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BOTTLEMANIA: THE BOTTLED DRINKING WATER BOOM IN ZIMBABWE WITH A SPECIAL FOCUS ON HARARE

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Abstract:
There has been a rapid growth of the bottled drinking water industry in Zimbabwe in the past two decades. However, despite such a phenomenal growth, there have been no studies to systematically analyse the characteristics and implications of the bottled drinking water industry in the country. This study, therefore, assesses the rapid growth of the bottled water industry in Zimbabwe with a particular focus on Harare, the capital. The specific objectives of the study were: to examine factors behind the bottled drinking water boom; to identify any issues in the country's bottled drinking water industry; and, to suggest recommendations based on the study findings. Primary data for the study were obtained through a questionnaire, structured interviews, observation and chemical analysis of sampled bottled drinking water brands. The study identified various reasons behind the bottled water boom in Harare, including declining municipal tap water quality amid rapidly rising water demand. The study also uncovered various issues in the country's bottled water industry, including bottled drinking water quality concerns and high bottled drinking water costs. The above issues have arisen largely due to an absence of a robust and comprehensive institutional framework to govern the rapidly expanding bottled water industry in Zimbabwe. The study recommends the setting up of a clear-cut bottled drinking water policy framework, as a matter of urgency, to enable an effective and sustainable contribution of bottled drinking water in meeting rising water demand in the country.

Keywords: bottled drinking water, urban water supply, potable water, water demand, water quality, chemical water analysis, Harare

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1. Introduction

Presumably, water has been bottled since the advent of bottles dating to the time of the first clay vessels thousands of years ago (Robins et al, 2010). However, water as a marketed commodity, specifically bottled for resale and consumption at distant places, is a relatively recent phenomenon (Robins et al, 2010; Cech, 2003). The earliest markets for bottled water were rooted in the perceived health benefits of 'spa waters' sourced at hot springs throughout Europe in the 1700s (Robins et al, 2010). Advances in chemistry in the 1800s, however, disproved most of the purported health benefits of spring water, resulting in a sharp decline in sales (Senior and Dege, 2005). In addition, the passage of the Pure Food and Drug Act of 1907 in the United States, followed by similar moves around the world, spelled the end of widespread medicinal use of spring water. The above developments notwithstanding, the persistence of a perception that bottled mineral waters are healthful and scarce helped sustain bottled water drinking throughout the nineteenth century (Robins et al, 2010).

By the beginning of the twentieth century, 'artesian' spring waters and other waters from natural sources entered a new market phase especially throughout North America and also Europe (Robins et al, 2010; Royte, 2008). These waters were still typically associated with spring waters as therapeutic retreats and baths. Such bottled products were therefore elite, expensive, and not typically consumed by average people who were just beginning to receive reliable modern municipal tap water. Later in the twentieth century, bottled water became more common and broadly distributed in industrialised countries, especially in commercial settings. Beginning in the 1970s, elite international brands of waters such as Evian and Perrier, began to make their way into consumer markets, though this did not change typical water consumption patterns as the products covered a small niche market (Wilk, 2006; Opel, 1999; Robins et al, 2010). In the 1990s, an incredible acceleration of bottled water consumption began around the world. Between 2002 and 2007, global consumption of bottled water of all kinds grew from 34 billion to 49 billion gallons annually, representing a 7.6% annual increase over the period. Bottled water now represents a massive growing economy (Robins et al, 2010). For instance, in 2007, sales of bottled water in the United States alone amounted to 11 billion dollars, and today bottled water ranks second in terms of sales for all beverages in the United States, behind only carbonated soft drinks (Robins et al, 2010).

By 2009, an enormous range of bottled water products had become available to consumers across the globe. These bottled waters are very different, and include (Senior and Dege, 2005; Robbins et al, 2010):

- Spring water and 'artesian' spring water – This is water drawn from a single underground water source. Spring water can flow naturally or be forced to the surface by pumping. In the case of 'artesian' water, this merely represents ground water from a confined aquifer where the water source flows to the surface.

- Mineral water – To be considered real mineral water, the water must contain 250 parts per million of minerals, and they must occur naturally and be derived from the water source. The actual minerals typically vary enormously, but might include calcium, sodium, magnesium, and fluoride, among others, thereby accounting for the distinct taste.
- Purified water–By far the most common form of bottled water, this is water that may come from surface water sources like rivers and streams, but often comes from a municipal source. The water is treated through filtration, and perhaps through reverse osmosis or other related techniques. This is not much more than expensive tap water and represents the vast majority of the bottled water market.
- Fortified products – This includes a range of new bottled waters with additional nutritional additives, like vitamins or electrolytes.

In part, the rise of bottled water consumption, in both poorer and wealthier countries, arises from a perception (both justified and unjustified) that traditional and municipal water sources have been compromised (Robins et al, 2010; Royte, 2008). Outbreaks of water-borne diseases, nitrogen alerts, and other crisis events across the globe, have certainly contributed to consumer concerns over municipal water quality. In addition, there is a feeling amongst consumers, especially in wealthy countries, that bottled water is natural, which associates it with healthy and environmentally friendly living (Opel, 1999; Robins et al, 2010; Karl, 1982). In many developing countries on the other hand, including Mexico, India and Egypt, water systems have been drastically transformed in recent years, thereby driving demand for bottled water. In part, this demand has been a result of significant urbanisation where the capacity of municipal services to keep up with demand has been outstripped (Cech, 2003; Robins et al, 2010). In other countries around the world, there has been a change in the way water is owned and managed. In many of these countries, water services have been privatised, often as a result of poor state management, with the distribution of water now governed through water markets (Robins et al, 2010; Cech, 2003). In such cases, the purchase of water, in bottles or directly from tanker trucks, is increasingly becoming common.

There has been a marked proliferation of bottled drinking water in Zimbabwe since the turn of the twenty-first century. However, despite the recent proliferation of bottled drinking water and its growing contribution to potable water provision, especially in the urban areas, there has not been any systematic analysis of the reasons behind the bottled water boom, its characteristics and implications. The objectives of the current study are: to examine the factors behind the boom in bottled drinking water in Zimbabwe, with a special focus on Harare, the capital; to identify any issues concerning bottled drinking water, and; to suggest recommendations based on the study findings, so as to enhance the contribution of bottled drinking water to potable water supply in the country.

2. Methodology

2.1 Study site

The study was conducted in Harare (Figure 1), the capital city of Zimbabwe. The choice of the study site was determined by a number of factors. First, a huge majority of the bottled drinking water entities in the country are headquartered in Harare, thereby making it much easier to access the various bottled water brands. Second, most of the reasons for the boom in the bottled water sector, which is one of the objectives of the study, seemed to manifest more clearly in the capital city. Another reason for the choice of Harare as a case for studying bottled drinking water in Zimbabwe was that all the key informants for the study, just as with the bottled water entities mentioned earlier, were also domiciled in Harare. Harare had a total population of 2 098 199 in 2012 (Central Statistical Office, 2012), which connotes a huge demand for water for domestic, institutional and industrial, among other needs.

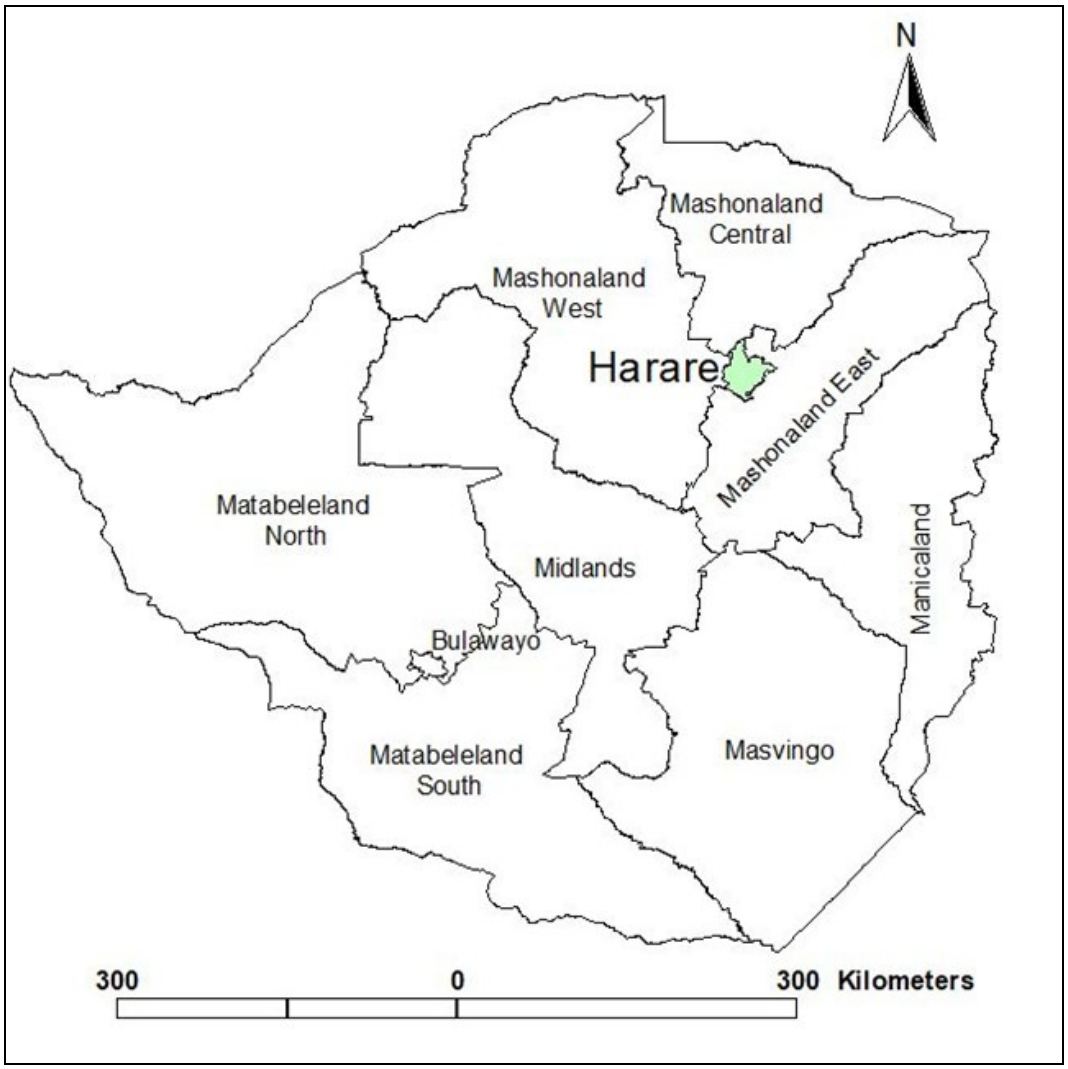

Figure 1: Location of Harare

2.2 Data collection and analysis

The study employed mixed methods in gathering primary data for addressing the research objectives. These included a questionnaire, key informant interviews and chemical analysis of bottled drinking water samples. The questionnaire targeted adult residents of Harare who had stayed in the city for the past one-and-a-half to two decades. Among the information solicited by the questionnaire included perceived reasons for the boom in bottled drinking water, perceptions on the quality of bottled drinking water in comparison with municipal tap water, and other issues related to bottled drinking water. The questionnaire respondents were randomly selected from the city centre during lunch time. The researchers, with the help of some research assistants, visited various eating places for questionnaire administration. This approach was quite convenient as respondents were interviewed while enjoying their meals, which enhanced cooperation from the respondents. The other advantage of this questionnaire administration approach was that it enabled the researchers to meet many people, and of different socio-economic statuses, within relatively short periods of time, thereby saving on time. A total of 50 questionnaire respondents were successfully interviewed.

Various key informants were also interviewed so as to gather in-depth information on bottled drinking water in Zimbabwe. These included representatives from organisations that are key in the bottled drinking water sector such as the Standards Association of Zimbabwe (SAZ), Consumer Council of Zimbabwe (CCZ) and the Food Safety Advisory Board (FSAB). Among the key informants were also representatives from some of the bottled drinking water entities. Purposive sampling was used in selecting the key informants.

Chemical analysis of bottled drinking water samples was also conducted so as to evaluate the potability of the bottled water. The bottled water samples were randomly selected from the shelves of shops and supermarkets across the city centre. The test results were then compared with the Food and Food Standards Natural Mineral Water and Bottled Drinking Water Regulations, which are more or less similar to the World Health Organisation (WHO) drinking water guidelines. The water parameters that were tested included pH, electrical conductivity (EC), dissolved oxygen (DO) and total dissolved solids (TDS).A total of 14 bottled water samples from different producers were collected for testing. Additionally, a sample of Harare's municipal tap water was also collected. This was quite crucial for comparison purposes between municipal and bottled drinking water. The collected bottled water samples constituted about half of the total bottled drinking water brands currently on the consumer market and, therefore, were quite representative of the country's bottled drinking waters. The actual names of the bottled drinking water brands were, however, withheld and replaced by letters of the Arabic alphabet. This was done so as to avoid possible litigations from the various bottled water brands sampled for the study.

3. Results and Discussion

At the turn of this century, there were just about five bottled drinking water brands on the consumer market in Zimbabwe. Today there are over 20 bottled drinking water brands, which is indicative of a phenomenal growth of the bottled water industry in the country. This represents an over 400% growth of bottled drinking water products in the country in just two decades. One of the study objectives, naturally, was to assess the reasons behind the bottled drinking water boom in Zimbabwe, with a special focus on the capital, Harare. Table 1 summarises reasons by questionnaire respondents for the marked growth in the bottled drinking water sector.

Table 1: Reasons behind the bottled drinking water boom in Harare
(multiple responses per respondent were permitted)

Reasons for the bottled drinking water boom in Harare	**% frequency (n=50)**
Rapidly growing demand for water	93
Declining municipal tap water quality	89
Huge business potential of bottled drinking water	86

As shown in Table 1, 93% of the questionnaire respondents attributed the boom in the bottled drinking water industry to the rapidly growing demand for water in Harare. According to the 2012 National Population Census, Harare had a total population of 2 098 199 people, representing 16% of the national population, a total household population of 531 967, and a population density of 2 406 people per square kilometre (Central Statistical Office, 2012). The capital city, which is also a province in its own right, had the largest population as a proportion of the national population among all the ten provinces of the country.

Harare registered a one percent population growth rate from the 2002 census. The large population of Harare has offered a huge challenge in terms of provision of adequate municipal tap water. Harare requires about 800 to 900 mega litres of treated water daily, but current treatment and pumping capacity can only produce about 500 mega litres, thereby creating a huge water deficit of 300 to 400 mega litres (Chigonda, 2011). A similar situation in terms of water provision also manifests in most of the other major urban centres in Zimbabwe. According to AMCOW (2011), on average, 40% of urban households in Zimbabwe were not covered with municipal tap water. In 1990, only 3% of urban households were not connected to municipal water (AMCOW, 2011), which is indicative of the increasing failure by the majority of the country's urban authorities to provide adequate water to their residents. The huge and growing unmet urban water demand in the country has thus spurred the growth of the bottled water sector. Interviews with various key informants also highlighted, unanimously, the importance of the rapidly growing, and unmet, water demand in Harare as one of the key drivers of the boom in the bottled drinking water industry.

Another factor behind the boom in bottled drinking water highlighted by questionnaire respondents in Harare concerned declining municipal tap water quality,

which was affirmed by 89% of the questionnaire respondents. With a monthly water treatment chemicals' bill of over US$450 000 (Chigonda, 2011), financial constraints have increasingly seen Harare City Council failing to secure these chemicals, which has compromised the quality of tap water. This has meant that, even in those suburbs or households connected to municipal tap water, residents now have doubts over the safety and potability of the tap water.

In addition, a study spearheaded by WHO on tap water, randomly picked boreholes, and dug-out wells in Harare, the three major sources of domestic water in the city, respectively, reported these as not meeting recommended guidelines for drinking water due to rising environmental pollution levels and rising water treatment costs (The Herald, 2009). In 2008, Zimbabwe experienced a cholera outbreak across the country. Since September 2018, a decade later, the country is also currently experiencing another outbreak of the diarrhoeal disease. The above outbreaks have been linked to poor, and declining, water and sanitation infrastructure since the turn of the century consequent upon the economic challenges facing the country, and especially in the urban areas. This has forced some people to seek alternative water sources particularly for drinking, which has seen the demand for bottled drinking water increasing over the years.

Eighty six percent (86%) of the questionnaire respondents attributed the growth in the bottled water industry to the business potential of bottled drinking water. This was also echoed by most of the key informants who indicated that, unlike other business ventures requiring higher capital investments, the bottled drinking water sector are relatively less capital intensive, thereby making it an attractive investment destination for many potential investors. In light of the earlier noted rising demand for domestic water amid declining municipal tap water quality in Harare, bottled drinking water has naturally grown into an alternative potable water source. All of the bottled drinking water brands sampled and tested were purified water, sourced either from municipal tap water, ground water or other sources.

The other objective of the study was, in light of the rapidly growing bottled drinking water industry highlighted above, to identify any issues surrounding bottled drinking water. One of the identified issues concerned the quality or potability of the sampled bottled drinking water brands. Table 2 reveals the chemical analysis results of the bottled drinking water samples and also of Harare municipal tap water. As noted earlier, the tested water parameters were then compared with the Food and Food Standards Natural Mineral Water and Bottled Drinking Water Regulations, so as to evaluate water potability.

Table 2: Chemical properties of sampled bottled drinking waters and municipal tap water

Bottled drinking water samples	Water test parameters			
	pH	**EC**	**DO**	**TDS**
A	6.52	63.9µS/cm	3.3mg/litre	40.96mg/litre
B	6.47	35.3µS/cm	1.8mg/litre	22.62mg/litre
C	6.91	62.1µS/cm	2.2mg/litre	39.81mg/litre
D	7.07	0.373mS/cm	3.3mg/litre	186.5mg/litre
E	6.76	159.8µS/cm	2.3mg/litre	102.44mg/litre
F	6.17	6.6µS/cm	0.7mg/litre	4.23mg/litre
G	6.21	24.6µS/cm	1.5mg/litre	15.77mg/litre
H	6.93	45.5µS/cm	1.3mg/litre	29.17mg/litre
I	3.64	47.5µS/cm	0.3mg/litre	30.45mg/litre
J	5.63	23.4µS/cm	1.4mg/litre	15.00mg/litre
K	6.81	194.8µS/cm	2.3mg/litre	124.68mg/litre
L	6.23	26.5µS/cm	1.6mg/litre	16.99mg/litre
M	6.58	23.4µS/cm	1.6mg/litre	15.00mg/litre
N	6.72	14.8µS/cm	1.1mg/litre	9.49mg/litre
Harare tap water	6.58	0.36mS/cm	1.4mg/litre	180.00mg/litre
Food and food standards natural mineral water and bottled drinking water regulations (maximum)	6.5 – 8.5	400mS/cm	10	100

As shown in Table 1, 6 out of the 14 bottled drinking water samples, that is 43% of the sampled bottled water brands, had pH readings that were outside the recommended pH range for bottled drinking water of 6.5 – 8.5 as stipulated by the Food and Food Standards Natural Mineral Water and Bottled Drinking Water Regulations. All the six bottled water samples had pH values of less than 6.5, while the highest and lowest pH readings for all the bottled drinking water samples were 7.07 and 3.64 respectively, which is indicative of a high acidity for the bottled drinking waters. Only one bottled water sample was above 7, the neutral point on the pH scale. With such a sizeable number of the sampled bottled drinking water brands failing to meet the pH guidelines, this raises some serious quality concerns on bottled drinking water in Zimbabwe. The negative health impacts associated with acidic drinking water, and acidic foodstuffs in general, are now relatively well known (World Health Organization, 2003). It is important to note that Harare municipal tap water fell within the stipulated pH range. The importance of the municipal tap water pH test result lies in the fact that, as indicated earlier, 89% of the questionnaire respondents highlighted declining municipal tap water quality as one of the major reasons for the boom in bottled drinking water in Harare. This challenges the commonly held view that bottled drinking water is of better quality compared to tap water.

Another quality concern highlighted by the bottled drinking water test results concerns total dissolved solids (TDS) in the tested samples. The maximum allowable limit for TDS according to the Food and Food Standards Natural Mineral Water and Bottled Drinking Water Regulations is 100. Three (3) out of the 14 bottled drinking water samples, or 21%, did not meet the TDS limit. Unfortunately, municipal tap water

also did not fall within the stipulated TDS limit. While the tests for EC and DO for all the bottled drinking water samples, and also for the municipal tap water, were within the recommended ranges, the results of the pH and TDS tests indicate that bottled drinking water in the country, after all, is not as safe as it is widely purported to be. A more comprehensive status of bottled drinking water could have been revealed had, resources permitting, more chemical parameters been tested. Nonetheless, the few parameters tested are adequate for drawing meaningful conclusions on the quality of bottled drinking water in the country. It is important to note that all the bottled drinking water brands sampled had the Standards Association of Zimbabwe (SAZ) logo, indicating that they had passed the SAZ quality tests. This highlights some deficiencies in the regulatory framework for bottled drinking water in Zimbabwe. It was further revealed through interviews that the SAZ quality standards are not mandatory but voluntary and an organisation can even chose to ignore them, hence rendering them less effective.

Besides the bottled drinking water quality concerns noted above, another issue surrounding bottled drinking water highlighted by the study revolves around the affordability of bottled drinking water. All questionnaire respondents (100%) noted that bottled drinking water was not affordable to the average Zimbabwean. The average retail price for a 500ml bottle of drinking water is currently pegged at $1.Taking into consideration the daily minimum per capita water requirement of 2 litres (Gleick, 1996), one would require at least $4 per day to be able to meet this. Under the current economic environment, very few people will be able to purchase enough bottled drinking water for the day. According to the 2012 national population census, the average household size in Zimbabwe was 4.2 (Central Statistical Office, 2012). An average family would thus need about $16 per day just for purchasing drinking water. Apparently, this is way beyond the reach of the majority of the households.

4. Conclusion and Recommendations

The study has identified various reasons behind the boom in the bottled drinking water industry in Zimbabwe, and in Harare in particular, since the turn of the century. Among the identified reasons include a growing demand for water, declining tap water quality due to increasing pollution levels amidst frequent shortages of water treatment chemicals, and a high business appeal of the bottled drinking water sector among investors. A couple of issues surrounding bottled drinking water were also identified by the study, which include bottled water quality concerns and affordability to consumers. It was interesting to note that Harare municipal tap water was proven by the chemical tests to be actually better than some of the bottled waters on certain test parameters, especially pH, which questions a commonly held belief that bottled drinking water is of a higher quality compared to tap water. In this case, an important question to ask would, therefore, be whether the bottled drinking water is not just expensive tap water? Are consumers not being swindled of their money through so-

called bottled drinking water? The above issues have arisen largely due to the absence of a robust and comprehensive institutional framework governing the rapidly expanding bottled drinking water industry in Zimbabwe. The study recommends the setting up of a clear-cut bottled water policy framework as a matter of urgency, so as to enable an effective and sustainable contribution of bottled drinking water in meeting rising water demand in the country. The SAZ certification system for drinking water, which is currently voluntary, should be made mandatory and binding upon all bottled drinking water entities, thereby making it more effective in regulating bottled drinking water in Zimbabwe. In addition, the SAZ certification process for bottled drinking water should also be made more robust and fool-proof, as some of the sampled bottled water brands with the SAZ logo on them ironically failed to meet some of the requirements for bottled drinking water. Or, probably, the SAZ certification logo is being fogged by some of the bottled drinking water brands? With corruption now so rife in Zimbabwe, it is also possible that some of those directly involved with the certification of bottled drinking water could probably be receiving bribes from some of the bottled water entities.

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