The Influence of Factors Stimulating the Consumption of Bottled Water in Malta

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Abstract: Consumption of bottled water is often referred to as one of the biggest mysteries of capitalism, in other words, the packaging and selling of something that is already more cheaply available. Within this context, this research study aims to investigate what drives Maltese customers to opt for bottled water rather than cheaper, more accessible and similarly high-quality tap water. To reach this aim, this study intends to examine the influence of factors, namely image, social norms, emerging trends, advertising, convenience, lack of public information on tap water, taste and hardness of tap water, the colour of tap water, health and safety risks associated with tap water, and irregular water supply (as independent variables) on the consumption of bottled water (as the single dependent variable). A research methodology was developed to systematically apply the research strategy adopted in this study. The two key multivariate analytic techniques implemented were factor analysis, followed by multiple regression. Whilst the former aims to condense the information contained in the initial ten independent variables into a smaller set of new independent variables with minimal loss of information, the latter aims to predict the consumption of bottled water in terms of the most influential factors.

Keywords: drinking water; multiple regression; organoleptic quality; social norms; water insecurity

Introduction:

Boastful salespersons are often quoted as saying that they “could sell ice to an Eskimo”. Nowadays, getting people to pay for something which they do not need has become commonplace. Marketing strategists realised that goods have magical powers that have nothing to do with actual needs and they have become illusionists who transform abundant goods into essential commodities. Bottled water is an exceptionally clear case of how an abundant public substance has been transformed into a valuable product. Ironically, the growth of the bottled water industry from relative obscurity into a global player occurred during a period where most western countries already had access to tap water available on a 24/7 basis, delivered directly to clients at a much cheaper price. Nowadays, in Malta, access to drinking water is as easy as the proverbial counting to three. A quick turn of the tap provides us with a constant supply of clean water which we use for drinking, cooking, and other needs. Despite this, the consumption of tap water is the lowest when compared to other European countries (Commission 2018). This outcome has even greater significance when considering the environmental repercussions of consuming bottled water.

The tap water supplied in Malta is in line with the Drinking Water Directive 98/83/EC and, thus, perfectly safe to consume. Moreover, it is delivered directly to the point of use. However, there seems to be a gap between the actual quality of tap water in Malta and the customer’s perception, which explains why tap water has remained relatively untapped.
This research study aims to investigate what drives Maltese customers to opt for bottled water rather than cheaper, more accessible, and similarly high-quality tap water. To reach this aim, this study intends to examine the influence of factors, namely image, social norms, emerging trends, advertising, convenience, lack of public information on tap water, taste and hardness of tap water, the colour of tap water, health and safety risks associated with tap water, and irregular water supply (as independent variables) identified from the literature on consumer behaviour, that is, the independent variables. Identifying and analysing the most influential factors that encourage consumers to opt for bottled water can serve as a crucial tool for the policymakers, environmental activists, and for the national water company to launch aggressive campaigns which further encourage the use of tap water and hence minimize the environmental damage caused by plastic bottles.

Various research studies analyse the significant accomplishments of the bottled water industry, particularly in attempting to understand what is convincing customers to pay for something which they already have. Within this context, (Wilk 2006: p. 305) asks a fundamental question: “why do we pay for something which can be accessed for a much cheaper price?” Various studies attempt to answer this question and identify the influences that are leading customers to opt for bottled water rather than cheaper and adequately high-quality tap water. These factors, ten in total, can be categorized into two groups. The first group, entitled “direct factors”, refers to direct elements that drive the consumption of bottled water. These include image (Etale, Jobin, and Siegrist 2018; Ferrier 2001), advertising, emerging trends, and convenience. The second group, entitled “indirect factors”, refers to elements which are discouraging people from consuming tap water and, consequently, opt for bottled water. These factors include taste and hardness of tap water (Doria 2006; Saylor, Prokopy, and Amberg 2011), colour of tap water, health and safety risks, irregular water supply, and lack of public information on tap water. These factors are further explained below.

**Image**

Product image is a vital factor affecting customer consumption as it gives the product an identity. Various scholars agree that people tend to opt for a particular product whose image or brand fits with their view of themselves, or whose image they respect, admire, or aspire to (Allen 2001; Barker, Tandy, and Stookey 1999). The concept of image has been relevant since ancient historical times. In the Roman era, mineral water was obtained directly from the underground water tables and was exclusively used by rich people and people with a higher social status. Hence, access to mineral water was considered a status symbol. Nowadays, the concept of image reflected in the symbolism of status and wealth still applies in the form of exclusive outlets for bottled mineral water, with prices exceeding well over twenty euros for half a litre bottle (Etale et al. 2018). Ferrier (2001) also suggests that the increase in people’s standards of living is also a catalyst that encouraged customers to further endorse the product image of bottled water as a means of demonstrating their wealth, as well as their high social or professional status.

**Social Norms**

Social norms are defined as cultural mores that prescribe one’s behaviour in specific circumstances. (Hechter and Opp 2001: p. 32) define norms as “rules that prescribe what people should and should not do given their social surroundings”. Scholars, including Fehr and Fischbacher (2004), state that social norms also influence the consumers’ consumption behaviour. Other authors (Brei 2018; Brei and Tadajewski 2015) also suggest that social norms are another factor that promote the consumption of bottled water. According to the authors, social norms may also determine the type of water served on certain occasions, the type of water to be served to guests, as well as to children. Social norms might also
explain why people’s preference towards tap or bottled water may change according to location.

**Emerging Trends**

Emerging trends set by the bottling companies further inspire consumers to opt for bottled water rather than tap water. One particular trend which has further fuelled the sales of bottled water has been the launch of flavoured and functional bottled water. Both types of bottled water have seen an enormous increase in popularity. Functional bottled water products include additional nutritional value such as minerals and vitamins, whilst flavoured water products include water blended with a sweet taste flavour such as strawberry, pineapple, or watermelon. Another emerging trend is the development of functional water specifically created for sports and energy use (Bullers 2002; Sloan and Adams Hutt 2012; Ward et al. 2009). To appeal to environmentally concerned customers, in the last two decades, there has also been a trend by global suppliers of bottled water to seek more environmentally friendly alternatives to minimize their environmental footprint (Noble et al. 2009).

**Advertising**

Most of the water bottle labels generally feature images taken from nature, such as mountains and springs portraying the thought that the costumers will be consuming pure natural water flowing from a mountain stream. Moreover, according to Wilk (2006), blue is the most predominant colour used in marketing campaigns of bottled water, and the bottle is usually transparent to convey the image of cleanness and purity. A report published by the National Resources Defence Council (NRDC) shows that the most common keywords used by bottling companies in their advertising campaigns include ‘natural’, ‘pure’, and ‘pristine’ (Olson, Poling, and Solomon 1999). Ferrier (2001) suggests that 10% to 15% of the price of bottled water goes towards advertising. Brei (2018) also acknowledges that various marketing campaigns of different brands of bottled water portray symbolism of nature, youth, and purity, indicating that consuming bottled water will transfer these attributes to the customer.

**Convenience**

According to several studies, convenience is also another reason that encourages the customer to buy bottled water rather than drinking tap water (Ensermu 2014). A particular study conducted by Dupont (2005) shows that more than 70% of the participants studied opted for bottled water because it was simply more convenient. Several participants interviewed by Ballantine, Ozanne, and Bayfield (2019) highlighted the importance of the convenience of bottled water especially when they were travelling or on the go. The same study also showed that convenience also encompasses practicality. Participants indicated that bottled water was easier to consume rather than fetching a glass and filling it with water. Moreover, some participants also indicated that normally a plastic bottle is thrown away after one-time use, rather than having to go to the trouble to wash the glass each time.

**Lack of Public Information on Tap Water**

Research studies show that the lack of information on water quality, mainly related to microbiological and chemical composition, together with the nutritional value of tap water, is discouraging people from using it (de Queiroz, Doria, Rosenberg, Heller, and Zhouri 2013). A survey conducted by Celik & Muhammetoglu (2008) shows that more than 80% of the participants expressed a strong desire to receive information on tap water quality.
Furthermore, the participants also showed an element of distrust in the information already provided by the tap water companies. On the other hand, in the case of bottled water, information on the water is displayed on the bottle itself and is thus more accessible and visible to the client.

**Taste and Hardness of Tap Water**

Various research studies show that customers tend to oppose tap water due to the taste of chemicals, primarily chlorine which is used for eliminating bacteria and other microbes in water (de Franca Doria, Pidgeon, and Hunter 2005; Garfí, Cadena, Sanchez-Ramos, and Ferrer 2016; Huerta-Saenz, Irigoyen, Benavides, and Mendoza 2012; Lou, Lee, and Han 2007). An IFEN report estimates that in France half of the population indicate the bad taste of water as one of the factors that pushes people away from consuming tap water. Turgeon, Rodriguez, Thériault, and Levallois (2004) show that in several Canadian regions participants identified organoleptic properties (that is, those influencing the senses) as the primary reason for consuming bottled water. The “hard” taste of water is an important element which affects organoleptic properties. Water hardness refers to the percentage of calcium and magnesium dissolved in water. Hard water implies a high dissolved rate of these elements in the water.

**Colour of Tap Water**

According to various studies, colouring in tap water is also a detrimental factor that pushes customers away from tap water, and in turn consumers bottled water. Ideally, drinking water should have no visible colour. The colouring in drinking water is mainly the result of coloured organic matter such as fulvic and humic acids linked with the humus fraction of soil. Furthermore, oxidation by iron bacteria in waters containing ferrous and manganous salts may result in rust-coloured deposits in the water. Even the corrosive process of water leaching copper from copper pipes in buildings may impart colour in water. Whilst colour in tap water may not be a factor of safety concern, it lacks appeal from an aesthetic standpoint, which in turn discourages people from consuming it (Tijssen 2018; WHO 2017).

**Health and Safety Risks**

In most of the surveys carried out to determine why people opt for bottled water over tap water, health concerns and related risks always emerge as one of the prime motives. Studies conducted in the US, Canada, and France show that a substantial segment of the interviewed participants is concerned about tap water safety, including fear of drinking toxic or contaminated water (Doria 2006). In Antalya, Turkey, Celik and Muhammetoglu (2008) revealed that more than 40% of the respondents indicated that they thought that drinking tap water leads to serious health problems, with an additional 38% indicating that tap water may cause moderate harm to human health. Past accidents of consumption of unsafe or contaminated water may also have long-lasting repercussions on the consumers’ dependence of tap water. A case in point is the water crisis in Sydney, Australia in 1998. The crisis involved the alleged contamination of tap water by the insertion of the microscopic pathogens cryptosporidium and giardia in the water network. This accident resulted in a surge in the consumption of tap water by 40% in that particular year (Stein 2000).

**Irregular Tap Water Supply**

Although it is not a highly cited factor, irregular or insufficient tap water supply may also cause customers to opt for bottled water. This issue commonly occurs in developing countries. However, this problem also occurs on regular basis in developed countries such as the United States. Natural catastrophes such as floods, earthquakes, and tornados may
force people to opt for bottled water due to lack of tap water supply. The American Public Health Association advises citizens living in regions prone to tornados to always maintain a stock of at least three gallons of bottled water per person just for drinking. The association also recommends that people living in these regions should also store bottled water at their workplace (APHA 2020).

Methods

A research methodology was developed to systematically apply and describe the research strategy adopted in this study. The first multivariate analysis considered was factor analysis followed by multiple regression analysis.

Factor Analysis

Considering the large amount of independent variables, factor analysis was aimed at finding a way of condensing the information contained in the ten independent variables into a smaller set of independent variables with minimal loss of information, that is, through data reduction techniques. By grouping the ten independent variables into a smaller number of composite factors, the subsequent multivariate technique could be made more parsimonious.

Data was collected through a self-administered questionnaire containing twenty-nine questions. By carrying out a survey, attributes of a large population can be defined from a small group of individuals (Creswell 2003). The questionnaire was based on a number of statements that reflect the identified list of factors. In the questionnaire, the statements were presented to the participants as multiple Likert-scale items based on a scale from “strongly agree” to “strongly disagree”. The target population for this research is the Maltese population. The total population in Malta was estimated at 493,559 citizens in 2019, based on the latest figures issued by the National Statistics Office (NSO 2019). A sample size calculator was used to compute the sample size needed for the pre-test. At a confidence level of 95% and a confidence interval of 10%, the sample size required amounted to 96 respondents, thus, at least 96 valid questionnaire responses were required to fulfil the factor analysis. The formulation of the questionnaire is also grounded in ethics. During the questionnaire design process, it was ensured that no personal information such as full names, addresses, phone numbers or email addresses were requested. Informed and voluntary consent is another key consideration that was taken into account. Various studies indicate that prospective participants should make informed choices about whether or not to consent to participate. Moreover, the participants were informed explicitly that they were free to leave the study at any time without jeopardy. Participants also had the right to withdraw their data retrospectively after it was collected.

Following data collection, the next task was to identify the method of extraction and select the criteria to ultimately choose the factors with the highest variance. For the method of extracting factors, the principal component analysis was selected. Based on Hair et al. (2010), principal component analysis is suitable for this analysis mainly because it is adopted for situations where data reduction is the primary concern, i.e. to identify the minimum number of factors needed to represent the maximum portion of the total variance represented in the original set of variables. The percentage of variance criterion analysis was also performed. The aim is to ensure practical significance for the derived factors by confirming that at least a specified amount of variance is explained. Although no definite threshold is advocated, Creswell and Creswell (2017) indicate that in social sciences a solution with a cumulative percentage of 60 is normally considered as satisfactory.
The ultimate aim of the factor analysis is the interpretation which determines whether the initial set of variables can be categorized and interpreted within newly generated variables. To assist in the process of interpreting the factor structure and identify a final factor solution, an orthogonal varimax rotation method using kaiser normalisation was adopted. According to Hair et al. (2010), this process is widely used and is a suitable method when the ultimate goal is that of data reduction into a smaller number of representative variables. Once the rotated component matrix is performed, the subsequent task would be to examine the factor matrix and to ultimately re-specify the factor model. This would include the revision of the intimal conceptual framework and the redefinition of the initial hypothesis.

Multiple Regression Analysis

Following the outcomes of the factor analyses, multiple regression was subsequently implemented. This entailed analysing the revised independent variables as antecedents on the dependent variable to determine the most influential factors. Multiple regression was subsequently identified as the most suitable. The objective of multiple regression is to predict the dependent variable in terms of a set of independent variables. In doing so, a relationship between the dependent and independent variables can be established. Subsequently, the magnitude and significance of the regression coefficient of each independent variable can be analysed.

The new set of variables which emerge from factor analysis will serve as the set of independent factors for multiple regression purposes. The dependent factor will remain unchanged. All the variables are metric in nature and are quantified through a set of Likert scale questions laid out in a second questionnaire. Following the outcomes of the factor analysis, the second questionnaire was updated to ensure that the items are grouped according to the new independent variable set.

Several assumptions must be considered to ensure linear regression. If these assumptions are not met, it can lead to untrustworthy outcomes. One of the primary assumptions in regression is that variables have a normal distribution. Multiple regression is also based on the concept of a linear relationship between the dependent and independent variable. Linear models forecast values that fall in a straight line by having a constant unit change of the dependent variable for a constant unit change of the independent variable. The assumption of homoscedasticity is also critical to the proper application of linear regression. Homoscedasticity refers to a situation in which what is termed as the error term (e), i.e. the random disturbance in the relationship between the dependent and independent variable, is constant for all the values of the independent variables. Testing for multicollinearity is also performed to check if the predictors are correlated. Multicollinearity occurs when the predictors are highly correlated with each other. This is undesirable when fitting regression models because a small change in data can make the regression coefficient change considerably.

After addressing the assumptions of linear regression, the next phase involved assessing the overall model fit. The ANOVA model provides the statistical test for the overall model fit, i.e. to check whether the independent variables reliably predict the dependent variable. If the P-value is less than 0.05 then it can be safely concluded that the independent variables reliably predict the dependent variable (Hair et al., 2010). Once the regression model is defined, the ultimate stage is to interpret the regression variate by examining the regression coefficients \( b_1 \) for their explanation of the dependent variate.
Results and Discussion

This section aims to present the results of the factor analysis followed by the multiple regression analysis.

Factor Analysis

Following the collection of data, each response was checked to ensure its validity, i.e. the extent to which a scale or set of measures accurately represents the concept of interest. In total, 115 responses were received of which eight responses were eliminated because the participants selected the same answers (for example “Strongly Agree”) for almost all the statements in the questionnaire, thus also suggesting inattentive responding. Cronbach’s alpha test was conducted for the 10 independent variables to measure the reliability/alpha coefficient. This test is a measure of internal consistency, that is, how closely related a set of items are as a group. The alpha coefficient was found to be at 0.712, which is considered as an acceptable level of internal consistency (Hair et al. 2010). The communalities, derived from the percentage of variance criterion, explain the extent to which a component correlates with all the other components. In particular, the extraction column indicates the proportion of each variable’s variance that can be explained by the retained factors. According to various scholars, an extraction value of less than 0.5 is unacceptable (Freund and Perles 2007; Tabachnick and Fidell 1996). From the results achieved, presented in Table 1, all the extraction values exceed this level of criterion and thus, all items can be considered as valid.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Initial</th>
<th>Extraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social_Norms</td>
<td>1.000</td>
<td>.571</td>
</tr>
<tr>
<td>Emerging_trends</td>
<td>1.000</td>
<td>.693</td>
</tr>
<tr>
<td>Advertising</td>
<td>1.000</td>
<td>.751</td>
</tr>
<tr>
<td>Convenience</td>
<td>1.000</td>
<td>.598</td>
</tr>
<tr>
<td>Taste_Hardness</td>
<td>1.000</td>
<td>.625</td>
</tr>
<tr>
<td>Smell_Colour</td>
<td>1.000</td>
<td>.657</td>
</tr>
<tr>
<td>Health_Safety</td>
<td>1.000</td>
<td>.564</td>
</tr>
<tr>
<td>Irregular_tap_water_supply</td>
<td>1.000</td>
<td>.881</td>
</tr>
<tr>
<td>Lack_of_public_information</td>
<td>1.000</td>
<td>.642</td>
</tr>
<tr>
<td>Image</td>
<td>1.000</td>
<td>.539</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.

Table 1: Communalities

The percentage of variance criterion, computed using the principal component analysis was the primary approach selected to identify the number of factors to extract. This approach is based on attaining a specified cumulative percentage of total variance extracted by successive factors. As can be observed from Table 1, the first column shows the eigenvalue/latent root which represents the amount of variance in terms of a factor. The total sum of eigenvalues equals the number of components. The second column displays the variance of each component with the components in the first rows possessing the largest percentage variance whilst the components in the last rows have the lowest percentage variance. The third column provides the cumulative percentage of variance. The extraction was based on
eigenvalues greater than 1. Eigenvalues less than 1.00 are not considered to be significant and should be disregarded (Girden 1992; Hair et al. 2010). Based on these instructions, the second part of Table 2, labelled “Extraction Sums of Squared Loadings”, presents only those factors that met this cut-off criterion. Therefore, the number of factors to be extracted is four, which in total explain 65% of the total variance. This outcome implies reducing the complexity of the data set from 10 variables to 4 new variables, with only a 35% loss of information. Although there are no specific guidelines on the absolute threshold of cumulative percentage of variance, the results obtained tally with Hair’s guidelines which indicate that in social science studies, solutions that account for 60 per cent of the total variance are deemed as satisfactory (Hair et al. 2010).

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Extraction Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Variance</td>
</tr>
<tr>
<td>1</td>
<td>2.913</td>
<td>29.133</td>
</tr>
<tr>
<td>2</td>
<td>1.281</td>
<td>12.815</td>
</tr>
<tr>
<td>3</td>
<td>1.245</td>
<td>12.451</td>
</tr>
<tr>
<td>4</td>
<td>1.081</td>
<td>10.815</td>
</tr>
<tr>
<td>5</td>
<td>.864</td>
<td>8.637</td>
</tr>
<tr>
<td>6</td>
<td>.739</td>
<td>7.392</td>
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<tr>
<td>7</td>
<td>.617</td>
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<tr>
<td>8</td>
<td>.567</td>
<td>5.670</td>
</tr>
<tr>
<td>9</td>
<td>.397</td>
<td>3.967</td>
</tr>
<tr>
<td>10</td>
<td>.295</td>
<td>2.949</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.

Table 2: Total variance explained

With the factors duly extracted, the next step is the analysis of the rotated component matrix. Ultimately, the interpretation of the rotated component matrix is instrumental in achieving the objective of factor analysis, i.e. the reduction of the ten original variables into a new set of four underlying factors. The outcomes of the rotated component matrix are essential to evaluate the factor loadings for each component and to determine each component’s role and influence in establishing the factor structure. Table 3 presents the rotated component matrix computed with the varimax kaiser normalization. As can be observed, the rotated component matrix is composed of five columns. The first column shows the original variables, each representing an independent factor. The other four columns are the results for the four extracted factors. As can be noted, the highest value for each variable is marked in yellow, indicating moderate to significant correlation to the respective component. Various scholars agree that correlations of less than 0.4 should be regarded as trivial. Rotation converged in eight iterations. A closer examination shows that the first component is most highly correlated with image, social norms, emerging trends, advertising, and lack of public information. The second component is most highly correlated with convenience and irregular tap water supply. The third component is most highly correlated with taste and hardness of tap water and smell and colour of tap water. The fourth component is most highly correlated with health and safety risks associated with tap water.
Table 3: Rotated component matrix

<table>
<thead>
<tr>
<th>Component</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image</td>
<td>.679</td>
<td>-.282</td>
<td>-.007</td>
<td>-.173</td>
</tr>
<tr>
<td>Social_Norms</td>
<td>.821</td>
<td>.110</td>
<td>-.032</td>
<td>.079</td>
</tr>
<tr>
<td>Emerging_trends</td>
<td>.738</td>
<td>.305</td>
<td>-.101</td>
<td>.179</td>
</tr>
<tr>
<td>Advertising</td>
<td>.694</td>
<td>.266</td>
<td>.214</td>
<td>.023</td>
</tr>
<tr>
<td>Convenience</td>
<td>.220</td>
<td>.682</td>
<td>-.319</td>
<td>-.100</td>
</tr>
<tr>
<td>Taste_Hardness</td>
<td>.063</td>
<td>.356</td>
<td>.620</td>
<td>-.377</td>
</tr>
<tr>
<td>Colour</td>
<td>.087</td>
<td>-.096</td>
<td>.727</td>
<td>.133</td>
</tr>
<tr>
<td>Health_Safety</td>
<td>.071</td>
<td>.063</td>
<td>.047</td>
<td>.932</td>
</tr>
<tr>
<td>Irregular_tap_water_supply</td>
<td>.000</td>
<td>.754</td>
<td>.241</td>
<td>.120</td>
</tr>
<tr>
<td>Lack_of_public_information</td>
<td>.614</td>
<td>-.017</td>
<td>.400</td>
<td>.049</td>
</tr>
</tbody>
</table>


a. Rotation converged in 6 iterations.

The rotated component matrix provided a means for reducing the original set of ten variables into four new components. As previously indicated, the first component groups image, social norms, emerging trends, advertising and lack of public information variables. These original set of variables were grouped under a new variable labelled as ‘social influences’. Social influences is defined as the means which causes people to change their emotions, behaviour, and opinion to meet the demands of a social environment (Izuma 2017). In their study, Prasad and Jha (2014) demonstrate how social factors greatly influence consumer behaviour. Social factors can take different forms including marketing, hence the inclusion of the ‘advertising’ and ‘emerging trends’ variables. The influence of family members, friends, and work colleagues are also major social influences, thus the addition of the ‘social norms’ variable. Social status is another attribute of social influences on consumer buying decisions. Social status refers to the position that people have in social groups or societies based on factors such as wealth, education or occupation (Lautiainen 2015). Henceforth, within this context, the ‘image’ variable can also be grouped under social influences. Lastly, even the variable ‘lack of public information’ on tap water was grouped under social influence. Lack of public information on tap water or the product information on bottled water may lead to the formation of societal opinions among citizens which might give rise to consensus formation that for instance tap water is not fit for consumption.

The second new variable, named ‘Low Organoleptic Quality of Tap Water’, encompasses the original variables ‘Taste and Hardness of tap water’ and ‘Colour of tap water’. These two factors are the direct characteristics of water quality. However, the World Health Organization (WHO) Guideline for Drinking-water Quality (GDWQ) as well as the Drinking Water Directive 98/83/EC also list other quality parameters such as safety, purity, amount of micro-organisms, as well as microbiological and chemical parameters (WHO 2017). To avoid misinterpretation, the terminology organoleptic quality was coined, i.e. the evaluation of water based on taste, colour, and/or odour. Hence, both the variables ‘Taste and hardness
of tap water’ and ‘Colour of tap water’ can be grouped directly under low organoleptic quality of tap water.

The third new variable was defined as ‘Tap Water Insecurity’. It replaces the original variable ‘Health and Safety risk associated with tap water’. The definition of this new variable is based on Parasuraman, Zeithalm and Berry's service Quality model (PZB model). The PZB model defines security as ‘freedom from danger, risk or doubt’ (Franceschini, Galetto, and Turina 2010). Hence, the tap water insecurity variable indicates the customer’s willingness to consume bottled water without any concerns about health and safety risks which are normally associated with tap water.

The last variable, termed ‘accessibility’, groups the ‘irregular water supply’ and the ‘convenience’ variables. Mats (2018) defines accessibility as the proportion of the population supplied with reliable and immediate drinking water. The convenience variable emphasised the customers’ demand for bottled water, especially when they are travelling or ‘on the go’ hence emphasising the importance of instant accessibility. The other original variable, ‘irregular water supply’, underlines the issue of unreliable tap water supply, therefore the inaccessibility of tap water, which in return forces customers to resort to bottled water.

Multiple Regression Analysis

A reliability test was carried out again on the new data set composed of the new independent factors and the dependent factor. The new alpha value is 0.710, thus suggesting adequate internal consistency. After ensuring that the assumptions in multiple regression analysis were met, the next phase involved assessing the overall model fit. The ANOVA presented in Table 4 describes the overall variance accounted for in the model. This test assesses whether the R square proportion of variance in the dependent variable accounted for by the predictors is zero. If the null hypothesis is valid, then that would indicate that the slope of the regression line may be zero and that there is not sufficient evidence at the 95% confidence level that a significant linear relationship exists between the dependent and independent variables. However, from the results below, it can be noted that the P-value is less than the 0.05 criterion, suggesting 95% confidence that the slope of the regression line is not zero and, hence, there is a significant linear relationship between the dependent and independent variables. The F-ratio in this model is 17.125, implying that the improvement in prediction as a result of fitting the model is 17.125 times that of using the mean as ‘best guess’.

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
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<tbody>
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<td>3.891</td>
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<td></td>
<td>Residual</td>
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<td>.227</td>
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<tr>
<td></td>
<td>Total</td>
<td>44.878</td>
<td>133</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Consumption_Behaviour
b. Predictors: (Constant), Accessibility, Organoleptic_Quality, Security, Social_Influences

Table 4: ANOVA

Apart from the collinearity statistics, in Table 5, two other important outputs are the regression coefficients (B and Beta) which indicate the change in the dependent measure for each unit change in the independent variable. The comparison between the regression coefficients allows for a relative assessment of each variable's importance in the regression model.
<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>2.113</td>
<td>.294</td>
</tr>
<tr>
<td></td>
<td>Social Influences</td>
<td>.134</td>
<td>.057</td>
</tr>
<tr>
<td></td>
<td>Organoleptic Quality</td>
<td>.291</td>
<td>.071</td>
</tr>
<tr>
<td></td>
<td>Tap Water Insecurity</td>
<td>.234</td>
<td>.060</td>
</tr>
<tr>
<td></td>
<td>Accessibility</td>
<td>.005</td>
<td>.056</td>
</tr>
</tbody>
</table>

*a. Dependent Variable: Consumption_Behaviour

Table 5: Coefficients

It can be observed that the unstandardized (since the same unit of measurement was used throughout) regression coefficient (B) for Organoleptic Quality is 0.291, followed by Tap Water Insecurity (0.234), Social Influences (0.134) and, lastly, Accessibility at 0.005. Thus, in this model, it emerges that Organoleptic Quality and Tap Water Insecurity stand out as being the most important predictors of this outcome. Besides the high B value, both predictors are statistically significant at 0.000 level of significance. The two other predictors, i.e. Social Influences and Accessibility, are less important. In particular, Accessibility should not be considered as it is not statistically significant (0.09). Thus, using the “B” column under the “Unstandardized Coefficients” column, the regression equation can be presented as:

\[ Y = 2.113 + (0.234 \times \text{Tap\_Water\_Insecurity}) + (0.291 \times \text{Low\_Organoleptic\_Quality\_of\_Tap\_Water}) + (0.134 \times \text{Social\_Influences}) \]

**Conclusion**

The independent variable ‘Low Organoleptic Quality of Tap Water’ was the variable with the strongest positive relationship to the dependent variable. In the final regression model, this variable had the highest regression coefficient, i.e. 0.292 at a significance level of 0.000. Thus, this proves the hypotheses that the lower the organoleptic quality of tap water, the higher consumption rate of bottled water. This independent factor encompasses the original variables ‘Taste and Hardness of Tap Water’ and ‘Colour of Tap Water’. The second significant independent factor to exhibit strong correlation with the dependent variable was ‘Tap Water Insecurity’. This variable has a regression coefficient of 0.235 and a beta weight of 0.314 at a significance level of 0.001. This variable proves the hypothesis that the higher the perceived safety of bottled water, the higher the consumption. The perception that bottled water is safer than tap water also features in numerous other studies carried out in Western countries.

The independent variable ‘Social Influences’ exhibited the third strongest significant positive relationship with the dependent variable. The regression coefficient for this variable is 0.136, complemented by a beta weight of 0.193 at a significance level of 0.005.
This proves the hypothesis that the larger the social influences, the higher the consumption rate of bottled water. This variable is composed of five original variables, i.e. Image, Social Norms, Emerging Trends, Advertising, and Lack of Public Information on Tap Water. These results also tally with the outcomes of other European studies which indicate that social influences together with psychological factors play a key role in water consumption choice (Etale et al. 2018). Although in this study Social Influences emerged as an extremely effective measure, on a local level, its role in tackling consumption behaviour is still underestimated.

A limitation to this study would be the randomness of the sample selected as, notwithstanding all efforts to seek randomness, the use of the online survey approach could not guarantee a truly random sample. Efforts to eliminate response bias were made to reduce the impact of this limitation.

References


