facilities will be constructed.
- Alternative energy sources will be a target for the reduction of methane and carbon dioxide emitted to the atmosphere.
- Utilization of solar energy will be extended. Despite being a controversial issue, nuclear power plants will be encouraged since they don't cause any carbon dioxide emission.
- Waste management and treatment in plants which consume huge amounts of energy, like in cement, steel, and lime factories, will be re-organized.
- Systems and technologies emitting less carbon dioxide to the atmosphere will be adopted. Since coal based thermal power plants prevail in our country, systems in these facilities need to be renewed.
- o More tax will be levied on whoever consumes more fuel and produces more carbon dioxide.

# 4. Products against the effects of global warming and consumers' approaches

Humans have been thoughtlessly and irresponsibly destroying the earth for thousands of years with a desire to dominate and exploit it as much as possible. In many respects, the issue of global warming differs from other climatic events and changes occurring naturally for thousands or millions of years. Above all, global warming is not a phenomenon which occurs in the nature's own cycle. It is wholly the result of human intervention and a combination of cumulative and incremental events triggered by humans. It first emerged with the dawn of Industrial Revolution when people interfered with the environment and started to alter its circumstances. With the advancements in technology, nature and the environment were thoughtlessly abused, without thinking the hazardous outcomes it could cause towards human and living life, thereby bringing about global warming which has occurred as a consequence of these irresponsible behaviors. It was only in the 1970's that the entire world came to recognize the dangerous borders of global warming. (Kadıoğlu, 2001; Öztürk, 2002).

Global warming is changing consumption habits, too. While some industries are being affected by global warming more than others, it is forcing firms to make amendments in their future plans, and shaping human lifestyle beyond expectation. Hot sunny days have caused biggest disappointments for the textile industry, and various businesses which look forward to winter seasons to sell winter products have been adversely affected. Goods of companies keeping their assets in stock have remained in their warehouses. Manufacturers have suffered a 30 % capital loss. (*www.inepo.com*).

Whatever business you're in, your company will increasingly feel the effects of climate change. Investors already are discounting share prices of companies poorly positioned to compete in a warming world. Many businesses face higher raw material and energy costs as governments around the globe increasingly enact policies placing a cost on emissions. Consumers are taking into account a company's environmental record when making purchasing decisions. There's a burgeoning market in greenhouse gas emission allowances (the so-called carbon market), with annual trading in these assets valued at tens of billions of dollars. Firms that manage and mitigate their exposure to the associated risks while seeking new opportunities for profit will gain a competitive advantage over rivals in a carbon-constrained future. (Lash-Wellington, 2007:95) . This situation seems to be inevitable in the near future with respect to consumer preferences. In other words, businesses must "create values for the customer" as well as "create values to protect the environment". Therefore, all activities

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must be categorized according to whether or not they create further added value for the products of the business and the environment.

As humans have been instrumental in global warming, we need to find the solution not in nature's own cycle and balance, but in raising awareness to do things. 90 % of people have gained knowledge about global warming. This knowledge assigns them some tasks to do individually. First of all, we must read nature very well. We must use products which saves us all kinds of means. We must inspect the properties of products we are using and consider their impact on nature. We must particularly keep away from fossil fuels. We must enhance the utilization of environment-friendly alternative energy resources. We must cooperate with NGOs which exert efforts on the issue. (www.indeksiletisim.com).

# 5. Methodology

The present study has been undertaken to determine the extent of consumers' grasp of global warming and whether or not any change has occurred in their choices of products based on this grasp. Our study chose Ankara, capital of Turkey, as the main mass. Geographically, it is located in the middle of Turkey and has continental climate. In recent years Ankara has been one of the cities where effects of global warming have proved to be evident. It has experienced water shortage due to inadequate rainfall. Ankara has been the choice because it offers a suitable population for the study and it falls within easy reach.

We drafted a questionnaire for data collection. By means of convenience sampling we conducted the survey with 388 persons with whom we had face-to-face meeting. The questionnaire drafted consisted of three sections. The first section comprised five-point Likert scale type of questions which tried to determine consumers' understanding of global warming and their approach to the phenomenon. The second section contained questions aimed to make out consumers' source of information regarding global warming and their preferences for environment-friendly products against its effects. Questions regarding consumers' demographic properties took place in the third section. The questionnaire used was first applied to a limited mass, and was later used as a data-collection means after its reliability was justified.

# 6. Research Findings and Analysis

First of all, the reliability analysis for the questionnaire is done. According to the results of the analysis, the questionnaire is found as reliable (Cronbach's Alpha = 0,807).

Age	Frequency	%	Occupation Frequency		%
18-25	103	26,6	Public Officer 58		15,1
26-30	71	18,3	Worker 42		10,9
31-40	90	23,2	Bureaucrats	13	3,4
41-50	76	19,6	Teacher	29	7,5
51 and above	47	12,1	Free Profession	84	21,8
Overall	387	100	Student	63	16,4
Education	Frequency	%	Overall	385	100
Not literate	4	1,0	Gender	Frequency	%
Literate	18	4,6	Female	155	40
Elementary education	34	8,8	Male	233	60
Middle school	125	32,2	Overall	288	100
University	189	48,7	Income	Frequency	%
Graduate	18	4,6	0-500	37	9,6
Overall	388	100	501-1000	75	19,5
Marital	Frequency	%	1001-1500	94	24.4
Status				<i></i>	2 ., .
Married	221	57,6	1501-2000 74		19,2
Single	163	42,4	2001-2500 53		13,8
Overall	384	100	2501-3000 25		6,5
			3001 and above 27		7,0
			Overall	385	100

Table 1: Demographic Feature of the Sample

When we examine the features of the sample, it is seen that the data is not equally distributed but it does not show a trend of gathering in a certain point. In other words, we see that there are sufficient data on each group for the analysis in terms of demographic features. When we examine the data in Table 1, it seems that youngs in age group, graduates in educational group, married persons in marital status group, 1000-1500 Turkish Liras gap in income group, males in sex group, and independent business owners in profession group become important.

QUESTIONS (Factors)		I strongly disagree	I disagree	no idea	I agree	I strongly agree	Standard deviation	Mean
		%	%	%	%	%		
1	Global warming is a threat to our world.	4,9	7,6	4,3	27,6	55,6	1,14	4,15
2	Global warming is a threat to our country.	4,7	4,9	3,4	35,4	51,6	1,05	4,24
3	Global warming is a threat to the region where we live	4,1	6,2	5,7	37,2	46,8	1,05	4,15
4	The effects of global warming are not only on climate.	4,2	3,1	10,6	37,9	44,2	1,01	4,13
-	In global warming, the products work with solar energy should be	2.6		11.7	10.6	10.0	0.00	4.1.1
5	used more widely.	2,6	4,4	11,5	40,6	40,9	0,96	4,11
6	6 Products that may reduce damage of global warming must be increased to use		3,4	7,5	35,1	50,1	1,00	4,24
7	Products on the market are not quality products to reduce these global warming effects	4,4	3,9	17,3	38,0	36,4	1,04	3,97
8	More products are needed to reduce these global warming effects	2,6	3,1	8,8	43,0	42,5	0,91	4,19
9	In this regard, I think in the future many new products will be generated.	2,1	10,1	18,6	39,9	29,3	1,02	3,84
10	Businesses must make their products available to the solution of this problem now.	3,4	6,5	12,4	42,4	35,3	1,02	3,99
11	When I buy these products, over price difference is not important	6,4	25,5	13,1	35,6	19,4	1,23	3,35
10	Informed(conscious) consumers should follow these issues and	26	0.5	4.0	40.0	24.0	1.02	4.01
12	must use these products	3,0	8,5	4,9	49,0	34,0	1,02	4,01
13	Consumers in the fight against global warming, have responsibilities too.	2,6	2,8	5,7	45,6	43,3	0,88	4,24
14	I use products to reduce the effects of global warming in my home.	4,9	20,3	14,8	41,0	19,0	1,15	3,48
15	There is no such thing as global warming, climate change, this situation is temporary.	44,4	27,1	8,5	12,4	7,6	1,29	2,11
16	Global warming is a game invented by the developed countries to sell more goods.	45,1	28,9	12,9	6,7	6,4	1,19	2,00
17	I do not find sufficient activities of states and international organizations to reduce the effects of global warming in the world.	12,7	12,7	16,3	35,7	22,6	1,30	3,43
18	States and international organizations should seek an urgent solution for global warming issue.	3,1	3,6	9,8	43,7	39,8	0,95	4,13
19	Business organizations thoroughly understand the results of global warming and should develop products that prevent global warming.	3,4	2,6	7,7	47,4	38,9	0,92	4,15
20	Businesses have not yet fully understood about the results of global warming bring.	3,9	5,7	16,5	45,1	28,8	1,00	3,88
21	Businesses must develop new products for the effects of global warming.	2,3	3,1	9,6	47,5	37,5	0,88	4,14
22	22 Businesses need to do market research to understand problems of global warming in their business field		3,6	9,8	48,3	35,2	0,93	4,08
23	23         Global warming will affect consumers' consumption preferences		6,2	10,1	43,6	35,5	1,06	3,99

**Table 2:** Threat Perceptions Againist Global Warming and Attitudes to New Products

When we examine threat perception as well as attitudes in relation to global warming, it strongly seems that a consciousness among consumers has become visible in regard to global warming. In addition to this, we see that consumers believe that everybody should do something about global warming. It is strongly believed in this regard that companies should make contribution to the solution by developing new products. The second question, *global warming a big thread for Turkey*, the sixth question, *the products which will reduce global warming and its negative effects should be produced more*, and the thirteenth question, *consumers should take responsibilities in fighting against global warming*, get the highest value with the average of 4,24. These tree questions summarize the main idea of the study.

	Frequency	%
Energy saving products	185	47,8
Products that reduce harmful gas production	22	5,7
Does not contain harmful chemical products	32	8,3
Water saving products	40	10,3
Fuel saving products	37	9,6
I do not have a specific preference in this matter	71	18,3
Overall	387	100,0

Table 3: Which types of products diminishing the effects of global warming are you using at your home?

It seems that consumers prefer energy saving products with a ratio of 47,6% within product groups which will diminish effects of global warming. It also seems that other products are preferred by consumers' fairly low rates. In this case it could be said that consumers think that they will make contribution to the solution of global warming by using energy saving products.

Table 4: How does your attitude toward products developed against global warming in your shopping

	Frequency	%
This is not an issue that I notice in my shopping	84	21,6
After that, I pay attention to these issues	106	27,3
Sometimes, it takes my attention	116	29,9
Definitely I consider these issues	37	9,5
I both consider and recommend my environment	45	11,6
Overall	388	100,0

It is clearly shown that when consumers do shopping, their product preferences are not very sensitive and careful about global warming. Table 1 indicates that consumers are very sensitive to global warming, but when they do shopping they are not. In this regard, we can say that the level of consciousness of consumers is not as expected.

	Frequency	%			
I have not enough information about this issue	100	25,8			
I have information about this issue is limited with the media.	173	44,6			
I have enough information on this issue.	80	20,6			
In this regard, I've reviewed a lot of sources to inform	25	6,4			
In this regard, I can say I am an expert.	10	2,6			
Overall	388	100,0			

Table 5: How is your Information level On Global Warming

It seems that consumers do not have adequate knowledge about global warming or a much part of their knowledge is limited with the information provided by the media.

## 7. Hypotheses and Results of the Research

When planning the research, we formed the main research questions as follow: What kind of perception do consumers have on global warming? Does the perception of consumers ensure their preference to the products reducing global warming effects or not? The hypotheses and their evaluation results as follow:  $H_1$ : The perception of global warming threat affects the demands of consumer's product development.

 $H_1$ : The perception of global warning threat affects the demands of consumer's product development.  $H_2$ : There is a correlation between consciousness level and consumers' demand for the products developed.

 $H_2$ : There is a correlation between consciousness level and consumers' demand for the products developed.

 $H_3$ : There is a correlation between consumers' demographic features and consciousness level in relation to global warming.

 $H_4$ : There is a correlation between consumers' demographic features and the demand for the products developed against to the threat of global warming.

The regression analysis for the first hypothesis reveals significant results (F =216, 55 and P = 0,000). According to the obtained linear model, the perception of global warming threat explains 35.8 % of the demand for product

development (Adjusted R2 = 0,358). The intercept of the model is 2,30 (Beta = 2,307, t = 15,288 and P = 0,000). The perception of global warming threat in the model is also found statistically significant (t =14,716 and P = 0,000). The coefficient of demand for the perception of global warming threat against new product development is 0.494. The regression model is as follow:

Y = 2,30 + 0,494 x The Attitude Against Product Development

Ki-square tests done for H2, H3, and H4 hypotheses are not statistically significant.

## 8. Concluding remarks

Global warming is a threat and can lead to vital problems for the world. Even though the public is informed about the scope of the problem, it is clear that initiatives and policies about the problem is not enough. Developing new products diminishing the negative effects of global warming can be a solution for the problem. Developing a new product is a long and costly process, and requires R-D. That is why it is important that consumers should demand for these newly products. The demand for the new product depends primarily on how consumers perceive global warming as a threat. The purpose of this study is to answer questions mentioned above.

The results of the study verify the first hypothesis. Based on this result, it can be said that the consumers selected as sample have a very high perception of global warming threat. As a result of this perception, consumers demand for developing products which diminish effects of global warming. In short, the perception of global warming threat supports attitudes directed toward developing new products sensitive to global warming.

In order to test H2 hypothesis, Ki-square test statistic is used. However, the results are not statistically significant. This means that there is no correlation between the consciousness level in regard to global warming and products demand which sensitive to global warming. This result may be explained in two different ways: Firstly, an error is done in the research. Because at least theoretical level, consumers' consciousness level affects the demand of products which are sensitive to global warming. Secondly, consumers perceive having consciousness about global warming as the same demanding for products sensitive to global warming. It is obvious that there is a need for new studies and research in order to find clear answers to these questions.

Ki-square test statistics does not verify H3 and H4 hypotheses. In other words, there is no correlation between demographic features of consumers and their approaches to the subject of global warming, and product demands sensitive to global warming. Based on this result, we can say that, all the consumers consisted of the sample, regardless of demographic features, approach consciousness to the issue of global warming. It can be seen in frequency table, the perception in all consumer groups is quite high.

As a conclusion it can be said that people is quite sensitive to global warming issue. And it is expected that they will demand for the new products developed by companies which are sensitive to global warming. It is possible for companies by taking into consideration this demand that they can try to develop new products and thus they can both make contribution to the solution of global warming and make profit. Undoubtedly, this approach will get benefit for everybody at institutional, individual, and social level.

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