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# Customer Perception of De-Marketing Domestic Water Consumption in Egypt

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## **Abstract**

This research work studies the effects of de-marketing efforts on domestic water consumption amongst different categories of Egyptian consumers, an effort to identify which method is more effective. In order to perform this, the researcher placed a survey questionnaire on the Internet, receiving 503 random responses from different categories and sectors of the population. The researcher then did a quantitative count of responses followed by a statistical analysis and correlation and regression tests to detect any compatibilities or relations, if present, between responses and categories. The researcher concluded that the problem of water conservation is considered extremely important by most respondents and the water conservation campaigns are effective in influencing individuals to reduce their water consumption in various areas of their daily lives. The research also highlighted the importance of various communication channels and strategies in promoting water conservation and suggests the need for a multi-faceted approach to increase awareness and encourage sustainable water consumption practices. The research recommended that more de-marketing efforts and education procedures are needed to address the shortage in water. This will help in reducing personal usage of water in households which constitutes a large percentage of the water demand and hence it will be reflected on the national consumption.

**Key words:** Marketing, de-marketing, consumer behavior, Egyptian domestic water consumption patterns.

## 1- Introduction

Not only do human beings, animals and plants directly need water to survive, all living species totally depend on it for providing every other aspect of well-being such as food, fertilizers, pesticides or simply any manufactured good. Unfortunately, after global warming the availability of this vital resource has become a challenge in many parts of the world. Egypt, with the Nile as its safety valve for thousands of years, has recently joined the global anxiety. Global warming initiated the problem, but building the Ethiopian dam intensified the new threats of insufficiency of water to cover Egypt's water needs for domestic, agricultural or industrial use.

Egypt, like other countries, is striving to achieve further development in order to advance its national economy, through enhancing production capacities and increasing its resources' utilization efficiency. The Government has taken several procedures to rationalize the consumption of both scarce energy reserves and decreasing water resources. Improved water management practices such as reuse and recycling are major methods of addressing the problem. Also supporting sustainable agriculture practices is a must for good management of water. This includes conservation and increasing investments in dams, pipelines and reservoirs, which are major areas the Government has currently started to address. However with the increasing domestic consumption of more than 100 million citizens (Central Agency for Public Mobilization and Statistics, 2022) that are in many cases unaware of the scarcity of water, a large part of the problem remains to be addressed. From here, the idea of de-marketing domestic consumption, began as an initial step aiming to reduce the demand for water and other limited resources, e.g. energy, to rationalize their use, not only for economic motives, but also to contribute to sustainable development.

This research focuses on the water sector. The study aims to examine the effect of different de-marketing efforts on the Egyptian consumer behavior regarding domestic water consumption and the degree of variance in consumer patterns in the different social categories as a result of the different attempts to reduce individual water consumption. These efforts include different measures such as advertising campaigns, tutorial programs, increase in prices and reducing available quantities. The researcher's objective is to reach a pattern or map reflecting extent of success of de-marketing efforts to decrease water consumption.

## 2- Research topic and significance

This study aims to highlight the importance of de-marketing strategies as a mechanism to reduce domestic consumption of water in an effort to face the decreasing supply of water, preserving one of the most important natural resources and at the same time contributing to the efforts of sustainable development.

## 3- Research methodology

This research work adopted a preparatory desk study to formulate the research propositions and guide the preparation of a survey questionnaire list to cover all aspects of the research. The researcher then carried out a preliminary test of the survey list through distributing 50 printed copies to individuals and modifying the list in light of the test results for greater clarity of questions and accuracy of answers. The researcher then placed the modified survey questionnaire on the Internet, receiving 503 random responses from different categories and sectors. The researcher then did a quantitative count of responses then performed statistical analysis and correlation tests to detect any compatibilities or relations, if present, between responses and categories. The researcher also performed a reliability analysis to ensure the reliability of the data. The researcher then performed regression tests to show whether changes observed in the dependent variables are associated with changes in one or more of the explanatory variables.

Since the study population is of unlimited size, and the geographical divergence of its units furthermore, it has no frame, the researcher used Steven Thompson's formula (Thompson, 2012) with 95 % confidence and a margin of error 0.05, to calculate the sample size. That is,

$$\begin{aligned} n &= \frac{z^2 \times p (1 - p)}{\alpha^2} \\ &= \frac{(1.96)^2 \times 0.5 (1 - 0.5)}{(0.05)^2} \approx 384 \end{aligned}$$

## 4-Main research elements

This section consists of three major parts. Water scarcity as an international and local concern is discussed in the first part. The second part discusses the concept of de-marketing while the third part demonstrates how the Egyptian Government applied strategies and tools of reverse marketing with the aim of reducing water consumption.

## 4-1 Water scarcity

### 4-1-1 Water shortage as an international problem

Total demand of water has increased excessively with the increase of population all over the world. On the other hand, the amount of available water, has decreased excessively as a result of the lack of rain caused by climate changes and global warming (Mckay, 2000). In spite of global efforts to save water there are still people who die every day due to scarcity of clean healthy water. (Fuggle & Rabie, 1992). A recent World Health Organization report states that 2.2 billion people lack access to clean safe drinking water which increased the rate of waterborne diseases immensely. Water scarcity has become a world-wide concern.

Needless to say water is the main pillar of agriculture. The shortage of water affects both the quantity of land cultivated and the crop yields. Water shortage decreases available food and increases its prices. It also affects animal stock both directly by reducing available water covering their needs and indirectly through the quantity of cultivated food for them.

Manufacturing and mining are also affected by the shortage of water especially in areas that depend intensely on water. The reduced amounts lower productivity, increase costs and might even lead to closure of facilities.

The change in climate and increase in temperature has not only caused draughts but also cause increased humidity causing floods in many areas of the world. This has magnified food unavailability in many countries.

Efforts world-wide have tried to address this problem. Among these efforts was a World Bank initiative in a report named “*An EPIC Response: Innovative Governance for Flood and Drought Risk Management*” (World Bank Report, 2017). The report offers a proposal for how to manage the increasing risks of droughts and floods. All Governments should use these guidelines to face the problem in their countries. The Epic Response report consists of several aspects each represented by a letter in the word EPIC. The following are the key elements as mentioned in the 2017 World Bank Report:

- “*Enabling environment of policies, laws, agencies, strategic plans, and information*”
- “*Planning at all levels to prioritize risk mitigation*”
- “*Investing in watersheds and water resources infrastructure*”
- “*Controlling the use of land and water resources to reduce exposure and vulnerability*”
- “*Response: monitoring, responding, and recovering from floods and droughts*”

## 4-1-2 Water shortage as a local problem in Egypt

### 4-1-2-1 Water situation in Egypt

Lately, Egypt too started to suffer from water scarcity problems. Despite the flow of the river Nile, which had been its savior for centuries, recently, the problem has started prevailing several times a year. The increase in population resulting in an expansion of agriculture projects and hence cultivated lands, added to the emergence of new cities are among reasons why water demand has extensively increased. The filling of the Grand Ethiopian Renaissance Dam and several other dams in Sudan and Kenya has escalated the problem. In short, the demand for water in Egypt is growing, at a rate faster than the increase in the sources of supply.

Table 1, shows how the demand on water has risen as compared to its supply (Annual Bulletin of Irrigation and Water Supply Statistics, 2022).

**Table 1a:** Water demand and supply in Egypt from 2005 to 2020

(First part of table: supply)

(Water is measured in billion cubic meters)

Year	The Nile River	Ground water	Sewage	Industrial	Rain Water	Desalination	Total
2005	55.5	6.1	5.1	1.1	1.3	0.1	69.2
2006	55.5	6.1	5.4	1.2	1.3	0.06	69.56
2007	55.5	6.1	5.7	1.3	1.3	0.06	69.96
2008	55.5	6.2	8	1.3	1.3	0.06	72.36
2009	55.5	6.2	9.65	1.1	1.1	0	73.55
2010	55.5	6.3	8.95	1.3	1.3	0.05	73.4
2011	55.5	6.3	9.37	1.3	1.3	0.05	73.82
2012	55.5	7.5	9.17	1.3	0.63	0.06	74.16
2013	55.5	7.7	10.1	1.3	0.74	0.06	75.4
2014	55.5	6.7	11.1	1.3	0.9	0.1	75.6
2015	55.5	6.9	11.5	1.3	0.9	0.1	76.2
2016	55.5	6.9	11.7	1.2	0.74	0.01	76.05
2017	55.5	9	11.9	1.4	1.9	0.1	79.8
2018	55.5	8.6	12.5	1.4	1.9	0.1	80
2019	55.5	8.2	13.5	1.3	1.55	0.1	80.15
2020	55.5	8.7	13	1.3	1.55	0.35	80.4

Source: Annual Bulletin of Irrigation and Water Supply Statistics, 2022, *Central Agency for Public Mobilization and Statistics*.

**Table 1b:** Water demand and supply in Egypt from 2005 to 2020

(Second part of table: demand &amp; balance) (Water is measured in billion cubic meters)

Year	Agricul t-ural	Desalin- ation	Domestic	Evaporative losses	River naviga-tion	Total Balance	Bal-ance
2005	58.5	5.8	1.15	2.1	0.2	67.75	1.45
2006	59	6.1	1.15	2.1	0.2	68.55	1.01
2007	59.3	6.5	1.15	2.1	0.2	69.25	0.71
2008	60	8.9	1.33	2.1	0.2	72.53	-0.17
2009	61	9	1.33	2.1	0.2	73.63	-0.08
2010	61.3	9.35	1.2	2	0.0	73.85	-0.45
2011	60.9	9.55	1.2	2.1	0.0	73.75	0.07
2012	61.5	9.6	1.2	2.2	0.0	74.5	-0.34
2013	62.1	9.7	1.2	2.5	0.0	75.5	-0.1
2014	62.35	9.95	1.2	2.5	0.0	76	-0.4
2015	62.35	10.4	1.2	2.5	0.0	76.45	-0.25
2016	62.15	10.4	1.2	2.5	0.0	76.25	-0.2
2017	61.35	10.7	5.4	2.5	0.0	79.95	-0.15
2018	61.55	10.7	5.4	2.5	0.0	80.15	-0.15
2019	61.63	10.8	5.4	2.5	0.0	80.33	-0.18
2020	62	11.53	5.35	2.25	0.0	81.13	-0.73

Source: Annual Bulletin of Irrigation and Water Supply Statistics, 2022, *Central Agency for Public Mobilization and Statistics*.

The following facts summarize the Egyptian water situation (Annual Bulletin of Irrigation and Water Supply Statistics, 2022)

- 1- The per capita share of water is low, about 1,500 cubic meters over the past 60 years, due to population growth
- 2- The population of Egypt in 1959 recorded 20 million people, while the water share was 55.5 billion cubic meters, i.e. the per capita share exceeded 2000 cubic meters at that time.
- 3- The registered population of Egypt in 2022 was 105 million people plus refugees. The per capita share of water was recorded to be less than 600 cubic meters annually.
- 4- The United Nations reports define the water poverty line at 1000 cubic meters of water per year per person
- 5- The limit of water scarcity is estimated at 500 cubic meters per person annually
- 6- Egypt suffers from a water deficit of 20 billion cubic meters annually

7- Around 12 billion cubic meters of water are reused and 6 billion cubic meters of square meters of groundwater are extracted annually, which increases the total available water resources Egypt uses to more than 76 billion cubic meters of water.

According to the World Food and Agriculture Organization (FAO).The Egyptian agricultural sector alone consumes about 80 percent of Egypt's total annual water consumption currently. However, success in spreading water-saving agriculture and investing large sums of money in new water projects will not provide an alternative to the annual loss of a large part of the Nile water, especially since water networks cover only 35 percent of the Egyptian countryside so far. The Egyptian per capita consumption of water is still below the necessary global rates. Also, urbanization and economic growth require additional quantities of water that recycling and groundwater projects cannot fill in the gap in the long term. However, the minister of Irrigation confirmed that good management of water all problems could be solved (Bawabat Al-Ahram, 2022).

#### **4-1-2-2 General efforts aiming to rationalize water consumption in Egypt**

Egypt has endeavored to improve the water supply situation through efforts with Nile Basin countries by initiating appropriate policies for regional and international cooperation and hence developing water saving irrigation methods with regional and international participation.

Government efforts also include a number of plans adopted by the Ministry of Housing Developing to rationalize water consumption and maximize the utilization of available water resources, as part of the efforts aiming to preserve drinking water as one of the most important necessities of life (Takouleu, 2019) .

The plan (Alyoum El-Sabeie, 2023) includes a number of measures such as:

- 1- The provision of alternative sources of drinking water, through (desalination of water in the coastal governorates, the establishment of stations to extract groundwater).
- 2- The reuse of treated water in some areas of agriculture, through (the expansion of the establishment of sewage treatment plants in the governorates of Upper Egypt, raising the efficiency of treatment plants and converting them into tertiary treatment).
- 3- Reducing waste in drinking water in all fields, through rationalizing water consumption and using special water saving devices, reducing commercial and physical losses from drinking water, providing household meters and developing a plan to educate citizens to rationalize consumption.



According to the Ministry of Housing development plan there are 58 existing stations, in the governorates (North Sinai - South Sinai - Red Sea - Matrouh - Ismailia), with a total capacity of 440 thousand m<sup>3</sup> / day (Al-Ahram, 2023)., At the same time, there are 23 seawater desalination plants which are being built in the Governorates of (Matrouh - Red Sea - North Sinai - South Sinai - Port Said - Dakahlia), with a total capacity of 734 thousand m<sup>3</sup> / day, at a cost of 15.968 billion pounds. In addition 16 stations were established, within the urgent plan that ended in the year 2022, in the Governorates of (Matrouh - Red Sea - North Sinai - South Sinai - Kafr El-Sheikh), with a total capacity of 671 thousand m<sup>3</sup> / day, at a cost of 13.327 billion pounds (Al-Ahram, 2023).

The Government has also adopted a plan to reduce drinking water losses in all fields. The plan includes 4 elements. The first is related to the rationalization of water consumption by using special spare parts that rationalize water usage. The Arab Organization for Industrialization and Works developed these parts with a technology to control water flow by pressure controls. The parts can be installed on all types of faucets, in the Egyptian market. The Prime Minister has urged all State ministries with their bodies and institutions to implement the technology of saving water consumption using these parts. The parts are also provided to the public through the customer service centers of the water companies, in an effort to make them widely used (Supreme Standing Committee for Human Rights, 2022).

As for the second element, it is related to reducing the commercial and physical losses of drinking water. The networks are divided into about 10 thousand isolated areas (DMAs) that can be controlled and in which measuring devices are installed to determine the actual percentages of the total losses (physical and commercial). The plan aims to reduce the losses from 30% to 20%. One hundred and five regions have already been isolated in 16 Governorates, and about 12 thousand m<sup>3</sup>/day has been reduced.

The third component is concerned with the provision of household meters. The total number of subscribers in 2018 was 15 million (meters - practice), and the coverage rate of subscribers with meters was determined at about 70%. During 2019 the number of subscribers was increased by 1.4 million meters, 245 thousand prepaid meters, in addition to 40,000 meters with large diameters starting from 1.5 inches for industrial purposes.

With regard to maximizing the use of treated sewage water in crops of economic benefit, the Ministry of Housing, in cooperation with some private sector companies, has started establishing agricultural projects that are irrigated from treated sewage water. A good example of these efforts is the project with the Egyptian Kuwaiti Holding Company which

includes 3,000 feddans in the new city of Beni Suef, 3,000 feddans in Sadat City, 6,000 feddans in the new Minya City, and 1,000 feddans in Samalout).

Examples of crops that have been included in such projects are the lands cultivated by mahogany trees, used in the manufacture of home furniture. Another example is the jojoba plants, which are used in the manufacture of aircraft engine oils, biofuel, some medical preparations, and the cultivation of tree forests, for the use of the produced wood in the manufacture of compressed industrial wood, particleboard, and others. There are also experiments to cultivate trees producing medical oils using purified waste water.

Worth noting is that the coverage of drinking water at the country level is about 98%, and the amount of water produced is 30.1 million m<sup>3</sup>/day (11 billion m<sup>3</sup>/year), and the length of the networks is 166 thousand km, while the percentage of sewage coverage at the country level is about 65%. The percentage of sanitation coverage in rural areas has increased from about 12% in 2014 to 34% in 2019, and the actual wastewater treatment capacity is 12.8 million m<sup>3</sup>/day (4.7 billion m<sup>3</sup>/year), and the length of networks is 53,000 km (Supreme Standing Committee for Human Rights, 2022).

## **4-2 The concept of de-marketing**

### **4-2-1 The meaning of de-marketing and when it is used**

The first time the term de-marketing appeared was in 1971 by Kotler, Philip & Levy, Sidney (1969). They compared between use of marketing tools of product development, pricing, distribution and promotion in classic business firms and non- profit organizations, shedding light on efforts to curb demand on undesired products via de-marketing. Later they (Kotler, Philip & Levy, Sidney, 1971) defined de-marketing as "that aspect of marketing that deals with discouraging customers in general or a certain type of customers in particular on a temporary or permanent basis." They explained it as the efforts of reducing demand on a certain product for reasons varying between insufficiency of production to meet demand, or harmfulness of the product to health or fear of its effects on degrading the economy.

De-marketing is described on the internet as "a process in which a company develops strategies to reduce the consumption of a product." Companies can use it in different situations to control product use, price or demand (Sergej Ostrovkij, 2023).

In 2010 Kumar added that de-marketing is the exact opposite of marketing, so if marketing aims to attract customers, de-marketing tries to reduce demand at least for a certain period of time.

Abu N. M. Waheeduzzaman (2021) categorized the literature on de-marketing according to the objective of the de-marketing activity, whether product based, behavioral and societal based, or cause and societal betterment targeted.

Robert S. Moore (2011) defined de-marketing as the process of persuading consumers to change their behavior and habits towards certain products and services negatively.

De-marketing was also described as part of the social and cultural marketing system of the organization of which the philosophy is based on promoting benefits for society and reducing or limiting consumption of unhealthy products. (Roets, 2013.)

Ahmed Azza Rajeh (2008), defines de-marketing as those marketing efforts that invite others to give up and not act.

Reducing consumption of health threatening products is one of the major areas in which de-marketing, is frequently applied by health and environmental institutes. Coca Cola Company shifting its marketing campaigns to diet and zero-sugar products instead of classic drinks in an effort to promote healthier options, is an example of such practice (Aggarwal, 2023). Prohibiting smoking is another example where de-marketing is frequently used. Moore's work (2011) concentrated on changing the habits of smokers. Shiu et al (2009) presented a conceptual model linking the 4ps in a de-marketing with three outcome measures: consumers' attitude toward the tobacco industry, consumers' attitude toward smoking, and consumers' intention to quit smoking. He deduced that de-marketing measures affect all three aspects but in different degrees. Chauhan (2016) tried to understand the factors that encourage youngsters to smoke and analyze these factors' relationship to socio-economic and demographic factors in an effort to develop a set of de-marketing strategies that could promote new non-smoking habits amongst vulnerable groups. (Chauhan et Al, 2016). In the West Bank, in Palestine a group of researchers made similar efforts. They identified the main objective of de-marketing to be the good and well-being of the society and then tested applicability of its tools to de-market smoking cigarettes. (Salem et al, 2022)

Brand management is an area in which de-marketing is often used to create a feeling of scarcity of the product that would be reflected on its value in the eyes of customers thus enhancing brand name. An example of using this method is evident in many famous brands such as Rolex watch brand or Ferrari and Lamborghini car brands. In this case, manufacturers use scarcity as a value adding factor (Aggarwal, 2023).

Place de-marketing is a new area in which new places are promoted and other places are de-marketed. The main reasons this is needed, being decreasing the effect of seasonality and crisis prevention and management (Medway et al, 2011). The strategies used to

implement de-marketing of places were identified by Medway to be: no marketing, marketing alternative places, restricting access and pricing mechanism. Clements (1989), tested using de-marketing with certain segments of the tourist population in Cyprus, as a means of controlling which types will visit a destination. In Egypt, similar efforts were made by Sabreen Abdeljalil and Mohamed Ezzat from Menya University (2016) suggesting that de-marketing techniques can be used to discourage certain types of tourism while increasing other tourism products. The main aim of the study was to decrease mass tourism and create a balance and increasing tourism in higher yielding sectors.

De-marketing could also be applied on political and social issues. Waheeduzzaman (2021) broadened the concept of de-marketing to include new nontraditional aspects such as war issues. Being against war, he considered it a “product” and suggested de-marketing methods to be used to “un-promote” it. According to him, education and training amongst different segments of every society could be used to discourage war with all its catastrophic results. He categorized the targeted market for the de-marketing efforts into four main segments: “uniformed majority, silent masses, peace activists and war beneficiaries”.

Rationalizing electricity consumption has become a great concern in many parts of the world (Alsamydai et al, 2018). Many researchers have hence started testing the application of de-marketing tools on curbing the growing demand on electricity. In Jordan, Alsamydai and Youssef (2018) implemented a research study analyzing the correlation between (advertising, campaigns, perception, price, solar energy and reference group) and the demand of electricity.

In South Africa, Kerry Chipp and Tracy Mckay (2002) conducted a study to find out about the extent of knowledge and practice of children with issues concerning water conservation amongst children in different societal levels. She found out that most children from all classes are not concerned are not aware of these efforts and are completely uninvolved in related activities. They deduced that programmes do not address influence of the neighborhood or society.

Therefore, de-marketing can be considered a mechanism that is used to reduce the increasing demand or rationalize the consumption of a specific product or resource, permanently or temporarily, due to its scarcity or economic importance, or sometimes because of the negative effects of this product on the individual or society.

The main reasons for applying de-marketing techniques could be summarized by the following points:

- 1) To address environmental issues such as downsizing consumption of non-renewable resources.
- 2) To address social issues in the case of discouraging demand on harmful products with health hazards or that have a negative effect on the environment.
- 3) To manage limited resources with excess demand that cannot be met.
- 4) To balance demand in different seasons and optimize operations of businesses with seasonal fluctuations.

#### **4-2-3 De-marketing strategies**

De-marketing relies on three main strategies to rationalize demand (A.Coskun Samli 2013), namely:

##### **A) Negative reverse marketing:**

It is applied when using the product is indispensable for the consumer and at the same time he has the ability to acquire it. Effective reverse marketing works to reduce the volume of demand and limit its increase.

Negative reverse marketing strategy aims to:

- Educate the consumer about the negative effects of the product on society, the economy and the environment
- Consolidate the principles of social responsibility within the framework of sustainable development.

##### **B) Virtual or unreal reverse marketing:**

In this case reverse psychology is used. It is used when the organization is seeking to increase the interest of customers and their desire to acquire the product and thus increase demand while pretending to discourage them. Effective ostensible marketing works to reduce the volume of demand and limits its increase in order to balance between supply and demand in accordance with the requirements of the market or one of its sectors.

##### **C) Complete reverse marketing:**

This strategy is used to pull the product out of the market. It's usually used when a product is no longer needed or obsolete. An example of this is Apple Company constantly promoting newer versions of its mobile phone "iPhone" while discontinuing and phasing out its older models (Aggarwal, 2023).

#### **4-2-4 Tools of de-marketing**

De-marketing strategy comprises four elements; product (water availability), price (unit water price), place (water supply networks), and promotion which include campaigns aimed at reducing electricity consumption). In other words most authors identify the main tools of de-marketing same as the 4ps of marketing more or less, but according to Kotler with opposite objectives (Kotler and Levy,1971).

##### **A) Product and demand size**

Reverse marketing is performed in the case of products by limiting product diversification, using lower quality auxiliary materials and placing conditions on the purchasing process or trying to provide possible alternatives to the product and directing the demand to them.

In certain cases a customer rationing strategy could be used where the quantity of a product a customer can buy could be restricted to a certain amount to ensure fair distribution. An example of this is limiting the number of bread allocated for each buyer in case of Egyptian Government supported goods.

In the case of water limiting the amounts available for people could be hard to apply, due to its essentiality for human life, but efforts have been made to redundant quantities of water used by implementing certain devices and mechanisms to control water supply.

##### **B) Prices**

Prices have always been found to influence customer's perception of a product (Clements, 1989). Control via prices is mainly achieved by increasing prices of selling the products in case of de-marketing or decreasing it in case of desire to increase sales.

De-marketing could also be done by other helping measures such as stopping cuts or discounts on prices, and reducing all incentives related to increasing or sales volume in the case of promoting a product or the contrary in case of de-marketing it (Clements, 1989).

Increasing prices could be used by companies when they target a more exclusive segment through making products less affordable. This is used when a company wants to maintain a brand's high-end image. An example of this is luxury products such as designers' brands e.g. such Gucci or Christian Dior products (Aggarwal, 2023).

**C) Promotion**

De-marketing in this case is achieved by reducing advertising expenses on a product, or increasing campaigns promoting reducing quantities used of the product. Educating consumers about the dangers of excessive consumption of the product through warning leaflets, using counter advertisements and placing restrictions on some advertisements are other methods of de-marketing (Kotler et al, 1971). This is usually used in situations of product scarcity or environmental concerns. Campaigns for water conservation are a perfect example of this.

**D) Place or distribution**

De-marketing in this case is achieved by limiting the product's reach and restricting the availability of a product to certain locations or times. (Kotler et al, 1971). This could be described as selective marketing (Aggarwal, 2023).

Down-sizing the amount of consumption of water through "place" de-marketing, could be achieved by shrinking the distribution system and reducing distribution outlets. Another method that could be used to reduce supply is by limiting the quantity allocated to each consumer in certain outlets. These methods could be used in places that are known for wasting water or places that have alternative sources of water such rain or sea water that could be distilled.

**4-3 How the Egyptian Government applied strategies and tools of reverse marketing that aim to reduce water consumption**

The Egyptian Government has developed a national plan adopting several strategies and tools plan with the objective of reducing water consumption (see 5.2). The Government's main strategy to curb water demand is "**Negative reverse marketing strategy**". This is mainly achieved by the Government through educating citizens about rationalizing water consumption in order to reduce commercial losses and water waste (Al-Ahram, 2023). A number of other tools were also used in different degrees.

The main de-marketing tools on which the Government depends could be categorized in four major groups, as follows:

**A. De-marketing measures concerning the water as a “Product”**

The Government aims to reduce quantities of water demanded by several measures the most important of which is the development of rationalization technology. Reduction devices have been installed in most Government buildings with an objective of decreasing amounts used. The Government has also rationalized water usage for industrial and agricultural needs by increasing dependence on reused water and installing more efficient water saving systems. The Government has also started increasing availability of distilled sea water especially in rural areas to decrease waste in water transportation to these areas (Annual Bulletin of Irrigation and Water Supply Statistics, 2022).

**B. De-marketing measures concerning “Promotion”**

Advertisements and seminars are used in Government work places to educate citizens about the water crisis and hazards of water waste. Lectures and class material in schools and universities are also effective tools to describe and analyze the problem and performing exercises on how to face it. A lot of material is published in newspapers, magazines and on the social media to create awareness of the problem. Big banners in streets have been put up in highly populated areas to enhance rationalizing water usage.

**C. De-marketing measures concerning the “Distribution” aspect**

More efficient pipeline systems have started being insulated in most places including rural areas. This reduced water being wasted through unfit or leaking pipelines. Small Nile branches were also embedded with isolating materials to decrease water loss in the soil (Annual Bulletin of Irrigation and Water Supply Statistics 2022).

**D. De-marketing measures concerning the “Pricing” of water**

Individual meters for each house have been installed in most houses now versus no meters or aggregate meters for large areas. This has resulted in each household paying its own household bill which made each house responsible for its utilization and hence encourage people to reduce their usage versus common undefined responsibility that left actual consumption unchecked. Also several increases in prices of water have been implemented (Al-Ahram, 2023).



## 5-Research Proposals

This study aims to investigate the following propositions:

5-1 Consumer behavior regarding domestic water consumption has changed as a result of de-marketing efforts.

5-2 Consumer intention towards consuming water has changed as a result of de-marketing efforts.

5-3 Changing the extent of availability of water has changed consumers' behavior towards water consumption.

5-4 Changing accessibility of water has changed consumers' behavior towards water consumption.

5-3 Changing pricing policy of water has changed consumers' behavior towards water consumption.

5-4 Increase of advertising campaigns about rationalizing water consumption affected general usage of water.

## 6. Hypothesis:

Four major hypotheses have emerged from these propositions:

H1- There is a positive effect of the product on customers' intention to reduce water consumption.

H2- There is a positive effect of price on customers' intention to reduce water consumption.

H3- There is a positive effect of promotion on customers' intention to reduce water consumption.

H4- There is a positive effect of place on customers' intention to reduce water consumption.

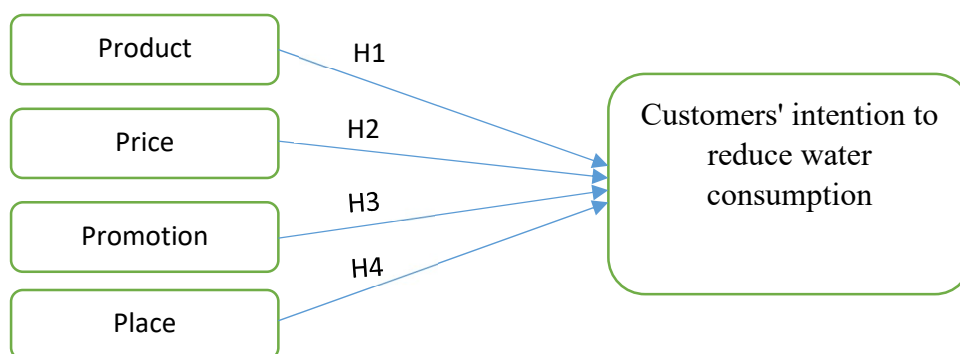


Illustration 1: Proposed Research Framework

Source: Developed by the Researcher

## **7- Statistical study**

The study aims to analyze the relationship between a number of demographic variables for a sample of 503 candidates of different categories of the Egyptian society, residing in and outside the capital of Cairo with the different measures that have been taken to reduce the consumption of water for domestic uses in an effort to find out which measure is more effective. Statistical analysis is divided into three main sections. (Section 7-1) describes how the different functions affect different demographic groups through frequency and correlation tests, (Section 7-2) demonstrates reliability of the data, while (Section 7-3) measures regression between the different de-marketing factors with the customers' intention to reduce water consumption.

### **7-1 Descriptive Analysis**

This section consists of two major parts, statistical analysis based on frequency of responses and statistical analysis based on chi-square test.

#### **7-1-1 Statistical Analysis based on frequency of responses**

In this section the responses of 503 respondents were analyzed. <sup>1</sup> Table 2 presents the demographic characteristics of respondents, where 56.5% of respondents were male and 43.5% were female. In terms of residence, most respondents (73.3%) were from Greater Cairo, while the remaining 26.7% were from outside Greater Cairo. Regarding education level, the majority of respondents had a high level of education (69.2%), followed by intermediate level (25.0%), and a small proportion reported having no education (5.8%). For monthly household income, the largest group of respondents (55.1%) reported earning less than 5000 EGP, while 30.7% reported earning between 5000 and 10000 EGP, and 14.3% reported earning more than 10000 EGP. Finally, for age, 62.8% of respondents were under the age of 25, with 30.0% falling between the ages of 25 and 50.

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<sup>1</sup> Note that the total count may vary slightly due to missing data or rounding errors.

**Table 2:** Demographics characteristics of respondents

		N	%
Gender	Male	277	56.5%
	Female	213	43.5%
	Total	490	100.0%
Residence	Greater Cairo	360	73.3%
	Outside Cairo	131	26.7%
	Total	491	100.0%
Highest Education Level	Intermediate	121	25.0%
	High	335	69.2%
	None	28	5.8%
	Total	484	100.0%
Monthly Household Income	Less than 5000 EGP	255	55.1%
	5000 to 10000 EGP	142	30.7%
	More than 10000 EGP	66	14.3%
	Total	463	100.0%
Age	Less than 25 years	310	62.8%
	25 to 50 years	148	30.0%
	Above 50 years	36	7.3%
	Total	494	100.0%

### 7-1-1-1 An indication of the average quantities of water used by different categories

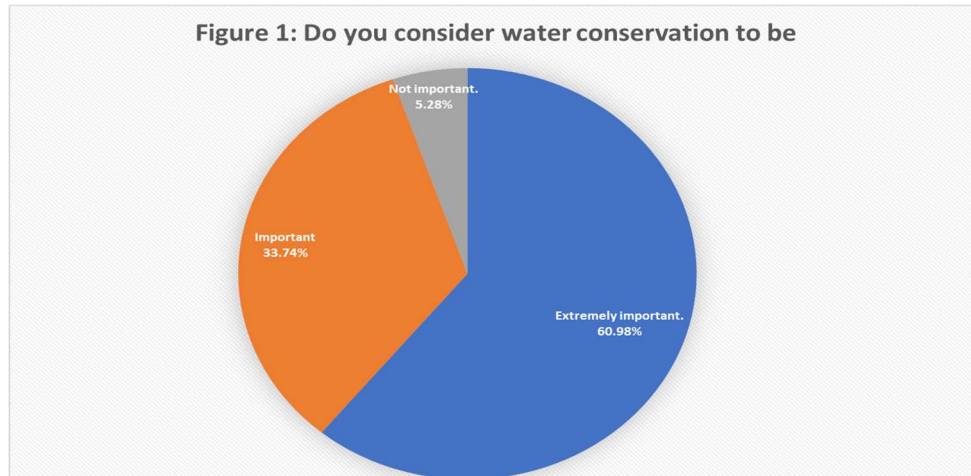
According to table (3), 40.2% of respondents, use from one large bottle to two bottles of drinking water per day. This was followed by 29.2% of respondents who reported consuming more than two large bottles per day. Additionally, 24.5% of respondents reported using between one small bottle to two bottles per day, while a smaller proportion of respondents (5.0%) indicated consuming less than one small bottle per day.

**Table 3:** How much drinking water do you use per day as an individual, approximately use (including hot beverages)?

	N	%
More than two large bottles.	147	29.6%
From one large bottle to two.	202	40.6%
Between one small bottle to two.	123	24.8%
Less than one small bottle.	25	5.0%
Total	497	100%

### 7.1.1.2 How the respondents perceive the importance of the water conservation issue

Figure 1 shows that the problem of water conservation is considered as extremely important by 61% of respondents. Additionally, 33.7% of respondents indicated that water conservation is important. A very small proportion of respondents (5.3%) reported that water conservation is unimportant. This reflects the extent of importance of the subject to individuals and hence their probable general cooperation with water conservation programs.



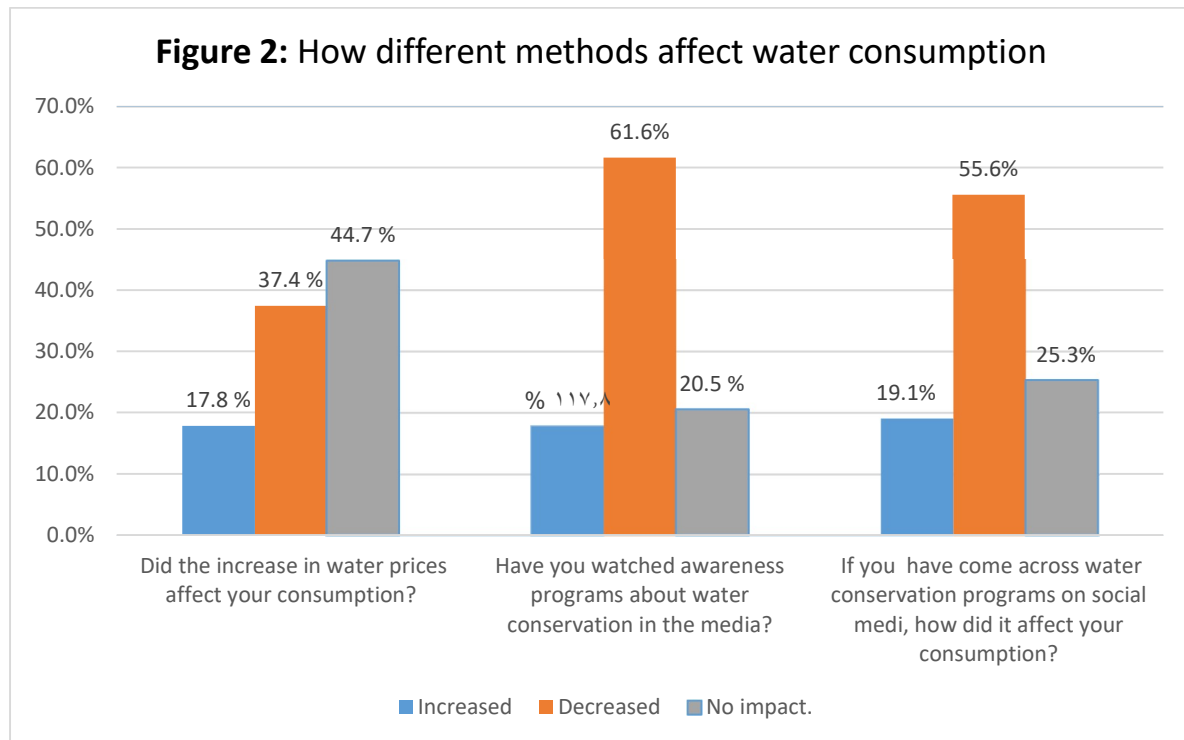
### 7.1.1.3 The perceived effect of water conservation efforts

Concerning general perception about efforts that are taken to reduce water consumption, table 4 shows that 48.3% of respondents believe that water conservation efforts can reduce the amount of drinking water they use. On the other hand, 51.7% of respondents did not believe that water conservation efforts can have such an impact.

**Table 4:** Respondent perception of the effectiveness of water conservation efforts

		N	%
Do you believe that water conservation efforts can reduce the amount of drinking water you use?	Yes	239	48.3%
	No	256	51.7%
	Total	495	100.0%
In general, has water conservation efforts affected the amount of water you use?	Increased	90	18.3%
	Decreased	205	41.8%
	No impact.	196	39.9%
	Total	491	100.0%

From table 4, 41.8% of respondents reported that water conservation efforts have decreased the amount of water they use. On the other hand, 18.3% of respondents stated that water conservation efforts have led to an increase in the amount of water they use. Furthermore, 39.9% of respondents reported that water conservation efforts had no impact on their water usage.



From figure 2, for raising water price, 17.8% of the respondents reported an increase in their water consumption in spite of the increase in water prices. Meanwhile, 37.4% of respondents stated that their water consumption decreased, and 44.7% mentioned that there was no impact on their water consumption as a result of the increase in prices. This high percentage of those who did not change their consumption patterns of water reflects the inflexibility of water consumption or the use of ineffective advertisements.

For respondents who have watched awareness programs about water conservation on television or read about it in newspapers, 61.6% stated that their water consumption decreased. This shows that traditional media like newspapers, television and radio are still successful in creating awareness of the problem to a large extent. However 17.8% reported an increase in their water consumption and 20.5% mentioned no impact on their consumption which shows further efforts are needed to exploit these media methods.

Among respondents who have come across water conservation programs on social media, 55.6% stated that their water consumption decreased. Additionally, 19.1% reported an increase in their water consumption, while 25.3% mentioned no impact on their consumption. This shows that social media is under-utilized in creating awareness of the problem.

#### 7.1.1.4 The most effective means to encourage water conservation from the consumers' point of view

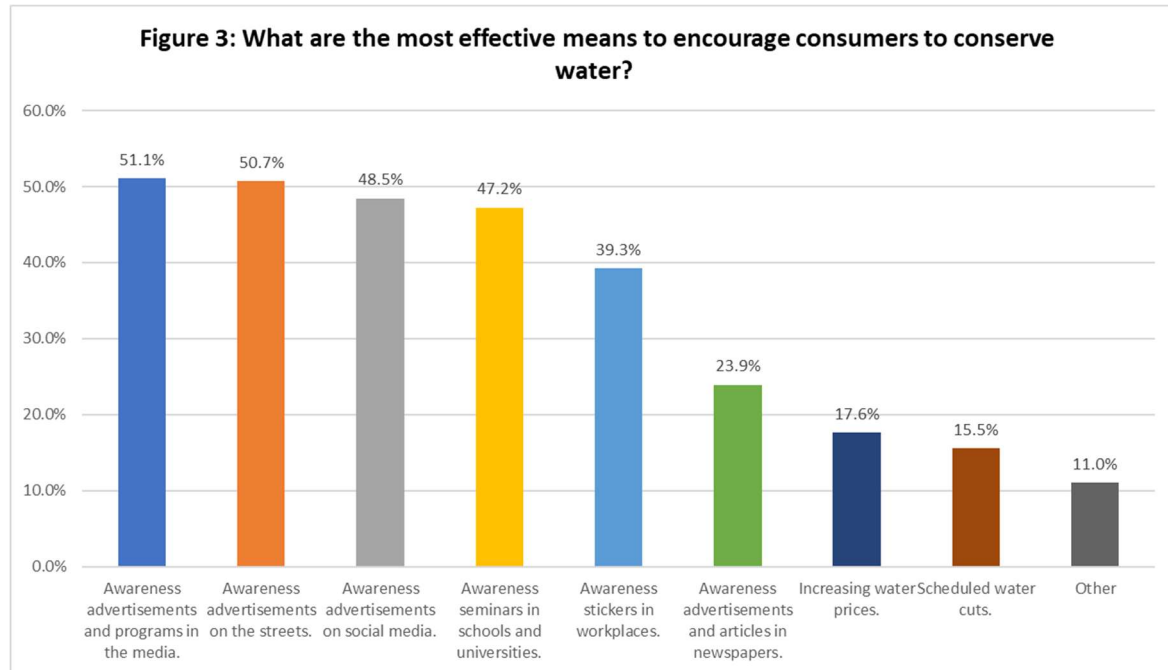


Figure 3 presents respondents' views regarding the effectiveness of different means influencing water conservation. Among respondents, the most commonly reported factor is "Awareness advertisements and programs in the media" (250 respondents, 51.1%). This suggests that media-based campaigns and programs have a significant impact on raising awareness and promoting water conservation. The other notable factors include "Awareness advertisements on the streets" (248 respondents, 50.7%) and "Awareness seminars in schools and universities" (231 respondents, 47.2%). These findings indicate the effectiveness of targeted awareness campaigns in public spaces and educational institutions. Additionally, "Awareness advertisements on social media" (237 respondents, 48.5%) and "Awareness stickers in workplaces" (192 respondents, 39.3%) are also recognized as influential in promoting water conservation. It is worth mentioning that factors such as "Increasing water prices" (86 respondents, 17.6%) and "Scheduled water cuts" (76 respondents, 15.5%) are reported less frequently but still hold some influence in raising awareness about water conservation. Finally, there is a category labeled "Other" (54 respondents, 11.0%) which

represents factors not explicitly listed in the table. These factors may vary and could include individual experiences, personal initiatives, or local conservation efforts.

Almost all respondents in all categories refused reducing availability or accessibility of water as a tool for decreasing water consumption. This is an important result because it shows that efforts that depend on reducing water quantities available to people or making it unavailable in certain places is completely unacceptable by nearly all respondents.

Overall, the data highlights the importance of various communication channels and strategies in promoting water conservation and suggests the need for a multi-faceted approach to **increase awareness and encourage sustainable water consumption practices.**

#### 7.1.1.5 Areas in which respondents reduced their water consumption after being reached by water conservation efforts

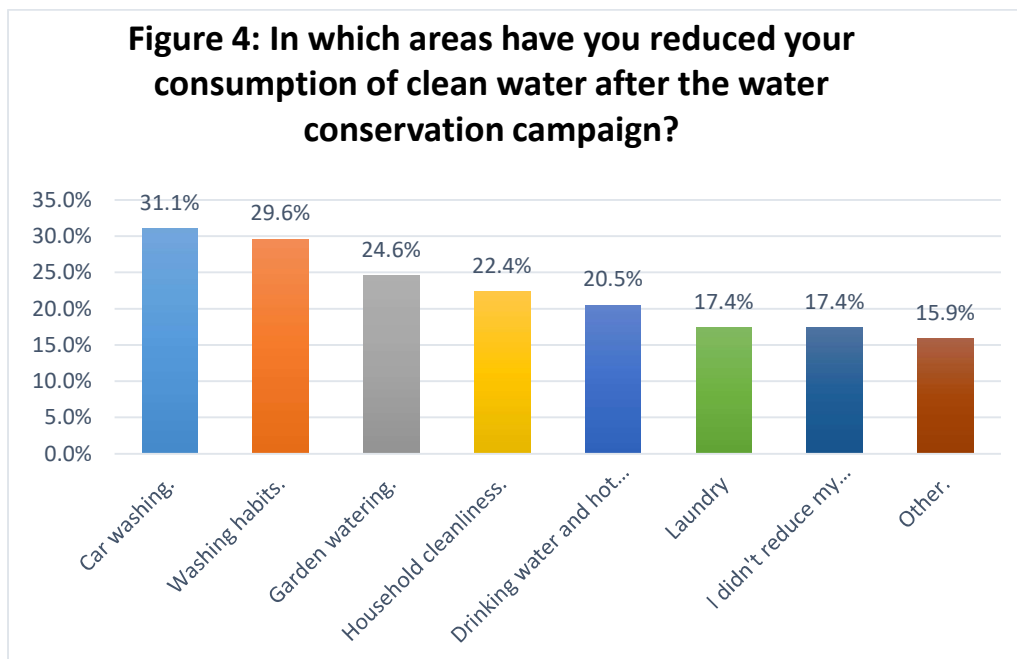


Figure 4 presents the percentages of areas in which respondents have reduced their consumption of clean water after the water conservation campaign. Among the respondents, the most commonly reported area where water consumption has been reduced is "Car washing" (150 respondents, 31.1%). This suggests that the water conservation campaign has influenced individuals to limit their use of water for washing vehicles which could be a reduction in frequency of washing vehicles or in the quantity of water used each time. This could be stressed upon by showing new ways of cleaning vehicles by using less water rather than traditional hoses wasting large quantities of water.

The other significant areas where water consumption has been reduced include "Washing habits" (143 respondents, 29.6%). This reflects water conservation programs encouraging shutting water when not used during showers or shaving or brushing teeth. "Garden watering" (119 respondents, 24.6%) is another area in which respondents decreased their utilization by using more efficient methods such as drip irrigation systems. These findings indicate that individuals have made conscious efforts to conserve water by modifying their washing practices and limiting water usage for outdoor activities e.g. garden watering and washing cars.

Furthermore, respondents have also reported reducing their consumption of clean water in areas such as "Household cleanliness" (108 respondents, 22.4%) and "Drinking water and hot beverages" (99 respondents, 20.5%). This suggests a willingness to adopt water-saving measures even in daily activities. It is worth noting that a portion of respondents (84 respondents, 17.4%) reported that they did not reduce their consumption of clean water, indicating that the water conservation campaign may not have had a significant impact on their behaviors or that they were already practicing efficient water usage. Additionally, a category labeled "Other" (77 respondents, 15.9%) represents areas not explicitly listed in the table where respondents have reduced their water consumption. These areas may vary and could include specific household practices or personal initiatives taken by individuals.

Overall, the data highlights the effectiveness of the water conservation campaigns in influencing individuals to reduce their water consumption in various areas of their daily lives. It suggests that efforts to promote water-saving behaviors have been successful in certain domains, such as car washing, changing personal washing habits, and garden watering. However, further measures may be needed to reach and engage individuals who have not significantly reduced their water consumption.

### **7.1.2 Statistical analysis based on chi-square test<sup>2</sup>**

In this part, a relation between demographic characteristics and water consumption variables was identified. From table 5, males tend to use more drinking water compared to females. The majority of males (over 75%) consume at least one large bottle of water per day,

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<sup>2</sup> Sig is the level of significance; it makes the correlation coefficient significant only if it is less than 0.05. Likewise, in T-tests of independent samples, the presence of significant differences between variables according to gender (male or female) or residence (in Greater Cairo or outside it) is if the level of significance is less than 0.05.



while females show a more balanced distribution across different consumption levels. The chi-square test indicates a statistically significant association between gender and drinking water consumption ( $\chi^2 = 11.78$ ,  $p = 0.008$ ), suggesting that gender plays a role in determining the consumption levels. This could be because a lot of jobs and activities that are usually performed by men, require longer hours in open areas exposed to heat e.g. working in building, agriculture, as lorry drivers.. etc.

There is no significant difference in drinking water usage between individuals living in Cairo and those living outside Cairo. The distribution of consumption levels is similar for both groups. The chi-square test shows no significant association between residence and drinking water consumption ( $\chi^2 = 1.438$ ,  $p = 0.697$ ), indicating that residence does not significantly impact consumption levels.

Individuals with a high education level tend to consume more drinking water compared to those with intermediate or no education. The majority of individuals with a higher education level consume at least one large bottle of water per day while those with lower education consume less. Thus the chi-square test reveals a statistically significant association between higher education level and drinking water consumption ( $\chi^2 = 14.03$ ,  $p = 0.029$ ), suggesting that education level influences consumption patterns. This result was quiet unexpected but it could be because the respondents considered the number of bottles to be a number of previously bottled water rather than a measurement of water.

There is no clear association between monthly household income and drinking water usage. The distribution of consumption levels is similar across different income groups. The chi-square test shows no significant association between monthly household income and drinking water consumption ( $\chi^2 = 7.063$ ,  $p = 0.315$ ), indicating that income does not significantly impact consumption levels.

Individuals above 50 years old consume larger quantities of drinking water compared to younger age groups. However, the chi-square test indicates no significant association between age and drinking water consumption ( $\chi^2 = 5.20$ ,  $p = 0.518$ ), suggesting that age may not be a strong determinant of consumption patterns.

In summary, gender and highest education level show significant associations with drinking water consumption, while residence, monthly household income, and age do not exhibit significant associations.

**Table 5:** Distribution of drinking water consumption according to demographic factors

		How much drinking water do you approximately use per day, as an individual, (including hot beverages)?										
		More than two large bottles.		From one large bottle to two.		Between one small bottle to two.		Less than one small bottle.		Total	Chi-Square	p value
		N	%	N	%	N	%	N	%	Count		
Gender	Male	95	34.3	113	40.8	61	22.0	8	2.9	277	6.92	0.031*
	Female	51	23.9	87	40.8	58	27.2	17	8.0	213		
	Total	146	29.8	200	40.8	119	24.3	25	5.1	490		
Residence	Cairo	105	29.2	148	41.1	91	25.3	16	4.4	360	1.438	0.697
	Outside Cairo	40	30.5	52	39.7	30	22.9	9	6.9	131		
	Total	145	29.5	200	40.7	121	24.6	25	5.1	491		
Highest Education Level	Intermediate	33	27.3	42	34.7	33	27.3	13	10.7	121	14.03	0.029*
	High	102	30.4	144	43.0	78	23.3	11	3.3	335		
	None	8	28.6	13	46.4	7	25.0	0	0.0	28		
	Total	143	29.5	199	41.1	118	24.4	24	5.0	484		
Monthly Household Income in EGP	Less than 5000	66	25.9	102	40.0	70	27.5	17	6.7	255	7.063	0.315
	5000 to 10000	47	33.1	62	43.7	28	19.7	5	3.5	142		
	More than 10000	23	34.8	26	39.4	14	21.2	3	4.5	66		
	Total	136	29.4	190	41.0	112	24.2	25	5.4	463		
Age	Less than 25 years	92	29.7	125	40.3	75	24.2	18	5.8	310	5.20	0.518
	25 to 50 years	47	32.0	55	37.4	39	26.5	6	4.1	147		
	Above 50 years	7	19.4	20	55.6	8	22.2	1	2.8	36		
	Total	146	29.6	200	40.6	122	24.7	25	5.1	493		

Table 6 provides insights into the impact of water conservation efforts affecting the amount of water you use among different demographic groups. The data includes responses regarding whether water conservation efforts have increased, decreased, or had no impact on water usage. Chi-square tests were conducted to assess the association between demographic factors and water usage categories.

For gender, there was a significant difference in water usage between genders ( $\chi^2 = 11.78$ ,  $p = 0.008^*$ ). Females (44.1%) were more likely to report a decrease in water usage compared to males (39.8%). Males were more likely to report increased water usage, while females were more likely to report decreased water usage.

For residence, no significant difference was found in water usage based on residence ( $\chi^2 = 2.314$ ,  $p = 0.314$ ). Both residents of Cairo and those outside Cairo showed similar patterns of water usage changes.

While for highest education level, water usage varied across different education levels, but the difference was not statistically significant ( $\chi^2 = 7.195$ ,  $p = 0.126$ ). Respondents with intermediate education (36.7%) and high education (43.5%) reported similar proportions of decreased water usage. Respondents with different education levels reported similar proportions across the water usage categories.

For monthly household income, there was a significant difference, in the change in water usage, based on monthly household income ( $\chi^2 = 10.46$ ,  $p = 0.033^*$ ). Respondents with a monthly income of less than 5000 EGP (42.6%) had a higher proportion of reporting decreased water usage compared to other income groups.

Finally, for age, Water usage varied significantly among different age groups ( $\chi^2 = 13.20$ ,  $p = 0.010^*$ ). Respondents above 50 years (61.1%) reported the highest proportion of decreased water usage, followed by those between 25 to 50 years (45.1%) and less than 25 years (37.8%)

These findings suggest that gender, monthly household income, and age influence the impact of water conservation efforts on water usage. The analysis highlights the variations in decreased water usage resulting from water conservation efforts across different demographic groups. Females, individuals with lower monthly household income, and older respondents showed a higher propensity for decreasing water usage. These findings emphasize the importance of tailoring water conservation strategies to specific demographic characteristics to effectively promote reduced water consumption.

**Table 6:** Distribution of water conservation efforts by demographic factors

		In general, has water conservation efforts affected the amount of water you use?								Chi-Square	p value
		Increased		Decrease		No impact.		Total			
		N	%	N	%	N	%	Count			
Gender	Male	62	22.6	109	39.8	103	37.6	274	11.78	0.008*	
	Female	28	13.3	93	44.1	90	42.7	211			
	Total	90	18.6	202	41.6	193	39.8	485			
Residence	Cairo	64	18.0	156	43.8	136	38.2	356	2.314	0.314	
	Outside Cairo	26	20.0	47	36.2	57	43.8	130			
	Total	90	18.5	203	41.8	193	39.7	486			
Highest Education Level	Intermediate	31	25.8	44	36.7	45	37.5	120	7.195	0.126	
	High	51	15.4	144	43.5	136	41.1	331			
	None	6	21.4	13	46.4	9	32.1	28			
	Total	88	18.4	201	42.0	190	39.7	479			
Monthly Household Income in EGP	Less than 5000	47	18.7	107	42.6	97	38.6	251	10.46	0.033*	
	5000 to 10000	20	14.1	53	37.3	69	48.6	142			
	More than 10000	12	18.5	36	55.4	17	26.2	65			
	Total	79	17.2	196	42.8	183	40.0	458			
Age	Less than 25 years	54	17.6	116	37.8	137	44.6	307	13.20	0.010*	
	25 to 50 years	33	22.9	65	45.1	46	31.9	144			
	Above 50 years	3	8.3	22	61.1	11	30.6	36			
	Total	90	18.5	203	41.7	194	39.8	487			

Table 7 examines the impact of increased water prices on consumption among different demographic groups. The analysis focuses on the proportion of respondents who reported an

increase or decrease in water consumption, as well as those who reported no impact. It explores any significant variations based on gender, residence, highest education level, monthly household income, and age. For gender, there was no significant difference in water consumption based on gender ( $\chi^2 = 0.013$ ,  $p = 0.998$ ). Both males (37.1%) and females (37.6%) reported similar proportions of decreased consumption.

For, residence, no significant difference was found in water consumption based on residence ( $\chi^2 = 0.284$ ,  $p = 0.868$ ). Respondents from both Cairo (37.9%) and outside Cairo (36.2%) reported similar proportions of decreased consumption.

For highest education level, A significant difference was observed in water consumption across education levels ( $\chi^2 = 12.38$ ,  $p = 0.015$ ). Respondents with intermediate education (31.4%) reported a lower proportion of decreased consumption compared to those with higher education (39.9%).

For, monthly “Household Income”, no significant difference was found in water consumption based on monthly household income ( $\chi^2 = 5.99$ ,  $p = 0.200$ ). Respondents from different income groups reported similar proportions of decreased consumption.

Finally for age, There was a significant difference in water consumption across age groups ( $\chi^2 = 12.67$ ,  $p = 0.013$ ). Respondents above 50 years (52.8%) reported the highest proportion of decreased consumption, followed by those between 25 to 50 years (44.9%) and less than 25 years (31.9%).

Generally, increasing water prices has led to varying impacts on consumption across different demographic groups. While there were no significant differences based on gender, residence, and monthly household income, education level and age demonstrated significant associations with changes in water consumption.

**Table 7:** Distribution of increasing water prices effect on consumption by demographic Factors

		Did the increase in water prices affect your consumption?								
		Increased		Decrease		No impact.		Total	Chi-Square	p value
		N	%	N	%	N	%			
Gender	Male	49	17.8	102	37.1	124	45.1	275	0.013	0.998
	Female	38	17.8	80	37.6	95	44.6	213		
	Total	87	17.8	182	37.3	219	44.9	488		
Residence	Cairo	62	17.3	136	37.9	161	44.8	359	0.284	0.868
	Outside Cairo	25	19.2	47	36.2	58	44.6	130		
	Total	87	17.8	183	37.4	219	44.8	489		
Highest Education Level	Intermediate	33	27.3	38	31.4	50	41.3	121	12.38	0.015*
	High	45	13.5	133	39.9	155	46.5	333		
	None	6	21.4	11	39.3	11	39.3	28		
	Total	84	17.4	182	37.8	216	44.8	482		
Monthly Household Income in EGP	Less than 5000	53	20.8	94	36.9	108	42.4	255	5.99	0.200
	5000 to 10000	21	14.9	52	36.9	68	48.2	141		
	More than 10000	6	9.2	27	41.5	32	49.2	65		
	Total	80	17.4	173	37.5	208	45.1	461		
Age	Less than 25 years	64	20.8	98	31.9	145	47.2	307	12.67	0.013*
	25 to 50 years	19	12.9	66	44.9	62	42.2	147		
	Above 50 years	4	11.1	19	52.8	13	36.1	36		
	Total	87	17.8	183	37.3	220	44.9	490		

Table 8 explores the impact of media awareness programs on water conservation and consumption. The study examines whether individuals who have watched such programs have

experienced changes in their water consumption habits. For gender, there was a significant difference in water consumption based on gender ( $\chi^2 = 10.45$ ,  $p = 0.005^*$ ). Males (56.1%) reported a higher proportion of decreased consumption compared to females (70.3%).

For residence, no significant difference was found in water consumption based on residence ( $\chi^2 = 3.20$ ,  $p = 0.201$ ). Both residents of Cairo (61.9%) and outside Cairo (60.6%) reported similar proportions of decreased consumption. For highest education level, a significant difference was observed in water consumption across education levels ( $\chi^2 = 10.364$ ,  $p = 0.035^*$ ). Respondents with intermediate education (50.6%) reported a higher proportion of decreased consumption compared to those with high education (66.0%).

For monthly household income, no significant difference was found in water consumption based on monthly household income ( $\chi^2 = 3.12$ ,  $p = 0.536$ ). Respondents from different income groups reported similar proportions of decreased consumption.

For age, there was no significant difference in water consumption based on age ( $\chi^2 = 4.86$ ,  $p = 0.301$ ). Respondents from different age groups reported similar proportions of decreased consumption.

Finally, gender and highest education level showed significant associations with changes in water consumption, with males and individuals with intermediate education reporting higher proportions of decreased consumption. Meanwhile, residence, monthly household income, and age did not show significant associations with changes in consumption.

**Table 8:** Distribution of how watching awareness programs about water conservation in the media affected consumption of different groups sorted by demographic factors

		Have you watched awareness programs about water conservation in the media, and if so, how did it affect your consumption?								
		Increased		Decreased		No impact.		Total	Chi-Square	p value
		N	%	N	%	N	%			
Gender	Male	41	23.7	97	56.1	35	20.2	173	10.45	0.005*
	Female	11	9.3	83	70.3	24	20.3	118		
	Total	52	17.9	180	61.9	59	20.3	291		
Residence	Cairo	36	15.9	140	61.9	50	22.1	226	3.20	0.201
	Outside Cairo	16	24.2	40	60.6	10	15.2	66		
	Total	52	17.8	180	61.6	60	20.5	292		
Highest Education Level	Intermediate	23	28.4	41	50.6	17	21.0	81	10.364	0.035*
	High	25	13.1	126	66.0	40	20.9	191		
	None	3	18.8	11	68.8	2	12.5	16		
	Total	51	17.7	178	61.8	59	20.5	288		
Monthly Household Income	Less than 5000 EGP	27	17.4	95	61.3	33	21.3	155	3.12	0.536
	5000 to 10000 EGP	14	18.9	41	55.4	19	25.7	74		
	More than 10000 EGP	7	14.6	34	70.8	7	14.6	48		
	Total	48	17.3	170	61.4	59	21.3	277		
Age	Less than 25 years	39	21.4	106	58.2	37	20.3	182	4.86	0.301
	25 to 50 years	11	12.9	56	65.9	18	21.2	85		
	Above 50 years	2	8.0	18	72.0	5	20.0	25		
	Total	52	17.8	180	61.6	60	20.5	292		



Table 9 examines the influence of water conservation programs on social media platforms and their effect on individuals' water consumption. The study investigates whether exposure to such programs has led to changes in consumption habits. For gender, there was no significant difference in water consumption based on gender

( $\chi^2 = 4.53$ ,  $p > 0.05$ ). Both males and females reported similar proportions of increased, decreased, and no impact on consumption.

For residence, no significant difference was found in water consumption based on residence ( $\chi^2 = 0.340$ ,  $p > 0.05$ ). Respondents from both Cairo and outside Cairo reported similar proportions of increased, decreased and no impact on consumption.

For highest education level, no significant difference was observed in water consumption based on education level ( $\chi^2 = 8.26$ ,  $p > 0.05$ ). Respondents with different education levels reported similar proportions of increased, decreased, and no impact on consumption.

For monthly household income, no significant difference was found in water consumption based on monthly household income ( $\chi^2 = 2.62$ ,  $p > 0.05$ ). Respondents from different income groups reported similar proportions of increased, decreased, and no impact on consumption.

For age, no significant difference was observed in water consumption based on age ( $\chi^2 = 2.39$ ,  $p > 0.05$ ). Respondents from different age groups reported similar proportions of increased, decreased and no impact on consumption.

Finally, the result indicates that exposure to water conservation programs on social media has not shown significant variations in individuals' reported changes in water consumption across different demographic groups.

**Table 9:** Distribution of how water conservation programs on social media affect different groups' consumption categorized by demographic factors

		Have you come across water conservation programs on social media, and if so, how did it affect your consumption?								
		Increased		Decreased		No impact.		Total	Chi-Square	p value
		N	%	N	%	N	%			
Gender	Male	34	23.4	77	53.1	34	23.4	145	4.53	0.104
	Female	12	12.5	57	59.4	27	28.1	96		
	Total	46	19.1	134	55.6	61	25.3	241		
Residence	Cairo	34	18.5	102	55.4	48	26.1	184	0.340	0.844
	Outside Cairo	12	21.1	32	56.1	13	22.8	57		
	Total	46	19.1	134	55.6	61	25.3	241		
Highest Education Level	Intermediate	18	27.3	29	43.9	19	28.8	66	8.26	0.082
	High	22	14.3	93	60.4	39	25.3	154		
	None	4	25.0	10	62.5	2	12.5	16		
	Total	44	18.6	132	55.9	60	25.4	236		
Monthly Household Income In EGP	Less than 5000	27	20.3	76	57.1	30	22.6	133	2.62	0.623
	5000 to 10000	10	18.2	27	49.1	18	32.7	55		
	More than 10000	6	15.8	23	60.5	9	23.7	38		
	Total	43	19.0	126	55.8	57	25.2	226		
Age	Less than 25 years	33	19.1	93	53.8	47	27.2	173	2.39	0.663
	25 to 50 years	11	18.6	37	62.7	11	18.6	59		
	Above 50 years	2	22.2	4	44.4	3	33.3	9		
	Total	46	19.1	134	55.6	61	25.3	241		

## 7.2 Reliability Analysis

The reliability of each construct with its different number of statements can be measured by Cronbach's alpha. In this model, constructs are focused on. The results in Table (10) indicates that product, price, promotion, place and customer intention to reduce water consumption have a high-reliability coefficient (0.825), (0.869), (0.845), (0.826) and (0.843) respectively. Therefore, the surveys are reliable because the Cronbach's alpha and the internal consistency based on the corrected correlations are more than 0.5 (Tavakol et al, 2011).

**Table 10:** Reliability Test for Constructs

	<b>Constructs</b>	Cronbach's Alpha	N of Items
1	product	0.825	3
2	Price	0.869	3
3	Promotion	0.845	3
4	Place	0.826	3
5	customer intention	0.843	4

## 7.3 Regression Analysis

Regression analysis helps identify which independent variables significantly impact the dependent variable, allowing decision makers to allocate resources more effectively (Montgomery, 2012). In this study regression analysis was used to investigate the relationship between the customer intention as a dependent variable and the different de-marketing functions (product, price promotion and place) as independent variables.

### 7.3.1 Testing the First Hypothesis H1

H1: There is a positive effect of the product on customers' intention to reduce water consumption.

To test the validity of the **First Hypothesis (H1)**, a simple regression model was developed between customer intention as a dependent variable and product as an independent variable.

**Table 11:** Analysis of Variance between product and customer intention

Dependent Variable	Model	Sum of Squares	Df	Mean Square	F	Sig
Customer intention	Regression	1.152	1	1.152	3.695	.005 <sup>b</sup>
	Residual	119.075	382	.312		
	Total	120.226	383			

In Table 12, the model shows that there is a significant relationship between product and customer intention. The significant level is .005<sup>b</sup>. The positive values show that there is a positive relationship.

**Table 12:** Analysis of Simple Regression between product and customer intention

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
<b>(Constant)</b>	4.234	.219		19.317	.000
<b>Product</b>	.091	.047	.098	1.922	.005

In Table 12, the coefficient of the simple regression model of product proves the significance of the coefficient of the resource. The significant level is .000. The coefficient of determination R-Sq is equal to 0.132 which means the effect of the **product** is 13.2 % in the variation of customer intention.

### 7.3.2 Testing the Second Hypothesis H2

H2- There is a positive effect of price on customers' intention to reduce water consumption.

To test the validity of the **Second Hypothesis (H2)**, a simple regression model was developed between customer intention as a dependent variable and price as an independent variable.

**Table 13:** Analysis of Variance between price and customer intention

Dependent Variable	Model	Sum of Squares	Df	Mean Square	F	Sig
Customer intention	Regression	2.208	1	2.208	7.148	.008 <sup>b</sup>
	Residual	118.018	382	.309		
	Total	120.226	383			

In Table 13, the model shows that there is a significant relationship between price and customer intention. The significant level is .008<sup>b</sup>. The positive values show that there is a positive relationship.

**Table 14:** Analysis of Simple Regression between price and customer intention

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	4.185	.177		23.675	.000
Price	.103	.038	.136	2.674	.008

In Table 14, the coefficient of the simple regression model of price proves the significance of the coefficient of the resource. The significant level is .000.

The coefficient of determination R-Sq is equal to 0.182 which means the effect of the price is 18.2 % in the variation of customer intention.

### 7.3.3 Testing the Third Hypothesis H3

H3- There is a positive effect of promotion on customers' intention to reduce water consumption.

To test the validity of the **Third Hypothesis (H3)**, a simple regression model was developed between customer intention as a dependent variable and promotion as an independent variable.

**Table 15:** Analysis of Variance between promotion and customer intention

Dependent Variable	Model	Sum of Squares	df	Mean Square	F	Sig
Customer intention	Regression	14.270	1	14.270	535.555	.000 <sup>b</sup>
	Residual	153.315	382	.401		
	Total	167.584	383			

In Table 15, the model shows that there is a significant relationship between promotion and customer intention. The significant level is .000<sup>b</sup>. The positive values show that there is a positive relationship.

**Table 16:** Analysis of Simple Regression between promotion and customer intention

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	3.433	.185		18.589	.000
Promotion	.642	.041	.692	26.963	.000

In Table 16, the coefficient of the simple regression model of promotion proves the significance of the coefficient of the resource. The significant level is .000.

The coefficient of determination R-Sq is equal to 0. 685 which means the effect of the **promotion** is 68.5 % in the variation of customer intention.

#### 7.3.4 Testing the Fourth Hypothesis H4

H4- There is a positive effect of place on customers' intention to reduce water consumption.

To test the validity of the **Fourth Hypothesis (H4)**, a simple regression model was developed between customer intention as a dependent variable and place as an independent variable.

**Table 17:** Analysis of Variance between place and customer intention

<b>Dependent Variable</b>	<b>Model</b>	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig</b>
Customer intention	Regression	2.547	1	2.547	313.470	.000 <sup>b</sup>
	Residual	72.219	382	.189		
	Total	74.765	383			

In Table 17, the model shows that there is a significant relationship between place and customer intention. The significant level is .000<sup>b</sup>. The positive values show that there is a positive relationship.

**Table 18:** Analysis of Simple Regression between place and customer intention

<b>Model</b>	<b>Unstandardized Coefficients</b>		<b>Standardized Coefficients</b>	<b>T</b>	<b>Sig.</b>
	<b>B</b>	<b>Std. Error</b>	<b>Beta</b>		
<b>(Constant)</b>	4.136	.127	.485	32.636	.000
<b>Place</b>	.402	.028		23.670	.000

In Table 18, the coefficient of the simple regression model of place proves the significance of the coefficient of the resource. The significant level is .000. The coefficient of determination R-Sq is equal to 0.234 which means the effect of the **place** is 23.4 % in the variation of customer intention.

## 8. General results and recommendations

### 8.1 General results

The study reached the following conclusions:

8-1-1 The problem of water conservation is considered extremely important by the majority of respondents (more than 61%) A very small proportion of respondents (5.3%) reported that water conservation is not important.

8-1-2 Nearly 50% of respondents believe that water conservation efforts can reduce the amount of water they use.

8-1-3 More than 40% of respondents reported that water conservation efforts have partially decreased the amount of water they use by eliminating wasted water.

8-1-4 The presented data highlights the effectiveness of water conservation campaigns in influencing individuals to reduce their water consumption in various uses. It suggests that efforts to promote water-saving behaviors have been successful in certain domains, such as car washing, household washing habits, and garden watering. However, further measures may be needed to reach and engage individuals who have not significantly reduced their water consumption as a result of campaigns. Yet, more de-marketing efforts and education procedures are needed to address excessive use of water. This will help in reducing personal usage of water in households which represents a large percentage of water demand and hence it will be reflected on national consumption.

8-1-5 Gender, monthly household income and age influence the impact of water conservation efforts on water usage. Difference in education levels showed significant associations with changes in water consumption, with males and individuals with intermediate education reporting higher proportions of decreased consumption. The statistical analysis highlights the variations in decreased water usage resulting from water conservation efforts across different demographic groups. Females, individuals with lower monthly household income, and older respondents showed a higher propensity for decreasing water usage as a result of de-marketing campaigns. These findings emphasize the importance of tailoring water conservation strategies to specific demographic characteristics to effectively promote reduced water consumption.

#### 8-1-6 **The effectiveness of using the four marketing functions (4ps) in de-marketing domestic water consumption**

The results showed that

##### **A) Product**

Efforts to control water quantity available for domestic utilization consists mainly of Government efforts to curb consumption through mechanical mechanisms fixed on valves and taps to decrease water stream. Cutting out water at certain times is also sometimes used in rural areas such as Matrouh. Decreasing quantities of available water through scheduling and water cuts was relatively undesirable by consumers.

Simple regression tests showed a positive relationship between quantity controlling measures and customer intention to reduce water consumption. However the effect of the **product** is 13.2



% in the variation of customer intention. When comparing this result with the results of the other factors such as promotion, price or place, we deduce that this is the least factor that affects customer intention.

#### B) Place

Accessibility of water through water networks is another aspect that is mainly controlled by the Government and which cannot be reduced due to the essentiality of water consumption. On the contrary the Government tries to increase water networks to reach as many places as possible. Reducing accessibility was undesirable by customers.

Simple regression tests showed a positive relationship between the factor place and customer intention to reduce water consumption. The coefficient of determination R-Sq was equal to 0.182 which means the effect of the **price** is 18.2% in the variation of customer intention. This is a relatively low result reflecting the low acceptance of reducing accessibility of water due to the inflexibility of demand on water.

#### C) Price

Increasing price of unit cubic meter of water has led to varying impacts on consumption across different demographic groups. There were no significant differences based on gender, residence, and monthly household income, associated with change in prices. This is mainly due to the inflexibility of water consumption as an essential product. However, education level and age demonstrated significant associations with changes in water consumption with the increase in pricing. This is mainly due to more awareness of more educated groups who decrease wasted water with prices increase.

#### D) Promotion

The effect of the **promotion** is 68.5 % in the variation of customer intention, which is the highest value, when compared with other factors. This indicates that promotion factor has the biggest influence on customer intention and thus is the most important tool that could be used to lower water consumption and reduce wasted water.

The results showing the effectiveness of using various communication channels in de-marketing excess water consumption can be summarized as follows:

- i) The importance of de-marketing efforts through various communication channels and strategies in promoting water conservation has been confirmed by the results of this study.

- ii) Traditional methods such as newspapers, T.V. and radio have proved to be more successful than more modern methods such as social media in reaching different groups and creating awareness of the problem. This means efforts using these methods should continue whilst creating more attractive ways on social media is recommended.
- iii) Advertisement signs in streets and public places have also been proven one of the most effective methods. This could be because such ads are exposed to a larger number of viewers.
- iv) Seminars in education organizations were also an effective tool to create awareness of the problem.

## **8-2 Recommendations**

In view of the results shown above we can make the following recommendations: -

- A)** This study has found out that promotion efforts of de-marketing have proved to be the most effective de-marketing function in curbing domestic water consumption amongst different demographic groups. Hence, promotional de-marketing efforts should be employed more extensively in efforts to reduce water consumption provided that campaigns are designed carefully and directed to the proper group.
- B)** Since different demographic groups respond differently to de-marketing efforts (as earlier proved) it is recommended that differences between different groups should be taken into consideration when designing campaigns including the use of different channels of communication and maybe different content.
- C)** Certain sections of the population respond more effectively to de-marketing campaigns. Females, individuals with lower monthly household income, and older respondents showed a higher propensity for decreasing water usage as a result of de-marketing campaigns. De-marketing efforts should start with groups to produce tangible results sooner.
- D)** This study indicated that de-marketing is a very useful tool in achieving national goals in the area of water consumption. The researcher therefore recommends that we should resort to de-marketing techniques in other areas of the economy where we aim to rationalize national economy e.g. electricity, irrigation water.. etc.
- E)** The researcher recommends that other researchers should pay more consideration to the branch of de-marketing as a fruitful area to conduct studies.

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