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Challenges of Sachet Water Factories in Kano Metropolis: A Spatial Analysis

[1]Abdulrazak Usman, [2]Mahmoud Zubair Imam & [3]Abdulrashid Muhammad
[1&3]Federal College of Education (Technical) Bichi, Kano State, Nigeria
[2]Sa'adatu Rimi College of Education Kumbotso, PMB 3218 Kano-Nigeria

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Abstract

In Nigeria, Sachet Water Factories (SWFs) provide portable drinking Water to a countless number of Individuals, employing working age population, increase internal revenue and improve local, state and national economic growth. This study aimed at finding out the challenges faced by the Sachet Water Factories in eight (8) local government areas that make up Kano Metropolis, these include Tarauni, Dala, Ungoggo, Kumbotso, Gwale, Nassarawa, Fagge and Municipal. Snowballing sampling method was used to identify SWFs and Purposive sampling method was used in the selection of SWFs employers. Taro Yamane Formular was adopted to draw 292 samples from the total population of 1224 employees. Questionnaire was administered to SWFs employees. The results reveals that 75% of the SWFs were owned by Individuals or sole proprietorship; major challenges faced by the SWFs include access to modern technology, trust, access to water and marketing. The minor challenges are ownership structure, lack of constant power and access to capital. The study recommends that the stakeholders of SWFs, should liaise with Kano Urban Planning and Development Authority (KNUPDA) when citing new factory to avoid challenges linked to location; proper agreement should be made when forming ownership structure of SWF to avoid management disputes; constructive agreement should be formed, between SWFs managers and marketers, by establishing trust and trade cordial relation.

Keywords*: Challenges of Sachet Water Factories, Factories, Sachet Water Factory, Small-Scale Industry, Water Supply*

Corresponding Author: **Abdulrazak Usman**

Background to the Study

Globally, more than 1.42 billion people - including 450 million children – are living in areas of high or extremely high water vulnerability, according to the UNICEF. This means that 1 in 5 children worldwide do not have enough water to meet their everyday needs. The figures in Nigeria are particularly worrying, with 26.5 million Nigerian children experiencing high or extremely high water vulnerability – or 29 per cent of Nigerian children. This necessitated the booming of sachet water business as a means of getting portable drinking water (Francesco, 2021).

Sachet Water is commonly known as Pure Water in Nigeria. This business surfaced in most of the developing countries due to difficulties in access to portable water. Nigeria is one of such developing countries that engages in Sachet Water Business (SWB) (Addo *et al.,* 2020). Portable drinking water were provided by both the sachet and bottled water factories for human consumption, based on preference, when needed (Nicola, *et al*., 2017; Qian, 2018; Abdullah, *et al.,* 2015). Bello *et al* (2021) reported that pipe-borne water supply in Kano has failed, as in many urban settlements in the region and it has resulted in the proliferation of water vendors.

Around 1990 the business begun and by the year 2000 attracted thousands of private entrepreneurs, due to the economic benefit (Oladimeji, 2019; Miner *et al.,* 2020). It continues to increase as a consequence of scarcity of pipe-born water, leading to the growth of Sachet Water (SWFs) across the country (Miner, *et al,* 2015; Ajala, *et al.,* 2020). The benefits of Sachet Water business are numerous. In addition to its being essential to human life; it creates employment, increases internal revenue to state and simulates economic growth (Osikanmi, *et al.,* 2020). Thus Sachet Water Business is backed by so many acts, which include: The Consumer Protection Act 66 of 1992 and Water Resources Act N 101 of 1993 (Enyidi, 2017), established to enhance supply of portable water to more than 200 million peoples and facilitate their surfacing across the six (6) Nigeria Regions, namely; North-Central, North-East, North-West, South-East, South-South and South-West (Enyidi, 2017).

The general quality of sachet and bottled water have all meet the standard set by World Health Organization (WHO) on drinking water (Justin, *et al*., 2014; Ojekunle, *et al*., 2015; Muhammad and Dansabo, 2018; Augustine, e*t al.,* 2019).Therefore, the high demands of sachet and bottled water, for drinking purposes, lead to blockage of drainage systems, increase in environmental waste and the alteration of natural environment as well as loss of soil productivity (Ezeokpube, *et al.,* 2014; Nicola, *et al.,* 2017; Chikamso, 2018; Sanni, 2019).

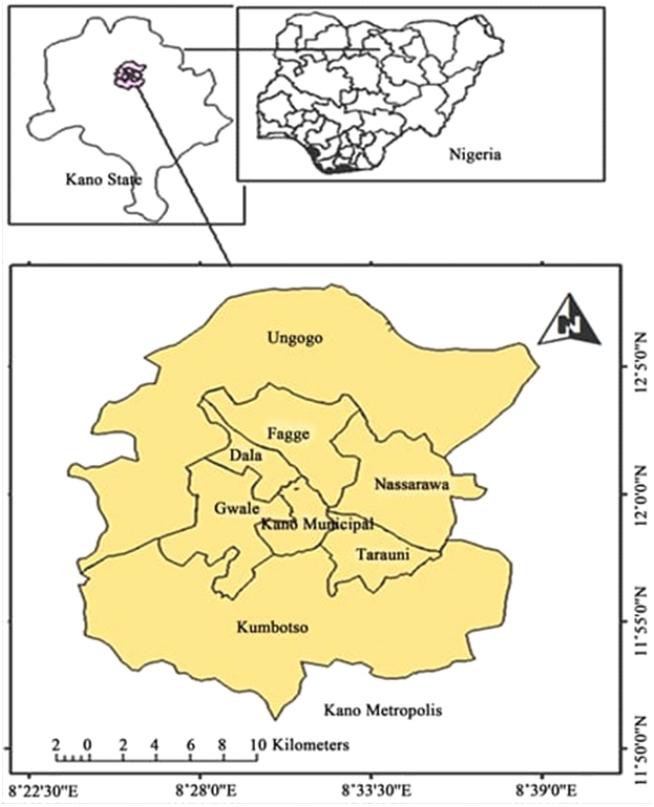
Thus, the sachet water's vendors and employers had neglected hygienic procedures (Ebenezer, et al., 2021). But there is some belief that, unhygienic drinking water, improve health of new born baby (Mohamed, *et al.,* 2018). Though, Sachet water factories are tied with the lack of the financial skills personnel, government bureaucracy and ownership structure, remain a critical challenge to the sachet water producers, at times lead to their collapse (Boame, *et al.,* 2014; (Lawrence, *et al.,* 2015; Usman and Imam, 2022).

This study, therefore, is aimed at finding out the challenges faced by Sachet Water Factories in Kano Metropolis, with a view to provide ample ways to curtail it. The research intends to fulfill the following objectives:

1. To identify the Sachet Water Factories Clusters in the study area.
2. To describe the nature of ownership structure of Sachet Water Factories in the study area.
3. To examine the challenges facing by Sachet Water Factories in the study area.

The study covered Kano Metropolis which comprises of eight (8) local government areas namely: Gwale, Ungoggo, Dala, Fagge, Kumbotso, Municipal, Tarauni and Nassarawa, of Kano State, Nigeria. The study would deal with the Employers of Sachet Water Factories and focus on the challenges faced by SWFs. Kano Metropolis covers 499 km^2 (Olofin*et al* 2014), It lies between latitudes 11° 52' N to 12° 07' N and longitudes 8° 22.5' E to 8° 47' E (Kibon and Ahmed, 2013), as shows in figure 1 below.

Figure 1: Kano Metropolis



Source: Source: Geography Dept, FCE (T) Bichi, 2022

This research would increase literature in SWF, economic geography and regional geography of Kano. In addition, it would assist the owners of Sachet Water Factories to

know the challenges faced by SWFs and the business. Identifying the clusters of SWFs would provide data on the number of SWFs, which may be of use to researchers as well as the public and private institutions, when the need arises, like in case of giving assistance or loans. It would help the Kano State Ministry of Commerce and Industry, Kano State Chamber of Commerce, Industry, Mines and Agriculture (KACCIMA), National Association Small-Scale Industries, to update data on SWFs and enable them monitor activities. Furthermore, it would assist Kano Urban Planning Development Authority (KNUPDA) and others policy makers to improve planning strategies within the Metropolis. It would support Kano Internal Revenue Service in identifying firms for revenue collection. Thus, this research is imperative as it would impact on numerous sector of the economy and research.

Literature Review

Sachet water is mostly associated with Africa rather than Europe or the Americas. It takes the place of canned, bottled or table water as it is commonly referred to in Asia. There are a number of literatures on these alternative sources of drinking water in the areas where they are produced. In the work of Yael and Tamar (2011) for instance, it found that canned water no actual advantages over the bottled. Additionally, bottled water is less regulated than tap water because it is often considered a food item in many regions of the world. This may be the reason behind European Union's promotion of the use of tap water over bottle water through upgrading its quality and access (Jale *et al.,* 2020). The choice of what to drink is the subject of Qian's paper. It found that 'safety and hygiene' and 'convenience and availability' as the major determinants of the choice between tap water and bottled water in Singapore and Macau (Qian, 2018).Packaged water contributes to household water demands in Ghana, Liberia and Nigeria (Nicola, *et al.,* 2017).Selling packaged water in Nigeria can lessen the difficulty of getting access to portable water, but regulatory agencies must take strict precautions to guarantee its cleanliness (Muhammad and Dansabo, 2018).As in case of Saki, Oyo State Nigeria. Sachet water has been identified as Saki town's primary supply of drinking water. One to four sachets of water are consumed daily by more than half of the survey participants (Sanni, 2018).

Reasons abound for the growth of bottled water manufacturers. Francesco (2021) reported that in Italy the expansion of domestic markets at north western, north eastern, centre, southern area, as a consequence of consumers' preference and consumption style influenced the growth. While in Ghana the main reasons are income generation and job creation (Lawrence, *et al*., 2015). In China, bottled water production is a multibillion dollar business and the product competes with tap water as well as soft drinks. Due to its relevance, many of the biggest food brands engage in the business (Yael and Tamar, 2011).

Water quality is an important issue and one that has attracted the attention of scholars across many fields of research. In Damango, Northern of Ghana, a research on the sachet water quality and vendors practices found that adherence to adequate hygienic procedures is very low: 94% of vendors lacked a health clearance, 90% did not regularly wash their containers for sale on a daily basis, and most stored and sold their goods in

filthy settings. Most manufacturers disregarded FDA regulations. The Water Quality and Water Pollution Indices gave all of the sachet water brands (vendors and production locations) excellent ratings for consumption (WQI and WPI) (Ebenezer, *et al*., 2021). Another research on the effects of storage on sachet water quality in Ogun State, Nigeria found that all of the brands of water analyzed were safe to drink and met international health standards. Five brands of water tested showed levels of viable and coliform bacteria that exceeded the recommended count of 100cfu/m. However, within two months of storage, all of the water's pH levels had been normalized to acceptable WHO limits (Ojekunle, et al., 2015). Similarly, an assessment of sachet and bottled water quality in Ibadan, Nigeria found that 90% of the resulting values for the physical, chemical and bacteriological properties and mineral content of the analyzed packaged and bottled drinking water meet the WHO / NIS guidelines on water quality (Augustine, *et al.,* 2019). Both bottled water and sachet water tested in Uganda's capital Kampala were not contaminated with fecal coliforms above acceptable limits (Abdullah, *et al.,* 2015). In Accra Capital City of Ghana, after adjusting for potential confounders, sachets of water from high-quality brands were 90% less likely to contain any amount of total heterotrophic bacteria. These findings diverge with a large portion of previous sachet water quality literature and could point to significant advancements in regulation and quality control (Justin, *et al.,* 2014). Water was broadly perceived as safe, accessible, and convenient. Self-reported handling behaviors of PW products were generally unhygienic. There was widespread belief that packaged water keeps newborn babies healthy (Mohamed, *et al,* 2018) although production managers at the Sachet Water Company in Anambra, Nigeria, have little idea of maintaining a hygienic environment in the areas where they operate (Nkoli, 2013).

Sachet water in Nigeria is produced in a polythene bag. Once the water is used, disposal becomes an issue. This is a concern to many environmentalists as polythene has become a major constituent of the domestic refuse in not only Nigeria but other countries in West Africa including Ghana and Liberia. Nicola, *et al.,* (2017) reported a significant negative environmental effects in the West African countries of Ghana, Nigeria, and Liberia caused by the packages of the sachet water. In Liberia, the inappropriate disposal methods practiced by respondents have resulted in blockages in the drainage system, degradation of the natural beauty of the environment from littering, death of land and aquatic animals from accidental consumption of waste, reduced levels of oxygen in the body and loss the agricultural productivity. Not paying proper attention to these consequences, resulting in continued improper waste management by residents across the city and beyond (Chikamso, 2018). The environmental problems associated with sachet water waste disposal in the study area (Nsukka Urban, Enugu State) vary from blockage of drainage systems to air pollution (Ezeokpube, *et al.,* 2014). A rubbish bin and cluttering the ground were discovered to be the final disposal techniques of sachet water in Nigeria. These are just a few of the main reasons Saki town is experiencing environmental issues (Sanni, 2019).

Sachet water industries are known to have collapsed despite the huge need of their products across West African sub region. Usman and Imam (2022) have found over 300 sachet water factories have collapsed in Kano within a span of about 25 years in Kano, Nigeria. Same could be found in many other towns across the region. Some of the reasons are given as: the financial stability of the water producing industry in Ghana's Northern Region may one day be threatened by a lack of accounting knowledge and abilities (Boame, *et al.,* 2014). Another is ownership structure and government bureaucracy have been shown to have a significant impact on sachet water plant collapses in Kano, Nigeria (Usman & Imam, 2022).

Theories of International Political Economy

Jean-Baptiste Colbert (1619-1683) Mercantilism, Adam Smith (1723-1790) theory of economic liberalism, and neo-Marxism are the three most important classical doctrines in the subject of International Political Economy Theory (IPET). Mercantilism theory of economy allows a government to regulate the economy, with a view to promote domestic industries. Theory of economic liberalism is supporting government interventions to curtail industrial failure. Neo-Marxism economic theory allows in identifying the category of industries as well as problems and solutions (Duncan, 1999; *Lake*, 2006).

Theories of the International Political Economy focused on how political forces affect multinational cooperation, Industries, Individuals and the implications of economic interaction on the political process. It concerns the interaction between international factors, domestic, relationship between internal political economy and country foreign economic policy. It also deals with the relationship between politics and economics (Duncan, 1999; *Lake*, 2006). According to the IPET, the government must provide financial assistance to suitable banks in order to avoid the collapse of industries, with the goal of improving the country's economy. The government has the authority to regulate its own economic activities and investments (Duncan, 1999). Furthermore, the theory aids in the description of a problem, its solutions, or its recommendations. These theories correspond to the difficulties that sachet water factories face in Kano Metropolis.

Literature Gap

The work of Yael and Tamar (2011) in European Union countries was on the comparison between tap-water and bottled water. While Nicola, *et al.,* 2017, Qian, 2018, Sanni, 2018, Muhammad and Dansabo, 2018 and Jale *et al.,* 2020 focused on the access and preference of sachet and bottled water. In 2021, the work of Francesco was on the growth of sachet water business, thereby the Lawrence, *et al.,* 2015 studied the value chain, drives from sachet water factories. Nkoli, 2013, Abdullah, *et al.,* 2015, Justin, *et al*., 2014, Ojekunle, *et al.,* 2015, Mohamed, *et al*, 2018, Augustine, *et al*., 2019, Ebenezer, *et al*., 2021, researched on the quality of the sachet water.

Thus, the studies by Ezeokpube, et al., 2014, Nicola, et al., 2017, Chikamso, 2018, Sanni, 2019, were on the environment pollution, caused by the sachet water. Therefore, based on the above mentioned literatures no researched have been found on the Clusters of Sachet

Water Factories and the nature of the ownership structure of Sachet Water Factories in the study area. Thereby, some studies on the challenges facing by Sachet Water Factories, but not in the Kano Metropolis.

Furthermore, this study would assist sachet water employers in solving problems, in relation to their businesses and help them to know the potentials areas to set up new factory. It would contribute in findings ways in which sachet water factories, may add the source of internal generate revenue. The work may help Kano Urban Planning and Development Authority (KNUPDA) in providing cluster of sachet water factories.

Industrial Activities in Kano Metropolis

Modern manufacturing industries emerged in Kano as far back as early 1900's, when the British forces conquered Kano emirate and led the region into the world capitalist economy, surfacing as the industrial heart of West African Sub-Region (Olukoshi,1996: Mustapha, *et al*, 2014). These have occurred, as a result of its long history of being the leading center for cottage industries, commerce and agriculture, dating back to the 7th century A.D (Mustapha *et al.,* 2014). The traditional handcrafts industries producing vast consumer goods contributed towards the rapid growth of modern industry (Olukoshi,1996; Dan'azumi and Bichi, 2010; Mustapha *et al.,* 2014). The Bompai industrial area was the first Industrial estate in the Metropolis housing as at the 1970s more industries mostly import substitution factories. Most of the new manufacturing plants of 1973-1983 specialized in food, textile, furniture, rubber, paper and paper products, perfume, cosmetics and toiletry, leather, and plastic processing. These have enhanced the urbanization process and shaped the later industrial layouts of Challawa, Sharada, Dakata and Hadejia Road (Olofin *et al*., 2008 as cited in Mustapha *et al.,* 2014).

Material and Methods

Preliminary survey was conducted in the eight metropolitan local government areas. This was to establish rapport with employees and to explore the existing SWFs. Cross-sectional research was adopted in acquiring data from SWFs employers. It assisted in identifying and describing issues regarding SWFs in a very limited time. Quantitative data was collected from different sources including latitude and longitude of SWFs clusters; ownership structure and the challenges. The data on SWFs clusters were sourced from the location, those on structure of ownership and the challenges faced by SWFs were from the employees. The Taro Yamane Sample Size Method was used to draw the sample for the research. The Taro Yamane Statistical Formula expressed as follows;

$$n = N/\ 1+N\ (e)2$$

Where: n = the required sample size from the population under study
N ≈ the whole population under study
E ≈ the precision or sampling error which is usually 0.10, 0.05 or 0.01

The Geographic Information System (GPS) was used as an instrument in capturing SWFs clusters coordinates in the study area. The questionnaire was adopted as a tool for

collecting quantitative data. Questionnaires were shared to two hundred and ninety-two (292) respondents, to solicit data on the ownership structure and the challenges faced by SWFs within the Kano Metropolis. Based on the reconnaissance survey carried out, there were about one thousand two hundred and twenty-four (1224) SWFs across the eight (8) clusters in Kano Metropolis as depicted in table 1.

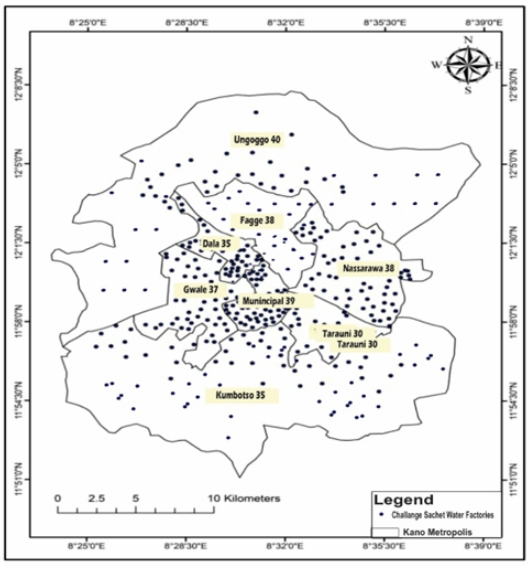
Table 1: Number of Sachet Water Factories per Local Government Area and Sample Size

L/Area or Cluster	No of SWFs	Sample Size
Tarauni	78	30
Nassarawa	177	38
Munincipal	189	39
Kumbotso	120	35
Gwale	144	37
Fagge	171	38
Dala	120	35
Ungogo		

Source: Field Survey, 2021

Snowballing sampling technique was used to mark the respondents. Purposive sampling method was used in the selection of respondents from employers, to solicit data on ownership structure and challenges. The clusters location was established by using mapping and coordinates. ArcGis 9.3 was used to produce clusters Map of SWFs. The Microsoft Excel was used to analyzed ownership structure and challenges faced by SWFs. Therefore, data on the SWFs clusters was presented on Map and table, data on ownership structure and challenges were presented on Charts figure 2.

Figure 2: Map of SWFs



Source: Source: Geography Dept, FCE (T) Bichi, 2022

Results and Discussion

This section discusses the findings of inventory SWFs and the results obtained from respondents on the ownership structure as well as challenges facing the SWFs in Kano Metropolis.

Objective I: To identify the Sachet Water Factories Clusters (Local Governments) in the study area

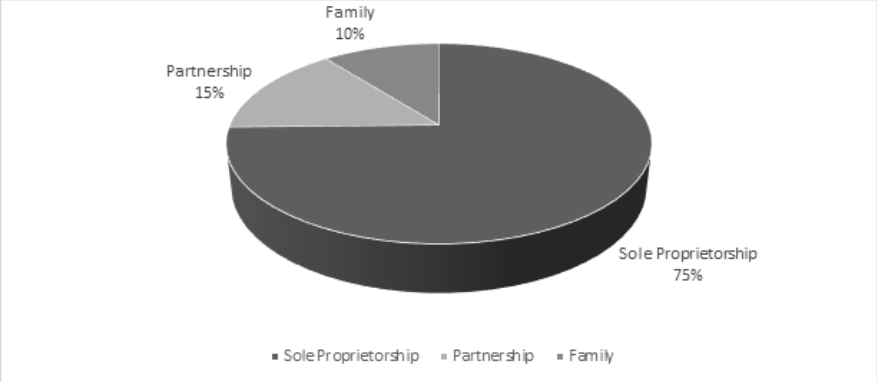
Based on the inventory there are one thousand two hundred and twenty-four (1224) SWFs across the Kano Metropolis. Tarauni is having the least number with 78 SWFs, Nassarawa, Dala, Fagge, Gwale, Kumbotso and Municipal having a range between 120 to 189 SWFs, while Ungoggo Local government has the highest number with 225 SWFs. Thus, the Table 2 is showing spatial distribution of the SWFs across the eight (8) local government areas of Kano Metropolis, Kano State, Nigeria.

The high number of SWFs in Ungogo is mainly because of numerous reasons that include: it is a peri-urban settlement that is encroaching the Metropolis. It is one of the local governments that has recently been added to the Metropolis, therefore land is comparatively cheaper in the areas; water is scarce in the area; population density is very high, and closeness to Dawanau International Specialized Food Product Market, the Bukavu Army Barracks, the International Airport, Kofar Ruwa Specialized non-food product market and its location along a major international road linking Kano City to Niger Republic through Kazaure (Jigawa) and Daura (Katsina) as well as through Babura (Jigawa State). While Addo *et al* (2020) has found that proliferation of Sachet Water Factories in Nigeria is associated with inadequacy of the public water system, Auwal *et al* (2021) has confirmed scarcity of water supply all over Kano Metropolis and has been supported by other researches including Bello *et al* (2021) and AbdulKadir *et al* (2019).

Objective II: To describe the ownership structure of SWF in Kano Metropolis

The respondents were asked to describe the ownership structure of SWFs. Based on the responses it has been found that 75% of SWFs are owned by individuals or Sole Proprietors as depicted in Figure 3 (Pie Chart). This is in line with the findings of Liman (2015) and Etumeahu *et al., (2009)*, Group of Individuals or Partnership and Family ownerships together formed just a quarter of the responses. There is no presence of public agencies in the ownership which corresponds to the findings of Oladimeji, (2019) and Miner *et al.,* (2020) who found that the business is left for private enterprise.

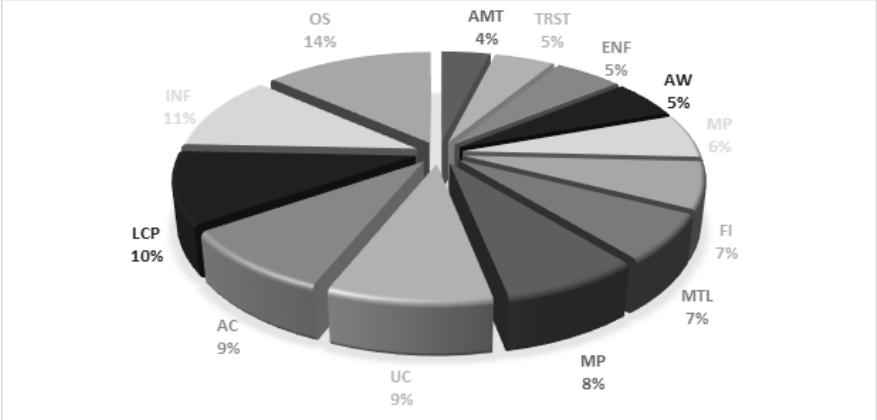
Figure 3: Ownership Structure of Sachet Water Factories, in Kano Metropolis



Source: Field Survey, 2021

Objective III: To examine the challenges facing SWF in Kano Metropolis
Respondents were required to state the major challenges facing SWFs they worked in 13 items were found to be most relevant due to their higher frequency in the response. These items are as presented in Figure 4 below:

Figure 4: Challenges facing SWFs in Kano Metropolis



Source: Field Survey, 2021

Table 2.

Key		**LCP**	Lack of Constant Power		
AMT	Access to Modern Technology	**MTL**	Multiple Taxes & Levies	**TRST**	Trust
OS	Ownership Structure	**MP**	Management Problem	**INF**	Infrastructure
ENF	Environmental Factors	**UC**	Unfair Competition	**FI**	Family Interference
MP	Marketing Problem	**AC**	Access to Capital	**AW**	Access to Water

Figure 4 above, indicated challenges faced by SWFs, revealed that, the access of modern technology as reported by Etumeahu *et al,* (2009), trust, environmental factor as reported by Oladimeji, (2019), access to water as reported by Enyidi, (2017), Addo *et al*, (2020); marketing problem as reported by Etumeahu *et al*, (2009), Yadav and Tripathi, (2018); family interference and multiple tax and levies regarded as a major challenge, having magnitude of 4% to 8%. While, unfair competition, access to capital as reported by Etumeahu *et al*, (2009), Acker and Vuvor, (2011), Yadav and Tripathi, (2018); lack of constant power as reported by Devlin, (2015), Infrastructure as reported by Etumeahu *et al,* (2009), Yadav and Tripathi, (2018), Eder, (2018) and ownership structure as reported by Adisa *et al.,* 2014, Liman, (2015), with magnitude of 9% to 14% leveled as minor challenge.

To confirm Figure 2 above, the data was subjected to a descriptive statistics analysis via IBM SPSS Statistics version 22 and it results in the table 3 below. The mean, median and standard deviation of the data set for each of the 16 challenges of sachet water factories is shown with the standard deviation in ascending order as depicted in table 3.

Table 3: Descriptive Statistics of the Challenges of Sachet Water Factories in Kano Metropolis

	N	Minimum	Maximum	Mean	Std. Deviation
Trust	192	1.00	2.00	1.0677	.25190
Infrastructure	192	1.00	2.00	1.5677	.49669
Government Bureaucracy	192	1.00	2.00	1.7187	.45078
Unfair Competition	192	1.00	2.00	1.4635	.49997
Ownership Structure	192	1.00	2.00	1.7448	.43712
Management problem	192	1.00	2.00	1.3698	.48401
Environmental Factor	192	1.00	2.00	1.3021	.46036
Market Problem	192	1.00	2.00	1.2656	.44282
Family Interference	192	1.00	2.00	1.4010	.49139
Access to Finance/Capital	192	1.00	2.00	1.3594	.48107
Multiple Tax and Levy	192	1.00	2.00	1.2708	.44555
Poor Power Supply	192	1.00	2.00	1.4219	.49515
Foreign Exchange	192	1.00	2.00	1.6354	.48257
Policy Inconsistencies	192	1.00	2.00	1.6302	.48401
Access to Modern Technology	192	1.00	2.00	1.1198	.32557
Non-availability of Raw Material	192	1.00	2.00	1.5365	.49997
Challenges of CSWFs	192	1.06	2.00	1.4297	.17392
Valid N (listwise)	192				

Conclusion

The SWFs found across the eight (8) metropolitan areas namely; Tarauni, Kumbotso, Fagge, Municipal, Ungoggo, Gwale, Nassarawa and Dala, totaled one thousand two hundred and twenty-four (1224). The SWFs ownership structure dominated by sole proprietorship and associated with challenges such as trust, marketing problem, access to modern technology as well as access to capital. Thus, challenges are hindering the operation of SWFs, which depleted production capacity, employment generation and state and national economic growth.

Recommendations

The paper wishes to recommend the following:

1. The Stakeholders of SWFs, should liaise with Kano Urban Planning and Development Authority (KNUPDA) for citing location of new factory, in order to avoid unsuitable location
2. The stakeholders should liaise with the Ministry of environment and National Agency for Food and Drug Administration and Control (NAFDAC), for supervision and proper monitoring of SWFs
3. Proper agreement should be made, when forming ownership structure of SWF, to avoid management disputes
4. Constructive agreement should be formed, between SWFs managers and marketers, by establishing trust and trade cordial relation
5. Stakeholders, should formed a partnership with private financial institution and Bank of Industry (BOI), to provide modern machine, to boost productivity
6. Stakeholders of SWFs, should provide Water Tank Truck, for easy access to portable water supply
7. Stakeholders of SWF, should formed a financial cooperative to provide members with financial support, when the need arises, in avoidance of taken loans with interest rate
8. Stakeholders of SWFs, should ensure a positive relationship with a host community, in order to secure smooth market environment
9. The SWFs stakeholders, should cooperates with Kano State Ministry of Commerce and Industry (KSMCI), Kano Chamber of Commerce, Industry, Mines and Agriculture (KACCIMA), and National Association of Small-Scale Industries (NASSI), with aimed of assessing their operation

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Conflicts of Interest

There are no any conflicts of interest between the authors.

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