

Establishing the Determinants of Urban Industrial Location for Sustainability and Development: The Case of Mwanza City, Tanzania

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Abstract

Proper industrial locations form the basis for industrial sustainability and development in urban areas. Numerous factors, specifically to a particular urban region, continue to determine the establishment and location of industrial amenities in urban areas depending on place and time. Therefore, understanding the determinants of the location of industries in the region provides a roadmap towards industrial sustainability and development. This paper assesses the determinants of urban industrial locations for industrial sustainability and development in Mwanza City, Tanzania. Data were collected from 204 out of 687 registered industries by using a mixed methods case study design. The sample of industries was selected from ten industrial zones in Mwanza City using a computerized systematic random number generator. The data were collected using questionnaires, interviews, and document reviews and analyzed and presented both qualitatively and quantitatively. The study found that Mwanza urban area has different industries located in different parts and ranging from micro, small, medium, and large scale industries. The results indicate that the location of industries in Mwanza City is determined by sufficient water supply from Lake Victoria, availability of land, enough supply of local raw materials, access to capital, agglomeration, and markets for the produced goods, as well as fair transportation costs. The paper concludes that a variety of factors, both in terms of place and time, determine the spatial distribution of urban industries. Also, industries are properly located in different areas of Mwanza City, and measures to enhance industrial sustainability are in order which include: appropriate procedures for Environmental Impact Assessment, marketing strategy and maximizing profits, training employees and managing technical staff,

and industrial pursuit with vigor and support from all parties. This improves the sustainability of industries and fosters development in Mwanza City. Therefore, the paper recommends that there is a need for continued proper industrial locations for the newly established ones and to enable the continued attraction and establishment of industrial investments for the future industrial sustainability and economic development, and also that the policies should prioritize inclusive economic development, with a focus on creating jobs and diversifying the economy to benefit local communities. This will foster greater collaboration across sectors, promote innovation, and enhance competitiveness at the local, regional, and global scales.

Keywords

Urban Industrial Location, Industrial Sustainability, Agglomeration, Urban Area, Development

1. Introduction

Urban industrialization is crucial for the economic development and long-term viability of cities worldwide due to urban infrastructures and other urban services (Rodrigue, 2021). Cities such as Mwanza in Tanzania are becoming important centers of industries, making a significant contribution to regional growth and the creation of jobs. Comprehending the factors that influence the location of industries in urban areas is essential for promoting sustainable industrial expansion and guaranteeing equitable development. Similarly, understanding the determinants of industrial location in towns and cities of developing countries, such as Tanzania provides insights to policy makers, investors and potential clients to find markets and highlights geographic strengths in industrial investments and sustainability (UNDP, 2019). This stimulates industrial development and potentially brings urban and peri-urban economic development and ensures industrial future sustainability (Hassan, Alenezi, & Good, 2019).

The historical development of industrial location factors can be traced back from the Industrial Revolution epoch, a transformative period in the 18th century (1750s-1850s) in Britain which was marked as an epoch of industrial establishments. Hence, there is the need for industrial locations in diverse urban areas of Britain (Lucas, 2004). The development of the locations of industries worldwide was also seen in the emergence of the location of industries being pioneered by Von Thünen (1783-1850) in his work “The Isolated State” in 1826, who depicted agricultural land use industry in a concentric circle pattern surrounding a central market (Fellman, 2018). This concept is widely recognized as one of the earliest cases in point of spatial location analysis in the field of location of economic activities (Xu, David, & Kim, 2018). Subsequently, other studies about industrial location emerged including that of Alfred Weber (1868-1958) in 1909 who concluded that the primary determining factor of industrial location is the cost of

transportation, with the ideal location being one that minimizes production costs (Fellman, 2018). Similarly, Harold Hötelling (1895-1973) in 1929 expressed that the decision of a firm's location is influenced by the choices made by its competitors, particularly in situations where a condition of location interdependence exists (Isard, 2018; Getis & Fellman, 2019). Finally, August Lösch (1906-1945) suggested that the location of industries is determined by the attainment of the highest possible profit (Isard, 2018; Blair & Promus, 2019; Getis & Fellman, 2019).

At the global level, MacCarthy & Atthirawong (2021), Nijkamp & Poot (2023) and Blair & Promus (2019) examined the criteria that influence international industrial location decisions which are realized by costs, infrastructure, labour characteristics, government and political influence, and economic influences. Getis & Fellman (2019) add that, in developed countries like Britain and the USA; Yan et al. (2023) in Shanghai city in China; and (Wang & Li, 2019) in Asian countries; examined the factors considered for the location of industries which are maximization of profits; and taking into account variable costs such as energy supply, transport costs, and labour costs; the aspect of markets, taxes, and in areas where the industry is located are also among the determinants. Similarly, Gephart, Frehlich, & Branch (2019); Han et al. (2020) and Okwonkwo & Ijeoma (2020) indicated the factors that influence the location choice and cluster patterns of manufacturing industries in Khulna City, Bangladesh; which include presence of convenient transportation facilities, adequate utility access, enhanced visibility, and proximity to the markets, were deemed as optimal characteristics for establishing manufacturing industries.

Rostow (2021) states that taking the seriousness in urban industrial location stimulated industrial sustainability and triggered the economic development in urban areas of the developed countries including Rhine-Ruhr and Hamburg-Germany; Houston-USA; and Trafford Park/Manchester-England which has created the source of foreign exchange, employment, wealth, infrastructure development, indigenous technology and building human capacity.

It is also added that proper industrial establishments in developing countries stimulates socio-economic development, urban population growth, and rapid growth, and sustainability of industries in urban centres (Okwonkwo & Ijeoma, 2020). Furthermore, industrial location and urban growth in Cairo, Egypt along the Nile River; is closely associated with outcomes of industrial location which has contributed to high productivity and income growth, and it is a hallmark of modernisation, and national economic growth for developing countries (Alamá-Sabater, Artal-Tur, & Navarro-Azorín, 2010). The widespread of industrial establishments in different parts of Africa, specifically in urban areas including Cape Town and Johannesburg, South Africa; Lagos-Nigeria; Accra, Ghana; Nairobi, Kenya, and Kampala, Uganda; called for the studies to understand the determinants of industrial locations for their sustainability and development in the mentioned cities (Allen, 2009).

Since 2015 onwards, the fifth and sixth Governments of the United Republic of

Tanzania proclaimed a new era of industrialization; and this has witnessed the mushrooming of industries in many cities and towns of Tanzania (URT & UNIDO, 2022). King'oriah (2020) states that due to the boom of all sorts of industries, the scrutiny of location is highly needed for efficient production and sustainable persistence of the industries established to ensure industrial development in urban areas of Tanzania. Rikalovic, Cosic, & Lazarrevic (2019) argue that the choice of location is a critical point towards the success or failure of industrial establishments. However, factors determining the location of industries are many, and differ with regards to place and time; therefore, this study aims at establishing specific industrial location factors for Mwanza City and at the same time looking at the sustainability and development of the industries. Industrial locations in urban areas need to be well-thought-out in the process of industrial establishments; as they play an important role towards the industrial sustainability and development rooted to profit maximisation, and national economic growth (Rostow, 2021; Yan et al., 2023; Gephart, Frehlich, & Branch, 2019).

Furthermore, Mwanza City has undergone swift urbanisation and industrial growth in the past two decades. The city's advantageous geographical position, combined with its role as a centre for commerce and transit, draws a wide range of economic activities, including manufacturing and processing industries. Nevertheless, the factors that determine the spatial distribution of industries in Mwanza City have not been well investigated. Therefore, this study on urban industrial location determinants in Mwanza City seeks to reveal the fundamental determinants that impact the bunching and spreading of industries within Mwanza City. Furthermore, the promotion of industrial sustainability in conjunction with economic development is a crucial goal for urban planners in Mwanza City. Similarly, to sustain long term prosperity and resilience against global economic uncertainty, it is crucial to maintain a balance between industrial expansion, environmental stewardship, social equality, and resource efficiency.

The scientific originality of this study exists in its focus on contextual relevance, as comprehending the elements that effect industrial location in urban environment is important for achieving industrial sustainable development and fostering economic growth in the region. Additionally, the results of this study have the potential to shape urban planning policy in Mwanza City and other comparable urban regions in Tanzania. It also offers evidence-based insights that can be used to improve urban planning initiatives, industrial policy formulation, and investment decisions. Moreover, the knowledge acquired from this study could potentially have wider results for other emerging urban areas in determining the appropriate location of industries for the sake of sustainability and development. Thus, the scientific originality is in its comprehensive approach to comprehending the interaction between industrial location, sustainability, and urban growth in Mwanza City and other urban areas. Therefore, this study focused on a) describing the industrial status and development in Mwanza City, b) establishing specific factors determining the location of urban industries in Mwanza City, and c) examining

the strategies for industrial sustainability and development in Mwanza City. This contributes to both academic knowledge and practical policy applications by providing a favourable setting for proper industrial location, long and lasting industrial growth, boosting regional competitiveness, and raise the living standards of urban inhabitants in Mwanza City and other similar urban regions in Tanzania, Africa at large and the whole world at large.

2. Theoretical Framework

This study is guided by the Theory of Intra-Urban Industrial Location (TIUIL) to establish the determinants of industrial location in Mwanza City. This is a continuation and polished theory of Alfred Weber (1868-1958) in 1909. The theory portrays that the availability of local resources significantly influences the potential placement choices for industries; various industries possess more extensive autonomy in selecting their locations, prompting the development of the intra-urban industrial location theory, which endeavours to explain the factors influencing the preference for some sites over others (Blair & Promus, 2019).

Theory of intra-urban Industrial location focusses on examining many factors that affect the spatial arrangement of economic endeavours within an urban area (Blair & Promus, 2019). The theory furthermore concludes that the spatial distribution of urban industries is determined by a confluence of several contemporary factors referred to as the location calculus of industries (Al-Shihri, Faez, & Lawal, 2020). According to the theory; comprehending the geographical distribution of industries within an urban setting is crucial for the establishment of a comprehensive industrial urban structure, thereby ensuring the long-term sustainability of industries in the region (Gannon, 1973; Getis & Fellman, 2019). The aspects of the theory of intra-urban industrial location encompass several key tenets including; the association with the central core and specialized services, the accessibility to markets or customers, the proximity to suppliers of raw materials or fabricated inputs, the land requirements, and the avoidance of traffic congestion (Gannon, 1973).

The strengths of intra-urban industrial location theory lie in its capacity to explain the reasons behind the preference for some locations by considering a range of more factors within a city for industrial purposes depending on the region itself (Isard, 2018). In addition, it puts significant importance on the inter-firm connections and relationships that contribute to industrial location decisions. Its weaknesses lie in reliance to the premise of perfect competition, which may not accurately reflect real world conditions; also it cannot comprehensively clarify the complicated dynamics inherent in contemporary urban economies with regard to diverse regions of the world (Fellman, 2018). The theory was beneficial to this study as it highlights that choice of the locations for industries depends on the diverse factors depending on the socio-economic aspect and the physical outlook of the urban region concerned; for this case, Mwanza City. The intra-urban industrial location theory explains the factors that influence the choice for certain

location over others. Furthermore, that the arrangement of urban industries is influenced by a merging of several current determinants in a particular region. Therefore, this study adds to the theory that together with the identified traditional factors in the theory, the socio-economic and physical perspectives of Mwanza City are reflected towards indicating the determinants of industrial locations for sustainability and development.

3. Materials and Methods

This section presents the description of the study area, population, sample size and sampling procedures with regard to the study about the determinants of urban industrial location towards industrial sustainability and development in Mwanza City.

3.1. Description of the Study Area

Mwanza City is located on the southern coast of Lake Victoria in the North-western region of Tanzania. It is situated within the latitudes of $2^{\circ}15'S$ and $2^{\circ}45'S$, and the longitudes of $32^{\circ}45'E$ and $33^{\circ}05'E$. The location of the area is situated at an altitude of 1140 meters above sea level and has a total land area of approximately 1337 km²; out of this 437 km² which is equivalent to 32% of the total area is comprised of dry land, while the remaining 900 km² which is equal to 68% is covered by water (Kaganga, 2023). Out of the total land area of 437 km², approximately 86.8 km² is urbanized, and the remaining portions consist of valleys, agricultural plains, forested land, grassy areas, and undulating rocky mountainous areas in the outskirts of the Mwanza City (MCCR, 2017).

Mwanza City; Nyamagana and Ilemela formed the case study area selected because they are making what is called Mwanza City with a rapid cumulative of industrial establishments compared with other districts in Mwanza Region. The study concentrated within the major ten industrial zones of which the industries are being located which are: Mwanza central business, Airport, Mkolani-Buhongwa, Igombe-Sangabuye-Kayenze, Kirumba-Pasiansi, Nyakato-Buswelu, Mkuyuni-Butimba, Bohari-Nyegezi, Igoma-Nyamhongolo, and Igogo-Mwanza south; as presented in **Figure 1**.

Mwanza City as the study area has some geographic advantages with positive historical business and socio-cultural links with other towns within the Great Lakes Region; which makes the rapid increase in industrial establishments ranging from micro scale to large scale industries (URT, 2017). There is a quick growth of business firms which has triggered the high speed for industrial establishments in different areas of Mwanza City which needs to be studied about the determinants of industrial locations and industrial development in Mwanza City. The general map overview of the study area; Mwanza City is presented in **Figure 2**.

3.2. Population, Sample Size and Sampling Procedures

A survey was carried out to the offices of Mwanza City (Nyamagana and Ilemela

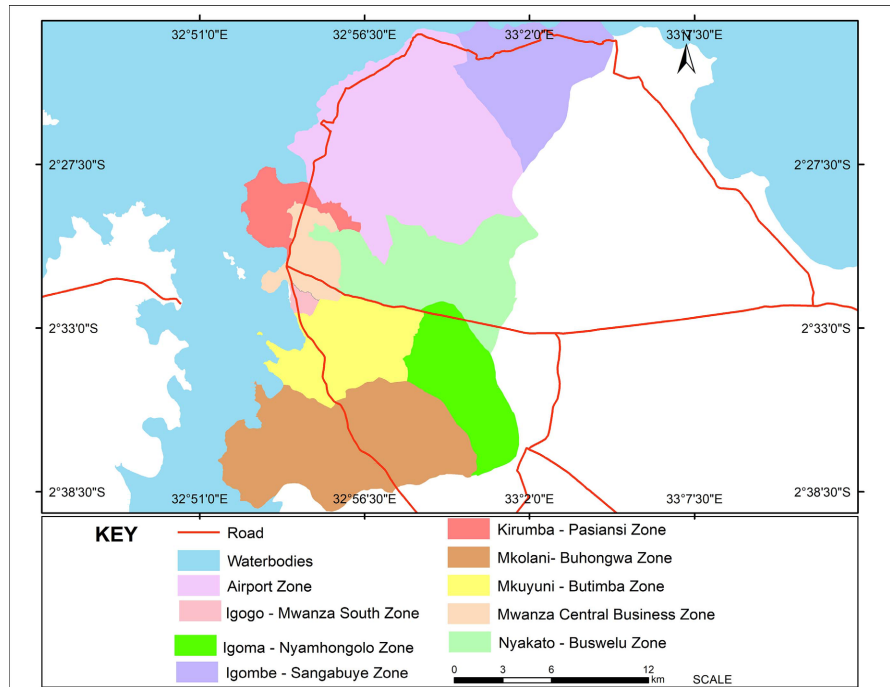


Figure 1. Map of Mwanza city showing the industrial zones.

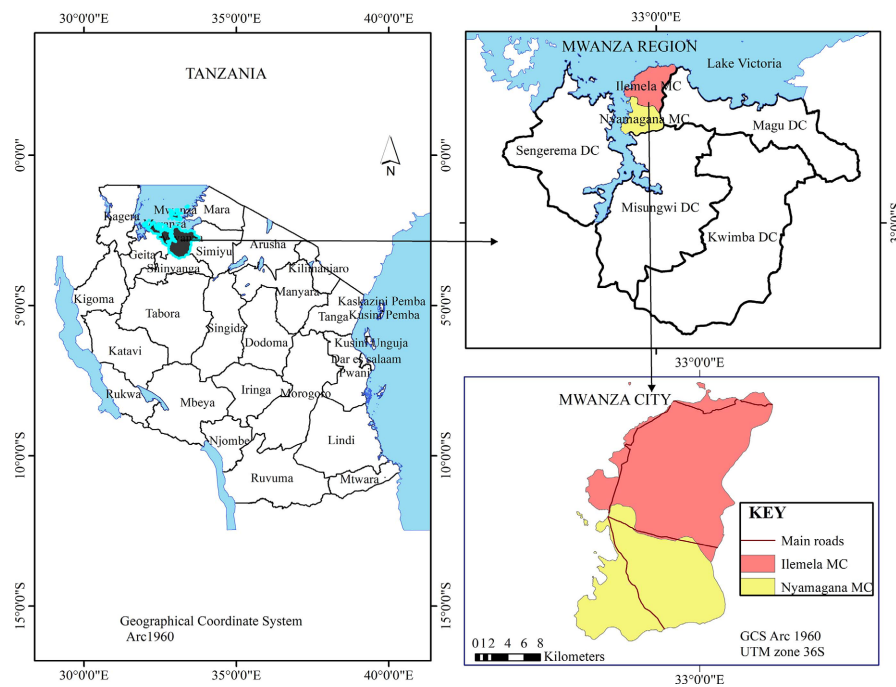


Figure 2. Study area map; Mwanza city; Nyamagana and Ilemela districts.

districts) to get an overview of the available industries in Mwanza city. In addition, the data on industries were obtained from the Regional industrial Registrar, which revealed 47 large-scale industries, 54 medium-scale industries, 465 small-scale industries, and 121 micro-scale industries making a total of 687 registered industries located in ten industrial zones within the boundaries of the two districts: Nyamagana

and Ilemela (URT, 2020). The selected sample of industries was considered as cases for the survey part of this study to determine their spatial locations by collecting the data on the reasons for localizing the industries to where they are currently located. The key informants including Mwanza urban industrial planners, Mwanza City industrial managers, and regional administrative secretary, and Nyamagana and Ilemela directors were selected purposively with regard to their positions. The sample size of 204 industries was recognised in the study area for in depth investigation and analysis, which includes 32 large-scale industries, 35 medium-scale industries, 82 small-scale industries, and 55 micro-scale industries, as presented in **Table 1**.

Table 1. Number of industries in the study area and the selected sample.

NYAMAGANA		ILEMELA		Total (n)	Selected Sample
Large scale industries	34	Large scale industries	13	47	32
Medium scale industries	30	Medium scale industries	24	54	35
Small scale industries	233	Small scale industries	232	465	82
Micro-scale industries	54	Micro-scale industries	67	121	55
	351		336	687	204

The required sample (**Table 1**) from each district was determined using the formula by Yamine (1967) that:

$$n = \frac{N}{1 + N(e)^2} \quad (1)$$

In this formula, “*n*” represents the sample size, “*N*” represents the total number of industries, “1” represents the desired confidence level (95%), and “*e*” represents the level of precision. The sample size was selected using systematic random sampling based on the *n*th term depending on the number of industries in their categories, in the prepared list of industries in Mwanza city as suggested by Jared et al. (2002), using a computerized scheme systematic random number generator to get the required Sample of 204 industries as in **Table 1**.

3.3. Data Collection and Analysis

Spatial data information about location variation factors of industries was collected using questionnaires, and interviews as suggested by Kothari (2004) that questionnaire and interview make the best data collection tools for mixed approach. The use of questionnaire was because it offers a cost-effective means of administration as well as getting data from respondents (Lall & Chakravorty, 2004). Questionnaires were used to collect data from 204 industrial managers on general factors influencing the location of industries for sustainability and development in Mwanza City taking into consideration the local perspective of Mwanza urban area. Semi-structured interviews were conducted with the key informants to get information about the determinants of urban industrial locations in Mwanza

city. Interviews were used due to capacity to yield significantly more comprehensive thorough information and yielding of qualitative information about urban industrial location factors in Mwanza city as put by [Bell et al. \(2018\)](#) and [Schmuck \(2018\)](#) that interviews provide a remarkable ability to provide substantial and comprehensive views through gathering of extensive and qualitative information. Secondary data were accessed both online and physical visits to Mwanza City; specifically from the district industrial annual census, district industry directory, development plans, district economic survey reports, district socio-cultural profiles records, and industrial annual reports in Mwanza City.

Qualitative data were analysed through contents analysis by creating themes and sub-themes and patterns followed by clear explanations to make sentences and paragraphs on the factors influencing location of industries for sustainability and development in Mwanza city. That is to mean that the data were subsequently organized through the process of identifying and distinguishing between many questions outlined in the interview guide. The researcher conducted an analysis of the replies pertaining to each theme and individual questions in a separate manner. As suggested by [Trochim & Donnelly \(2007\)](#), several themes and sub-themes were identified for investigation. The process of organizing data was devised and recorded in a structured database format that incorporates the diverse measures contained within the data on industrial locations and industrial sustainability in Mwanza City. In order to supplement the recordings and aid the acquisition of data in recalling situational aspects during analysis, field notes and memoranda were transcribed. The quotations utilized in this study were carefully chosen from interviews and transcriptions in order to provide support for, or serve as illustrations of the themes and sub-themes that emerged. The synthesis of these generative ideas was formulated into a preliminary version of the research outcomes. The analysis engaged carefully the multiple iterations and careful examination of the data in text so as to synthesize additional interpretations and enhancing the clarity of the identified themes on urban industrial locations, sustainability and development in Mwanza City. Recorded interviews were as well cleaned and transcribed into texts followed with critical interpretations with regard to the themes and sub-themes created.

The quantitative data were collected, cleaned then coded accordingly, checked for precision then logged into the computer system for analysis. The International Business Machines Statistical Products and Service Solutions (IBM SPSS) software version 23 was used to analyse quantitative data to generate frequencies and percentages as suggested by [Patton \(2001\)](#) and [Kaganga \(2023\)](#) that IBM SPSS software is recommended for quantitative data analysis in order to generate frequencies and percentages. On the other hand, Microsoft Excel software was used to generate graphs and charts. The tables and figures were used to present quantitative results on the determinants of urban industrial locations for sustainability and development in Mwanza City, and the qualitative data were presented by explanations organized and presented based on the sub-themes to make sentences and

paragraphs as recommended by Tufte (2006) and Gay & Airasian (2023) that it is advisable to effectively present qualitative data by organising and presenting explanations according to sub-themes, which can then be used to construct sentences and paragraphs.

4. Results and Discussion

This section provides the findings from the study area and subsequently analyses them by comparing to current literature in terms of their similarities or dissimilarities. The implications and interpretations of the pertinent findings in relation to this study are also being presented.

4.1. Mwanza City Industrial Status and Development

The study found that industrial status and development in Mwanza City is stimulated by socioeconomic activities, transportation and communication systems, topography and local physical characteristics. It was found that Mwanza City possesses industrial parks in the subsequent regions; Mwanza city council allocated a total of 24 plots of varying sizes for the aim of industrial development. Among these, the largest plot measures 150 hectares and is intended for industries located in Buhongwa. Ilemela District had industrial parks including a total land area of 260 hectares. Additionally, a plot measuring 72.77 hectares, specifically identified as Nyamhongolo Plot 559, Block A, was also found. According to Mwanza city directors, through interviews on industrial status in Mwanza City had it that;

“...it is a component of the national industrial development program that every Local Government Authority (LGA) is required to designate land for the establishment of industries...” (Mwanza city Directors, 21st March, 2023)

Additionally, they said that;

“...the Mwanza Regional Secretariat has issued a directive requiring all districts and town councils including Nyamagana and Ilemela to identify and allocate land for industrial undertakings. The selection of land for industrial activities has been formerly carried out by the Local Government Authorities (LGAs)...” (Mwanza Regional Administrative secretary, 26th March, 2023)

4.1.1. Economic and Social Activities

The study found that Mwanza City is a prominent commercial hub within the Lake zone in Tanzania’s north-western area. Through interview with the Mwanza urban industrial planners they revealed that:

“...Mwanza City has significant historical business and socio-cultural and economic ties to neighbouring cities, which have resulted in the area gaining geographical advantages in terms of rapid industrial development and establishment...” (Mwanza City industrial Planners, 26th March, 2023).

It was found that Mwanza City has a crucial transportation network such as roads, railways, waterways, and airways connecting major cities of the East and Central African countries which enable the international trading activities which has stimulated rapid industrial establishments and growth. The results arrived to

the similar conclusion with that of [Chete et al. \(2021\)](#); [Adesina \(2020\)](#) and [Kniivila \(2019\)](#) that the economic and social stability attracts industrial ventures in the area and stimulates local and international trade which promotes industrial flourishing in the region.

4.1.2. Industries in Mwanza City

The study found the presence of 687 registered industries in Mwanza city, with a notable concentration in Nyamagana and Ilemela Districts as in [Table 2](#).

Table 2. Number of industries per production activities in Mwanza city.

Production Activity Groups	Nyamagana	Ilemela	Total Number	Percentages
Posho Mills/Human Foods	126	99	225	32.80%
Textiles and Tailoring	91	109	200	29.10%
Bakeries/Cakes/Biscuit Production	25	16	41	6.00%
Faniture/Fabricating Workshops	17	24	41	5.90%
Machinery Assembly Accessories	19	13	32	4.70%
Leather Products Processing	9	10	19	2.80%
Soaps Manufacturing	8	8	16	2.30%
Fish and Sardines Processing	6	8	14	2.00%
Iron sheets and Steel Production	7	7	14	2.00%
Beer/Breweries and Wine	6	6	12	1.80%
Animal Foods Production	6	6	12	1.80%
Engineering/Drilling works	4	7	11	1.60%
Milk Processing	3	8	11	1.60%
Foam and Plastic Production	8	1	9	1.30%
Water Processing	4	5	9	1.30%
Cotton Seeds Oil Production	5	1	6	0.80%
Chemical Production	3	3	6	0.80%
Soft Drinks Production	2	3	5	0.70%
Mineral Processing	1	1	2	0.30%
Ginneries	-	1	1	0.20%
Pharmaceutical industries	1	-	1	0.20%
Total	351	336	687	100.0%

The documentary review showed that the industries comprised a broad range, spanning from micro-scale to large-scale industries. The industries comprise a broad range, spanning from micro-scale to large-scale industries. This is a considerable number of industrial establishments in Mwanza city, and it provides the

evidence that Mwanza City really attracts industrial establishments which produce goods and services sold in Mwanza and outside Mwanza; therefore, there a need to be studied for their sustainable development. Furthermore, there is a need for setting more suitable areas for industrial establishment in Mwanza City.

Milling/Posho Mill industries seem to dominate over different areas in Mwanza City with 32.8% followed by Textile and tailoring industries with 29.1%. However, Pharmaceutical, and Ginneries seem to be very few comparatively with 0.2%. This implies that Food staffs and Clothes are highly needed hence creating a possibility of investors to establish more industries on that category. However, Ginneries and Pharmaceuticals needs more capital to invest on them, hence being fewer than others as in **Figure 3**.

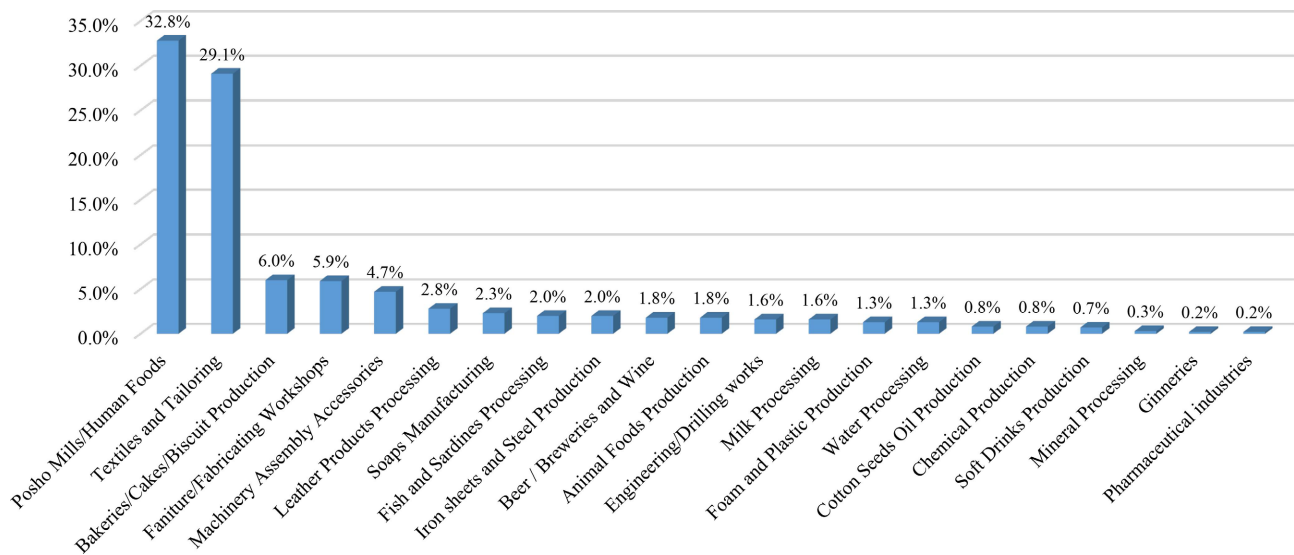


Figure 3. Percentage representation of industries per production activities.

This implies that there is a considerable number of industrial establishments in Mwanza City, and it provides evidence that the study area attracts industrial establishments that produce goods and services which are sold in and outside Mwanza City. The results concur with [Mazorodze \(2019\)](#) that the urban areas of South Africa experience the growth of industries which produce commodities for both internal and global trade. Similarly, [Golley, Zhou and Wang \(2019\)](#) found that there is a variety of industries in China's urban areas which deals with the processing and manufacturing of different products which are sold internally and internationally.

4.2. Industries in Nyamagana District

The study found that Nyamagana District as one of the districts in Mwanza City had a total number of 351 industries whereby 54 were micro, 233 were small-scale industries, 30 were medium-scale industries, and 34 being large-scale industries, as presented in **Table 3**.

Table 3. Number and percentage representation of industries in Nyamagana district.

Type of Industry	Number	Percentage (%)
Micro Scale Industries	54	15.4
Small Scale Industries	233	66.4
Medium Scale Industries	30	8.5
Large Scale Industries	34	9.7
	351	100

The results in **Table 3** indicate that Nyamagana district had micro industries at 15.4%, small-scale industries at 66.4%, medium-scale industries at 8.5% and large industries at 9.7%. This implies that small-scale industries make up the highest number of industries, followed by micro-scale industries, and the third is large-scale industries; while the medium-scale industries are ranked the last. Therefore, the implication of the results is that small-scale industries are more highly established in Mwanza city than others. Small scale industries provide more employment to the people hence contributing to the development of Mwanza city. The results concur with [Banik \(2018\)](#), [URT \(2020\)](#), [Oyekunle & Srayi \(2018\)](#) that small-scale industries make the best establishments in numbers compared to medium and large-scale industries in developing countries. Similarly, [Todaro & Smith, \(2019\)](#) and [Devries, Timmer and Devries \(2020\)](#) who found that due to high capital needed, the large scale industries are established less in industrial regions compared to small scale industries.

4.3. Number of Industries in Ilemela District

Ilemela district was another district in the study area. The results show that it has a total number of 336 registered industries; whereby 67 were micro scale industries, 232 small scale industries, 24 medium scale industries, and 13 large scale industries. The percentage representation of the industries is presented in **Figure 4**.

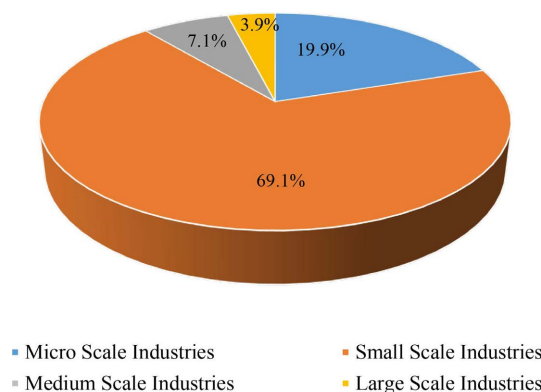


Figure 4. The percentage representation of the industries in Ilemela district.

The results in **Figure 4** indicate that Ilemela district had 19.9% of micro scale industries, while 69.1% were small scale industries; 7.1% of the industries were medium-scale industries, and 3.9% were identified as large-scale industries. This implies that, Ilemela district seems to have more numbers of small-scale industries compared to micro-scale, medium scale and large scale industries. Through interviews it was said that:

“...*Small scale industries have a greater proliferation in comparison to medium scale and large scale industries. Additionally, micro scale industries have the potential to evolve into small scale industries, further contributing to their numerical dominance over other industries...*” (Mwanza City industrial Planners, 26th March, 2023).

This means that small scale industries are highly established in the district than any other type of industries. This is attributed by the affordability of investment capital required for establishment of this industrial category; the large the size of industries established, the more the investment capital required and vice-versa. The findings are in line with that of **Banik (2018)**, **URT (2020)**, and **Oyekunle & Srayi (2018)**, that small-scale firms exhibit a greater prevalence in terms of establishment numbers when compared to medium and large-scale sectors. Also, agree with **Todaro & Smith (2019)** and **Devries, Timer, & Dvries (2020)** that due to high capital needed, the large-scale industries are established less in the industrial region compared to small-scale industries.

4.4. Factors Determining the Location of Urban Industries in Mwanza City

The findings obtained through interviews and questionnaires subjected to district directors and industrial senior officers. For the questionnaires, the respondents were asked to tick in the Likert scale for the factors known to determine the location of industries in Mwanza City based on strongly agree (6), somehow (5), agree (4), strongly disagree (3), disagree (2), and not sure (1). The report of the findings is presented with regards to the number of respondents and the corresponding percentages in brackets as in **Table 4**.

Table 4. Factors determining the location of urban industries in Mwanza city.

Factors for Industrial Location	Strongly agree	Somehow	Agree	Strongly disagree	Disagree	Not sure
Abundant supply of water/presence of Lake Victoria	196 (96.1%)	0 (0.0%)	8 (3.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Availability of land for investment and expansion in the suburbs of Mwanza City	186 (91.2%)	0 (0.0%)	18 (8.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Accessibility to both internal and external markets	161 (78.9%)	0 (0.0%)	43 (21.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Availability of local raw materials for industrial production	161 (78.9%)	1 (0.5%)	42 (20.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Continued

Access to capital for investment in manufacturing and urban economics	159 (77.9%)	3 (1.5%)	42 (20.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Proximity to other local establishments (agglomeration)	156 (76.5%)	0 (0.0%)	48 (23.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Fair transportation costs and improved infrastructures	153 (75.0%)	0 (0.0%)	51 (25.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

The results in **Table 4** presents the established determining factors for the location of industries in Mwanza City with regards to the number of multiple responses of respondents and the percentages for the identified factors. Abundant supply of water/presence of Lake Victoria seems to outshine than other factors; with 96.1% of the respondents strongly agreeing while 3.9% of the respondents agreed with it. On the other hand, fair transportation costs and improved infrastructures was determined the least with 75% of the respondents strongly agreeing while 25.5% agreed with it. This implies that the identified factors seem to have higher percentages, but the presence of the Lake Victoria has attracted and influenced the locations of the industries and played a great role towards the development of industrial establishment in Mwanza City. This was also identified by Mwanza City industrial Planners through interview that:

“... The factors determining the location of industries in Mwanza city are diverse and include the availability of land for investment and expansion, the availability of local raw materials for industrial production, access to capital for investment in manufacturing and urban economics, proximity to other local establishments (agglomeration), accessibility to both internal and external markets, fair transportation costs and improved infrastructure, abundant supply of water due to the presence of Lake Victoria...” (Mwanza City industrial Planners, 26th March, 2023).

Therefore, the findings validate that the geographical location and distribution of urban industries is influenced by a combination of several factors with regard to socio-economic and physical perspectives of Mwanza City, contingent upon the specified location and time period.

4.4.1. Abundant Supply of Water/Presence of Lake Victoria

Water supply from Lake Victoria was identified strongly with 96.1% as the local factor for industrial location in Mwanza city. Through interviews, industrial managers expressed explicitly that the presence of Lake Victoria attracted them to establish and locate the industries in Mwanza City due to the water supply and making Mwanza City a better place to live; they had it that:

“... The provision of water from Lake Victoria is fundamental to industrial production, serving several essential functions such as manufacturing, processing, cleansing, dilution, cooling, and transportation of goods...” (Industrial Managers, 28th March, 2023).

On the other hand, other industrial managers said that;

“...Lake Victoria possesses a significant attraction for investment in industrial endeavours inside the city of Mwanza. This is due to the notion that industrial operations thrive in the environments where there is an ample water supply and a nice area to live...” (Industrial Managers, 28th March, 2023).

The results align with [Nijkamp & Poot \(2023\)](#) who suggest that the geographical distribution of industries is influenced by a range of factors; one such factor is the availability of sufficient water supply; permanent water sources, such as lakes, rivers, or oceans, tend to attract a higher concentration of industries. [Raja et al. \(2019\)](#) assert that the availability of water plays a crucial role in determining the location of industries. Also, [Augustin \(2023\)](#) indicates that the quantity of water necessary exhibits significant variations contingent upon the particular industries.

4.4.2. Availability of Land for Investment and Expansion in the Suburbs of Mwanza City

The majority (91.2%) of the respondents, strongly agreed while a few (8.8%) simply agreed with the availability of land for investment and expansion in the suburbs of Mwanza City as the factor influencing industrial location ([Table 4](#)). Moreover, the study found that land availability and affordability are crucial because industries require substantial tracts of affordable land on which industries should be allocated, and as for Mwanza city, this isn't a problem. The majority of industries look for locations with the possibility for growth, production and profitability, sustainability and development. In view of this, one of the key informants said;

“...The two districts of Nyamagana and Ilemela still have enough space for industrial establishments, particularly to the outskirts of urban areas, such as Sangabuye, Igombe, Kayenze, Sahwa and Kishiri which make industrial location possible in Mwanza city; this ensures industrial establishment and sustainability...” (Industrial Planners, 26th March, 2023).

It was furthermore reported that enough land has been set aside by the district councils in Mwanza City for industrial activities including, 150 hectares of land located in Buhongwa, 260 hectares in Sangabuye, and 72.77 hectares at Nyamhongo area; mark the evidence of land availability for industrial establishment and location in Mwanza city. The results agree with that of [Nijkamp and Poot \(2023\)](#) that land availability determines the spatial distribution of industries in urban areas. Furthermore, [Murray \(2022\)](#) asserts that various factors including access of enough land contribute much to the selection of industrial sites.

4.4.3. Accessibility to Both Internal and External Markets

It was found that internal and external markets and anticipation of future markets do influence the establishment and location of industries in Mwanza city whereby 75.9% of the respondents strongly agreed and 21.1% agreed with it. The study identified that Mwanza City has a good population which makes the base of the internal market for the produced goods from industries. During the interviews, it

was explained that;

“...Population growth, income growth of the industries, daily sales on retail and wholesale, and external distribution of produced goods, are good indicators of the availability of markets in Mwanza City...” (Industrial Managers, 28th March, 2023)

Furthermore, the managers disclosed that the examination and upkeep of the markets for the items produced in Mwanza City are facilitated through marketing research, infrastructural services, product value addition, and the enhancement of customer communications. The city’s rapid urbanization is credited by several factors, including sustained population growth, favorable climatic conditions, and a stable environment characterized by peace and security make the area have promising future industrial market and growth because Mwanza City is the second fastest-growing urban centre in Tanzania. The results agree with Han et al. (2020) that the presence of accessible internal and external markets serves as a solid foundation for the establishment of industries in a particular location. Webber (2020) and Gohcheng & Morgan (2018) argue that future market growth of a place attracts investors to locate the industries in the region.

4.4.4. Availability of Raw Materials for Industries

This was also identified as one of the factors influencing industrial location in Mwanza City with majority agreement; whereby 78.9% strongly agreed, 0.5% indicated somehow, whilst 20.6% agreed (Table 4). Through interviews it was reported that;

“...Mwanza City is endowed with local raw materials needed to feed most of the industries including, milk for Yoghurt industries, animal skins for leather processing industries, agricultural products like cotton for ginneries, cotton seeds for cooking oil production, fruits for juice processing industries, and maize and rice for foodstuff milling industries...” (Industrial Managers, 28th March, 2023).

It was further emphasized that the availability of raw materials locally to cater for industrial production attracted the industries to be located in the place where they are located with expectations of lower production costs and sustainability. The results are consistent with that of Henderson & Francois (2021) & Okwonkwo & Ijeoma (2020) that the availability of raw materials is a major factor in industrial placement decisions. Okwonkwo & Ijeoma (2020); Han et al. (2020) & Nijkamp & Poot (2023) argue that locating an industry close to the source of raw materials is essential for industries that process perishable and weight-losing materials.

4.4.5. Access to Capital for Manufacturing Investments

Access to capital was identified with strong agreement from respondents in the study as another factor influencing the location of industries in Mwanza city. About 77.9% of the respondents strongly agreed, 1.5% said somehow, and 20.6% agreed (Table 4). It was established that for industries to be established they ought to construct office spaces, and innovate new goods, they require financial resources potentially obtained from both banking institutions and governmental

entities within specific regions accompanied with reliable insurance. This was commonly available in Mwanza city hence influencing industrial locations within the region. Through interviews, the industrial managers said that:

“...Capital plays a crucial role in facilitating the establishment of industries in Mwanza city. The capital accessed from available banks through loans helps in fixing the fixed capital, circulating commodity capital, and service inputs capital; these forms of capital influence the industrial location Mwanza city...” (Industrial Managers, 28th March, 2023).

This suggests that industrial managers in Mwanza City prioritize capital availability and the potential for capital expansion as key factors for ensuring the location and viability of their industrial businesses. Different Banks were mentioned in ensuring access to capital through loans including Cooperative and Rural Development Bank, National Microfinance Bank, National Bank of Commerce, Exim Bank, Equity Bank, Standard Chartered Bank, and Stanbic Bank. The support fund obtained from the financial institutions has ensured the sustainability and development of industries in Mwanza city. The findings concur with Han et al. (2020) that the presence of sufficient capital for the development of manufacturing industries serves as a compelling incentive for industrial establishment and location within the region. Also, Nijkamp & Poot (2023), the availability of capital has a significant impact on the spatial distribution of industries.

4.4.6. Proximity to Other Local Establishments

The study consistently found that the presence of other industries (industrial agglomeration) of the same or different type attracts more industries to that location; whereby 76.5% strongly agreed while 23.3% agreed (Table 4). It was explained via interview that:

“...More industries within some location lead to more development through industrial counterparts, particularly expertise complement for the same and non-rival industries...” (Industrial Managers, 28th March, 2023)

It was furthermore found that industries such as Nyanza Bottling Ltd, Serengeti breweries, Sayona Juice industries, Mwatex, Pepsi, and Nyakato Steel have been consolidated into a single region due to agglomerations. The results agree with Yan et al. (2023) that industries are presently situated in specific locations due to agglomeration effects. Similarly, with Han et al. (2020) and King'oriah (2020) that the presence of nearby local firms and the presence of urban economies contribute to the attractiveness of these areas for the establishment of new industries.

4.4.7. Fair Transportation Costs and Improved Infrastructures

The findings revealed a strong agreement with 75% that fair transportation costs and improved infrastructures influence the industries to be located in Mwanza City. It was disclosed through the interviews that:

“...The transportation networks have a positive impact on access to raw materials and markets for the produced goods. Mwanza City is noteworthy that various modes of transportation, such as roads, railways, waterways, and airways, provide

accessibility to the city from all major cities within the East African Community region...” (Industrial Managers, 28th March, 2023).

It was reported that industries are located in proximity to well-developed roads and rail infrastructure to facilitate the efficient transportation of supplies to industries and the subsequent distribution of commodities which minimizes transportation costs. The accessibility to airports, ports, motorways, and significant railway systems is of paramount importance for the location of industries in Mwanza city. The findings align with [Zhu et al. \(2023\)](#) that the Belt and Road initiative has had a favorable impact on the growth and organization of industries in Chinese provinces along the routes, mostly through technical advancements. Also, [Murray \(2022\)](#) and [Rodrigue \(2016\)](#) that the spatial location of industries is shaped by factors of fair transportation costs together with urban infrastructures. Also, [Henderson & Francois \(2021\)](#) put that economic factors, such as reduced transportation costs and enhanced transport and communication infrastructure linking various regions have significantly influenced the industrial placement.

5. Industrial Sustainability in Mwanza City

This study also focused on examining the sustainability of industries which are located in diverse areas in Mwanza City. Through questionnaires it was established that, in order to build a strong industrial base for long term industrial sustainability in Mwanza City, it is imperative to practice the following standpoints as in [Table 5](#).

Table 5. Strategies for industrial existence and sustainability in Mwanza city.

Strategies for Industrial Sustainability and development	Levels of Agreement	Respondents	Percentage (%)
Industrial Pursuit with Vigor and Support from all Parties	Strongly Agree	137	67.2%
	Somehow	7	3.4%
	Agree	60	29.4%
Training Employees and Managing Technical Staffs	Strongly Agree	181	88.7%
	Some how	16	7.9%
	Agree	7	3.4%
Appropriate Procedures for Environmental Impact Assessment (EIA)	Strongly Agree	194	95.1%
	Somehow	3	1.5%
	Agree	7	3.4%
Marketing and Maximizing Profits	Strongly Agree	192	94.1%
	Somehow	1	0.5%
	Agree	11	5.4%

Table 5 indicates the strategies suggested to be adopted in the process of ensuring industrial sustainability in Mwanza City. Appropriate procedures for EIA were identified mostly with 95.1% of the respondents who strongly agreed, 1.5% who said somehow, and 3.4% who agreed with it. This implies that EIA seems to form the base for sustainability of industries as it protects the negative impact from industries to the surrounding environment and the community at large. On the other hand, industrial pursuit with vigor and support from all parties was established the last.

5.1. Appropriate Procedures for Environmental Impact Assessment

The findings show that conducting appropriate Environmental Impact Assessment (EIA) ensures industrial sustainability in Mwanza city. EIA is a process that examines the potential environmental consequences of proposed industrial establishments. Its purpose is to identify and evaluate the potential impacts on various aspects of the environment, including the physical, chemical, biological, cultural, and socioeconomic components. The goal of the EIA is to mitigate any negative impacts and enhance the positive ones, thereby promoting the sustainability of the industry from its inception.

Furthermore, in their views they emphasized that EIA is very important by saying that;

“...the EIA plays a significant role in facilitating sustainable industrial development by ensuring that potential environmental impacts are thoroughly examined and addressed during the stages of planning and decision-making; EIA process aids in the identification of potential risks, the formulation of mitigation measures, and the exploration of alternative approaches to minimize any adverse effects on the environment and local communities; hence this facilitates the establishment of industry sustainability as it commences...” (Industrial managers, Mwanza city, 28th March, 2023)

EIA approach effectively balances the intentions of economic expansion, environmental protection, and societal welfare; hence industrial sustainability and development. Also, it is a methodical decision-making process that considers the establishment of industries and their potential environmental impact, thereby promoting the durable feasibility and sustainability of the industries. The findings align with that of [Feng et al. \(2023\)](#) that in order to ensure a sustainable supply of resources, it is imperative to promote environmentally friendly growth and minimize environmental damage; the contrast arise to the additional of climate change in their results. Also, the results match with [Wang & Li \(2019\)](#) who argue that EIA process serves the purpose of identifying potential risks, developing strategies for mitigation, and examining various techniques to effectively reduce environmental and community impacts. Similarly, [Barilari et al. \(2020\)](#) say that, there has been an increased need for Argentina to embrace industrial growth and sustainability by conducting EIA.

5.2. Marketing Strategy and Maximizing Profits

Marketing strategy and profit maximization was strongly established by the respondents with 94.1%. Marketing efforts actively promote industries in Mwanza by emphasizing its strengths, competitive advantages, and investment opportunities through targeted marketing campaigns, participation in trade fairs and exhibitions, and engagement with international business networks. The marketing initiatives highlight the region's potential for growth, market access, and proximity to key markets, which all contribute to increased product sales and enable industries to achieve greater profitability, thus ensuring the persistent industrial growth and sustainability. Additionally, the creation of valuable and pertinent content of the produced commodities can be employed to attract and engage customers. Moreover, efforts should be made to cultivate brand loyalty and stimulate sales. It was suggested that sectors should employ social media platforms, utilize e-mail marketing, and implement search engine optimization strategies in order to effectively engage with clients; as prescribed below;

“...Using of social media platforms as a means to expand their reach to a broader audience, enhance brand recognition, and foster consumer engagement; also utilizing email campaigns to establish and nurture customer connections, hence encouraging repeat purchases; and optimizing the content on their websites to enhance their organic search ranks and increase their visibility; all these make possible for industrial growth and sustainability...” (Industrial managers, Mwanza city, 28th March, 2023)

It was added that the process of maximizing profits in industries entails the implementation of effective strategies which expands revenue and minimizing costs. This is achieved through a comprehensive analysis of market dynamics and competition, which enables the establishment of optimal pricing strategies that maximize profitability. Additionally, identifying areas of inefficiency and implementing cost-saving measures is crucial in improving profit margins. Exploring new markets or expanding into unexploited customer sections is another avenue for driving revenue growth. Furthermore, prioritizing customer satisfaction, loyalty programs, and personalized experiences plays a key role in retaining existing customers and fostering repeated business, hence industrial growth and sustainability in Mwanza city. The findings contradict that of [Tan et al. \(2023\)](#) that achieving industrial sustainability and development requires the adoption of low-carbon practices through the utilization of digital economy, together with a fundamental restructuring of the industrial agenda; which was not tackled in this study. On the other hand, agree with [Serhiivna et al. \(2020\)](#) and [Matzarakis \(2019\)](#) who assert that the utilization of digital marketing tools is significant for domestic industries which facilitates the growth of industries and promotes long-term industrial sustainability. Similarly, [Balakrishnan \(2021\)](#) puts that targeted marketing campaigns, trade fairs and exhibitions, and international business networks promote the region's strengths, competitive advantages, and investment opportunities. [Arthur \(2014\)](#) argues that one potential strategy for increasing revenue is to identify and

target new markets or previously unexplored client categories.

5.3. Training Employees and Managing Technical Staff

Training of employees and managing of technical staff was another strategy pinpointed strongly by the respondents in the field with 88.7%. It was found that for industrial sustainability in Mwanza city, there should be the promotion of education and training programs which is essential for cultivating a trained workforce who effectively fulfill the hassles of various industrial production, hence boosting innovation and enhancing overall productivity; this makes industries to grow and become sustainable.

During the interviews, industrial managers and planners in Mwanza city said that:

“...the practical training and management of technical personnel by employees have proven to be crucial in enhancing their effectiveness and productivity, staying updated with industrial production trends and changes in consumer behavior, this makes industries to achieve success in their quest for growth and sustainability...” (Industrial managers Mwanza city, 26th March, 2023)

Training programs specifically designed for technical employees are crucial in ensuring that industrial output remains current and aligned with the evolving market needs and demands; this, in turn, contributes to enduring sustainability of industries. It was found that training of employees should be tailored with organizational capabilities of top management leaders and the priorities of national policies pertaining to industrial development. Training helps the workers from top level leaders to normal workers within the industrial business to take accountability for upholding the cohesiveness and longevity of the industry. The findings agree with [Holusa et al. \(2023\)](#) about industrial development in the Czech Republic who found that the use of virtual reality training for employees and technical staff management serves as an effective instrument for enhancing educational training and improving performance in the industrial production process. Similarly, [Dosi et al. \(2021\)](#) found that frequent individual training plays a significant role in enhancing labor productivity in the industrial sector hence industrial sustainability.

5.4. Industrial Pursuit with Vigor and Support from All Parties

The strong comments forming 67.2% indicated that the enhancement of vigor and initiative in promoting industrial sector development is crucial for ensuring sustainability and growth of industries in Mwanza city. It requires the active collaboration of all stakeholders, including investors, the government, and members of society. Through interviews with the industrial managers and planners, on how this should be achieved they had it that:

“...The decision to actively and enthusiastically pursue industrial development in a particular location should take into account the specific context, local needs, ability to solve challenges, and potential trade-offs. This endeavor necessitates

thorough planning, efficient governance, and engagement with stakeholders in order to maximize the positive effects and minimize the negative consequences. By adhering to these principles, industrial sustainability and development can be effectively achieved..." (Industrial planners, Mwanza city, 26th March, 2023).

It was furthermore established from the field that; if effectively and proactively managed by all stakeholders, industrial development has the potential to contribute to economic growth, create employment prospects, and enhance the overall quality of life within a community. Industrial growth has the potential to attract investments and foster innovations. When all of these objectives are successfully attained, it indicates that there is a great progress in both industrial development and sustainability in Mwanza city. The results contradict those of [Ali et al. \(2023\)](#), who concentrated on the element of the use of biogas energy for the sustainability of entrepreneurial performance and socioeconomic development; however, the biogas energy use was not touched in this study. Also, the results concur with the assertions by [Arthur \(2014\)](#) that the advancement, and endurance of the industrial sector, whether private or public, have been accomplished through the dedication of investors, government entities, and stakeholders. [Chete et al. \(2021\)](#) contend in their research on industrial development and sustainability in Nigeria that the industrial sector is experiencing ongoing growth and sustainability due to strategic initiatives and prioritization by stakeholders. According to [Balakrishnan \(2021\)](#) the achievement of industrial growth and sustainability in India is attributed to the collaborative efforts of the government and other stakeholders.

6. Conclusions and Recommendations

The study concludes that Mwanza City has a diversified kind of industries which are properly distributed in different places. The proper industrial location forms the base for industrial sustainability and development. The factors that influence the location of industries in Mwanza City offer useful visions that can be used to a broader understanding of the determinants of industrial location and sustainability of industries. Physical and socio-economic determinants are both important in determining the formation and development of industrial bunches. It is recommended, for urban areas and cities in Tanzania and Africa as a whole to prioritise investment in improving infrastructure, such as transport networks and utilities, in order to improve accessibility and operational efficiency for industries. This intends to promote the establishment of industrial areas in locations that are not in the core centres, which helps to distribute economic activity and alleviate congestion in the central areas of cities. Furthermore, it is important to prioritise education and vocational training initiatives in order to provide the local workforce with the necessary skills that are in high demand within growing industries. This guarantees a consistent influx of proficient workforce, enhancing the appeal of the areas to potential industrial investors. In addition, it is recommended for adoption of strong and clear industrial policies that offer incentives for companies to establish and grow their industrial firms in cities of developing countries. These policies

should prioritise inclusive economic development, with a focus on creating jobs and diversifying the economy to benefit local communities. This will foster greater collaboration across sectors, promote innovations, and enhance competitiveness at the local, regional, and global scales.

Conflicts of Interest

The authors declare that they have no competing interests regarding the publication of this paper.

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