The State of Infrastructural Facilities and Operational Efficiency of Manufacturing Industries in Kano Metropolis, Nigeria

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Abstract

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The prospect for the establishment and sustenance of manufacturing industries in general, and the Small Medium Enterprises in particular, depends largely on the existence and or provision of dependable/efficient infrastructural facilities. Yet there is a presumption that the major constraint to the establishment and growth of manufacturing industries especially the Small Medium Enterprises is the lack of and or inadequacy of infrastructural facilities; namely, electricity (i.e. energy), water, road, telephone, and other communication facilities.

In order to empirically ascertain the extent to which this assumption is valid, a survey was conducted to investigate the state of infrastructural facilities and the extent to which they affect the operational efficiency of the manufacturing industries in Kano metropolis. A sample of 50 manufacturing firms was therefore selected from the population of manufacturing establishments located in the two key industrial areas of Kano metropolis specifically, the Bompai and Sharada Industrial Areas. Survey data were collected using a questionnaire, the research instrument comprising multiple choice close ended questions.

The investigation revealed that manufacturing industries in Kano are generally suffering from inadequate supply of major infrastructural facilities considered too essential for their effective and efficient operation. It thus has a pronounced disruptive effect on their operations. Virtually all firms surveyed consequently operate at below their respective installed capacity. This perhaps is a reflection of the situation across the country.

It was therefore, recommended that the relevant governmental authorities and agencies should urgently consider embarking on measures aimed at significantly improving the infrastructural facilities especially electricity and water, that are

pertinent to ensuring optimal functioning of the manufacturing organizations. This is particularly appropriate and pertinent because of the potentially positive effect on the economy more so, in terms of the possible reduction in the level of unemployment and improvement in standard of living.

Introduction

The manufacturing sector of any economy plays a pivotal role in its developmental process. However, in spite of Federal Government of Nigeria's efforts to revitalize the sector, its growth has rather been on the decline; a situation that is considered worrisome and worthy of attention.

There is a presumption that an improved business environment would most probably ginger the existing entrepreneurs to continue to invest and grow. Therefore, a good business environment would most likely attract investment which is pertinent to economic growth and development.

Organizational literature distinguishes between internal and external environments. Internal environment specifically focuses on the internal structure, culture and process of the enterprise, including organizational structure, managerial practices, incentive systems, friendly relationships and other organizational idiosyncrasies (Mary and Chikwendu, 2006). However, Kilby (2003:7), noted, that the external environment focuses on issues and conditions generally outside the enterprise, some of which are beyond the control of the entrepreneur. These include government regulatory policies and bureaucratic practices, infrastructures, availability of operational resources such as finance, labor, machinery and raw materials, and the political climate. This research has attempted to probe into one aspect of the external factors i.e. infrastructures. Specifically, it is an investigation of how availability or otherwise of infrastructures has affected the operations of the manufacturing concerns in Kano metropolis.

Amongst the variety of problems facing the Nigeria's manufacturing industries are declining capacity utilization, the epileptic nature of power supply, lack of good road network, the near complete absence of rail services for the movement of raw materials and finished goods, irregular water supply, the dangerous nature of air travel and so on. These are some of the myriad of problems bedeviling the real sector, and the manufacturing industry in Kano is not an exception. If anything, its situation is most probably worse with more than half not being able to cope with the dearth of infrastructural facilities.

For the manufacturing industries in Kano to survive and operate at optimal level given these deficiencies, it becomes pertinent to explore ways to overcome these obstacles to industrial growth and development.

Remarkably, Nigeria has witnessed a "consistent decline in productivity within the industrial sector". Capacity utilization, a measure of the intensity with which industries use their production capability has consistently been on the decline (Solomon, 2005:8). Wherever there is human activity, it is reasonably assumed that there will be consumption, that is, the final use of goods and services to provide the required utility. Depending on the decision of any society on whether to produce or not (which is largely based on such factors as availability of raw materials, the state of infrastructures, technological know-how, cost effectiveness, developmental urge, and so on), consumption can largely be satisfied through two means i.e. either through production/ manufacturing or by importing or buying those goods and or services from countries or other entities that engage in their manufacture.

In the 1970s and 1980s Kano had over 500 manufacturing firms in diversified industries, many of which operate on a very large scale but in some cases, they were subsidiaries of multinational corporations. However, as at 2006 there were no fewer than 120 manufacturing

companies in Kano that are operating at less than 40% of their installed capacity (Salihi, 2006:6). A very recently held informal interview with notable officials of Kano Chamber of Commerce Industry Mines and Agriculture (KACCIMA) revealed that well over 70 per cent of about 2,000 of its members engaged in industrial production have for a long time shut down their plants while a fairly good proportion of those yet in business are comatose.

The challenges posed by, and the possible effect of inadequate infrastructural facilities to manufacturing industries in Kano metropolis is thus the primary concern of this work. Hence, an attempt was made in this research to assess the possible effect of the lack or inadequacy of infrastructural facilities on the operational efficiency of manufacturing industries in Kano.

Consequently, an attempt has been made in this undertaking to provide answers to the following key questions:
What is the current state of infrastructural facilities available to the manufacturing industries in Kano metropolis?

To what extent are the manufacturing firms operating at the optimal level of installed capacity?

To what extent are the infrastructural facilities responsible?
What options are available for effecting an improvement in the current state of infrastructural facilities?

It is the belief of these researchers that answers to the above questions will help to appropriately address the issues underlining this investigation.

The primary objective of this study therefore, is to investigate the effect of the state of infrastructures on manufacturing industries in Kano, with a view to proffering solutions to any identified problem(s), thereby improving the scale of operation and in effect considerably enhancing the efficiency of these industries. Consequently, the specific objectives of this research are to:

1. Ascertain the current state of the infrastructural facilities available to manufacturing industries in Kano

2. Establish the possible effects on the operations of the manufacturing enterprises.
3. Attempt to prescribe measures for tackling any identified deficiency.

Manufacturing industries are the engine for economic growth and development and their efficiency or otherwise would have consequences on the performance of the economy. Yet they require some essential infrastructures if they must perform optimally. The state in which manufacturing concerns find themselves with regards to the provision of the infrastructures is one that requires investigation with a view to finding practicable solutions.

Literature Review

One of the challenges facing any government, particularly in a developing economy, is how to assure economic growth and development. Hence, the need for the government to formulate and implement policies as well as execute projects that would propel a nation to attaining this goal. Critical to economic development is industrial production. The presence and or adequate supply of infrastructural facilities serve as a catalyst to the establishment and growth of manufacturing industries.

Infrastructure is an umbrella term for many activities usually referred to as "social overhead capital" by development economists. Precisely, infrastructure refers to a network of transport, communication, and public (social) services all functioning as a system or as a set of interrelated and mutually beneficial services provided for the improvement of the general well being of the population (Areola, 1987). The term "infrastructure" as Nwilo and Osanwuta (2004) similarly opine, typically brings to mind public

facilities such as roads, railway lines, electric lines, airports, telecommunications, geodetic control framework and similar physical structures or networks in which government has played a major role in their construction or ongoing support.

Sufficient infrastructural services are indispensable for economic development. The adequacy of infrastructure as Ogbuozobe (1997:163) stresses, helps to determine a country's success or failure in diversifying production, coping with population growth, reducing poverty, improving environmental conditions, etc. Good infrastructure, for example, raises productivity and lowers production costs. McNeil (1993) shows that The adequate infrastructure reduces the costs of production, which affects productivity, levels of output, and employment. When infrastructure works, productivity and labour increase. When it does not work, citizens suffer, particularly the poor. Thus, economic renewal and societal welfare become postponed or halted.

It has similarly been noted that infrastructural capacity grows step by step with economic output, that is, a one per cent increase in the stock of infrastructure is associated with a one per cent increase in Gross Domestic Product (GDP). Thus, as countries develop, infrastructure must adapt to support the changing patterns of demand (World Bank, 1994).

The State of Infrastructural Facilities in Nigeria

It is generally believed that the utility services in Nigeria, including electricity, telecommunication, water and transport, are failing to provide and develop the services and the infrastructures required for social and industrial development. The Structural Adjustment Programme (SAP) has increased prices but not performance, and has consequently "contributed substantially to lowering the quality of life and well-being of the average Nigerian who, over the past four decades, had become more and more impoverished" (Ademola & Afeikhena, 2004:32). This performance has made the proposals for privatization to appear like a plausible solution (Ademola & Afeikhena, 2004:32).

The importance of the provision of such utilities by the public is further underscored by the inefficient and costliness of attempts to provide private substitutes. Ademola & Afeikhena (2003:34) further stressed that, in a reaction to electricity shortages, over 90% of manufacturing companies installed power generating plants, and in reaction to the lack of water supply, 44% of households have their own private boreholes, and many rely on water vendors whose high prices amount to more than 30% of household income for the poorest. As a result, a large proportion of poor households resort to drawing water from unhygienic sources.

Electricity

The organization responsible for electricity production and supply in Nigeria is the National Electric Power Authority (NEPA), which has been renamed the Power Holding Company of Nigeria (PHCN) as part of the privatization process. The demand for electricity is higher than the supply (Ukpong, 1987:79). While PHCN's installed generation capacity is 4,200mw, the maximum available capacity is limited to 3,300mw, mainly due to a lack of maintenance. The transmission system is unable to deliver power to a major part of the country and is unreliable because it does not have adequate capacity and backup lines. There are transmission losses of 30-35 %. Currently, only 10% of rural households and approximately 40% of Nigeria's total population have access to electricity (Iyoha & Oriakhi, 2002:4).

It is generally believed that the system currently suffers from inefficiency and corruption. According to Salisu (2006) "Some commentators have argued that less than 10% of the entire money (300 billion Naira, spent by government) actually got to NEPA/PHCN. The rest is suspected to have ended up in the private accounts of a few

contractors. These contractors, it is alleged, know next to nothing about electricity. Meanwhile, the crisis in the Niger Delta region, shortage of gas and low water level at the Kainji dam, are always used to explain away the inability of government to provide electricity for the people. It is even insinuated that PHCN workers are reluctant to install the prepaid meters. The reason is simple; the introduction of pre-paid meters will block one of the lucrative avenues of making illegal money. The technical of the agency would no longer be able to intimidate consumers with disconnection ladders; nor send fictitious bills. Above all, they can no longer extort money from consumers who have outstanding arrears. The insider abuses prevalent in NEPA/PHCN affect Nigerians in another way; it is bad enough that people who live and work in darkness are made to pay exorbitant and imaginary bills (Olumuyiwa, 2006:21).

The World Energy Council (2003) discloses that Nigeria is involved in the West African Power Pool (WAPP). and it is expected to be one of the main sources of hydro power for the WAPP. To this end, NEPA/PHCN is planning a 330KV line from Lagos to Benin as part of a larger West African interconnection involving Niger, Benin and Togo, financed with a US $15.6m credit from African Development Bank (Olumuyiwa, 2006:22).

In 2006 the government made investments in new power stations at a cost of US $7 billion. They include all new thermal powers stations. In addition, the government agreed to start the Mambilla hydropower project, which is expected to generate 2000mw, and will be financed with loans from China and Islamic Bank, and counterpart funding from the Federal Government. (Olubunmi, 2006).

Telecommunications

A sound and efficient communication system is undoubtedly the pivot on which any development revolves. Sound and efficient communication system plays a major role in the overall development of any nation. As of December, 1993, there were no more than 350,000 lines nationwide. A sound and efficient communication system is undoubtedly the pivot on which any development revolves. Sound and efficient communication system plays a major role in the overall development of any nation. As of December, 1993, there were no more than 350,000 lines nationwide.

Globally, as Adeyinka (1997:351) noted, the last two decades have witnessed a pace of accelerated technological evolution and innovations in the field of telecommunications. Digitalization, mobile communications, satellite communications, multi-media, software control, miniaturalisation, the convergence of communication and computing technologies, the internet and so on are some of the innovations that have profoundly changed the landscape of telecommunications development.

A New Era of Telecommunications in Nigeria evolved following the setting up of the Nigerian Communications Commission (NCC) in 1993, there has been noticeable progress developing in the production capacity and technological capability within the telecommunications sector. The introduction of the Global System for Mobile (GSM) telecommunication in 2001gave rise to a rather dramatic and substantial improvement in services provided by this sector. The new socio-economic regime of deregulation and liberalization in Nigeria has, in effect, led to a multiplicity of actors in the telecommunications service provision (Adeyinka, 1997:355 & 356)

The Transport Sector

It is a well established fact that adequate transport is an essential ingredient in the growth of any economy, and the level of transport planning and development is a determining factor in the socio-economic development, and even the defence, of any country. In other words, without transport, economic and social systems would simply grind to a halt (Faulks, 1990).

The transport sector could be viewed as an integrated system comprising economic infrastructure (such as highways, railways, ports, waterways and airports), production line for both motorized and non-motorized vehicles, and vessels, marshalling yards as well as the actual delivery of transport services.At the moment, about 95 per cent of the internal movement of goods and people is by road transport. This is largely attributable to the natural advantage provided by the existence of vast land mass in Nigeria, when compared with waterways, and perhaps the inadequate attention being given to the rail system (Adesanya, 1997:182: Ukpong, 1987, 84). The existing poor condition of most roads in Nigeria is further compounded by poor response to road repairs, rehabilitation and deferred maintenance by the concerned road agencies..In most urban areas, inadequate road rehabilitation and road maintenance arrangements have always affected the free flow of vehicular traffic, thereby creating traffic hold-ups and congestion on many roads, especially during peak travel periods. Some pothole-ridden roads have become notorious accident black-spots, while many more are potential sources of road accidents (Adesanya, 1997:182-183 &184).

Water Supply

It is generally believed that water is life a presumption that water is a very basic necessity to human existence. This is perhaps why Ogbuozobe (1997:171) declares that water, a component of local infrastructure, is a sine qua non for virtually all human activities. It is a prerequisite for sustainable development. Apart from its primary role in enhancing human health, it is equally important for both industrial and commercial development. However, the present water supply situation in both the country's urban and rural areas is simply pathetic. The water supply situations in the country's industries are even more worrisome. Great majority of the country's population, both urban and rural, is without water supply. However, Nigeria does not seem to realize the seriousness of her water resource problems. Notably, Ibadan, Lagos and Kano (to name only a few) among the largest urban centres in the country have been having serious problems of water shortage for many years (Ukpong, 1987: 83-84).

The State of Nigeria's Manufacturing Sector

Although manufacturing is one of the fastest growing sectors of the Nigerian economy, being second only to the mining sector, it is relatively small, and in spite of the impressive growth rate as Adejugbe (1987:34) noted, the sector's contribution to the Gross Domestic Product is minimal. Manufacturing as Akpan (1998:322) points out is the second largest sub sector in terms of output and contribution to the GDP and constitutes, on the average, about 33 per cent of the industrial output. Manufacturing output only contributed an average of 8.4 per cent to the GDP, between 1981 and 1996. The nonoil industrial GDP is equally low, averaging about 11.8 per cent since 1981. Thus, using any index, the Nigerian manufacturing endeavour is still very vulnerable, compared to agriculture, petroleum and mining.

Following the declining fortune of the economy, the manufacturing sector has gone through difficult times in recent years. The economic downturn had a major impact on the manufacturing sector as capacity utilization fell drastically from 82 per cent in 1970 to less than 30 per cent in 1995. Similarly, manufacturing employment fell by nearly 25 per cent between 1985 and 1995 (Adenikinju, 1998: 305).

The Government and the Challenge of Developing Infrastructural Facilities

The manufacturing sector in Nigeria as Adenikinju (1998:303) explains, represents a major plank in the government's plan to restructure the economy and diversify its productive base, in effect to enhance the productivity of the manufacturing sector. This was corroborated by Akpan (1998:321) who also declares that.there is obviously a positive relationship between industrialization and general

development of the economy.

In its bid to encourage and promote industrial production as a cardinal platform for achieving economic growth and development, government has to create/provide the enabling environment for entrepreneurial activities. As Anonymous (1996) acknowledges, The improvement of urban infrastructure and services is critical to national development. Lack of attention to these issues will have a considerable negative impact on the lives and hopes of Nigerians, both in the rural and urban areas. Similarly, Havlicek (2006) identifies and stresses the availability of infrastructure as one of the key factors of economic growth of the small and medium enterprises.

Government investment is very important in the Nigerian economy because of its dominant role in aggregate domestic investment and the multiplier effect it has on the economy. For instance, infrastructural investments are largely provided or financed by the government due to a number of reasons the nature of some of these investments (they are regarded as public goods); their huge costs outlay; the declining costs associated with their production; and the high social benefits arising from their production. Hence, the declining rate of government investment may negatively affect private sector productivity in the country as the deteriorating state of the infrastructural supply affects the cost of doing business in the economy (Adenikinju, 1998: 306).

Yusuf (1995) found in his study that government support is one of the critical success factors for small business in South Pacific. Thus, governments in developing countries play a role in promoting and supporting companies by providing incentives and infrastructures. It was nonetheless stressed that a legitimate role of government, on behalf of the nation, is to provide a common, consistent infrastructure upon which a variety of government, private sector and community activities can take place (ANZLIC, 1996; Nwilo & Osanwuta, 2003)

Methodology

The research made use of the descriptive survey research design to collect data pertinent to the study from manufacturing establishments located in the three major industrial areas namely. Bompai, Sharada (phases I and II) and Chalawa, all located within Kano metroplolis.

Remarkably, only manufacturing firms that are functional constituted the population for the research. This is because quite a large proportion of the firms have either temporarily or permanently closed down (that is ceased to operate for one reason or another). Further more, although most of the firms were approached to canvass support and solicit cooperation for the research, participation was voluntary. However, efforts were made to explain the purpose as well as the possible benefits of the research to the owners and key management staffs.

In order to ensure validity of data to be collected, only the owners (that is, the entrepreneurs themselves) or, in case of absence, their key managers were targeted with the rerearch instrument a multiple choice close ended structured questionnaire designed by the researchers specifically for this research . An appeal was made that the target respondent personally complete the instrument. Although there were up to well over 300 potential respondents, only about 50 showed willingness to participate in the study. Yet it took tremendous efforts by way of repeated visits, telephone calls and replacement of lost instruments before 43 instruments could eventually be retrieved. It was remarkable that all the questionnaires retrieved were found usable for data analysis.

The 5-point Likert type rating scale was employed to measure the key variables, and so the data being largely nominal, simple descriptive statistics frequency distribution,, mean , standard deviation and z-score, were used to accomplish data analysis.

The Findings

The Current State Of The Infrastructural Facilities Available To The Manufacturing Industries

The major challenge of this study is to ascertain the state of infrastructural facilities and their import for operational efficiency of the manufacturing industries in Kano metropolis. It is thus compelling to first determine the current state of these facilities that are available to the manufacturing organizations, hence the respondents were asked to indicate the extent to which their respective organizations depend on each one of the major infrastructural facilities that are usually required for optimal functioning of manufacturing organizations namely, water, electricity, telephone, road and of course communication.

It became evident from the table that there was a great dependence on electricity (z-score=7.3862) followed by water (z-score=4.8763), while the least dependence was on communication. This result suggests that electricity and water contribute immensely to the efficient operation of manufacturing organizations in Kano metropolis.

Subsequently, the respondents were asked to indicate how adequate was the provision of each one of the major infrastructural facilities for the operation of their factories. Their responses were equally scored using the Likert-type rating scale ranging from 5 for "very adequate" to 1 for "very inadequate".

This result suggests that whereas the manufacturing organizations depend highly on electricity and water, these two facilities appear to be the least adequate in supply. This finding no doubt portends adverse consequences for the operational activities of the manufacturing firms.

The Current Operational Level Of The Manufacturing Industries Vis-À-Vis Their Installed Capacity

This research has attempted to ascertain whether or not the manufacturing organizations in Kano metropolis are operating at the optimal level of installed capacity. The responses to a question posed in this respect gave indication that only 4.65 % of all the manufacturing organizations surveyed were operating at full level of installed capacity, while the remaining 95.35 % operates at various levels below full capacity. For instance, analysis

Table 1 The Extent To Which The Manufacturing Organizations Depend On The Respective Infrastructural Facilities

	Infrastructural Facilities	To A Very Large Extent	To A Large Extent	To Some Extent	To A Little Extent	Not At All	Sample Mean	SD	Z-Score
A	Water	36	3	1	3	0	4.6744	0.8373	4.8763
B	Electricity	40	1	1	0	1	4.8372	0.6877	7.3862
C	Telephone	12	25	5	1	0	4.1163	0.6972	-3.7290
D	Road	15	24	3	1	0	4.2326	0.6844	-1.9362
E	Communication	7	25	10	1	0	3.9302	0.7036	-6.5974
	Population Parameter						4.3581	0.0649	

n=43 Source: Survey Data (2007)

revealed that 7.89 % are at less than 20 % capacity utilization, 55.16 % were between 21 and 40 %, 37.21 % were between 41 and 60 %, while 4.66 % operate between 61 and 80 % of their installed capacity. It was also noted that 32 or 74.42 % of the respondents declared that they operate shift duty ranging between 2 and 3 shifts. A question was put to the respondents to ascertain how many production workers they would normally engage when operating at full capacity, data analysis revealed that 18.6 % engaged less than 51, 16.28 % engaged between 41 and 80, 20.93 % between 81 and 100, 32.56 % engaged between 141 and 170 production workers. However, when operating at less than full capacity 32.56 % will engage less than 50, 16.28 % between 51 and 80, 39.53 % between 81 and 100, 4.65 % between 111 and 140, and 7.69 % between 141 and 170 production workers.

The Extent To Which Infrastructural Facilities Are Responsible For The Current Level Of Operation

A major thrust of this research is to assess the possible effect of infrastructural facilities on the operational efficiency of the manufacturing firms in Kano metropolis. Given the knowledge of the state of infrastructural facilities as well as the level of installed capacity, it becomes imperative to make an attempt to establish whether or not the state of infrastructural facilities was responsible for the current level of capacity utilization. Hence, the respondents were asked to indicate the extent to which the poor and/or inadequate provision of these facilities was responsible for the currently low level of production. Their responses in respect of each facility were scored on a 5 point Likert-type rating scale ranging from 5 for "to a very large extent" to 1 for "not at all

The result show that the effect of the inadequacy in electricity supply was very severe (z-score=3.1178) followed by water (z-score=1.7176) while the one that has the least effect was communication (z-score=-2.0163).

The respondents were also asked to specify how significant is the improvement in the provision of each of these respective facilities to facilitating an increase in their company's capacity utilization. The responses, also on a Likert-type rating scale ranging from 5 for "to a very large extent" to 1 for "not at all".

Table 2 The Perceived Adequacy Of The Respective Infrastructural Facilities For The Operation Of The Manufacturing Firms

	Infrastructural Facilities	Very Adequate	Just Adequate	Not Sure	Inadequate	Very Inadequate	Sample Mean	SD	Z-Score
A	Water	9	2	2	24	6	2.6279	1.3805	-1.2977
B	Electricity	7	4	1	13	18	2.3023	1.4886	-2.8373
C	Telephone	5	8	17	8	5	3.2791	1.1196	1.7816
D	Road	6	13	9	14	1	3.2093	1.1246	1.4516
E	Communication	3	12	15	12	1	3.0930	0.9714	0.9018
	Population Parameter						2.9023	0.2115	

N=43

Source: Survey Data (2007)

Table .3 Extent To Which The Effect Of Poor/Inadequate Infrastructural Facilities Was Responsible For The Low Level Of Factory Operation.

	Infrastructural Facilities	To A Very Large Extent	To A Large Extent	To Some Extent	To A Little Extent	Not At All	Sample Mean	SD	Z-Score
A	Water	31	8	2	0	2	4.5349	0.9599	1.7176
B	Electricity	39	3	1	0	0	4.8837	0.3909	3.1178
C	Telephone	10	16	15	1	1	3.7674	0.9216	-1.3629
D	Road	9	16	16	2	0	3.7442	0.8478	-1.4562
E	Communication	10	11	18	3	1	3.6047	1.0033	-2.0163
	Population Parameter						4.1070	0.2491	

N=43

Source: Survey Data (2007)

Table 4. The Possible Effect Of The Significant Improvement In Infrastructural Facilities On Capacity Utilization

	Infrastructural Facilities	Very Important	Just Important	Not Sure	Un-Important	Very Unimportant	Sample Mean	SD	Z-Score
A	Water	39	3	0	1	0	4.8605	0.5155	2.3868
B	Electricity	39	4	0	0	0	4.9070	0.2939	2.6676
C	Telephone	12	24	7	0	0	4.1395	0.6392	-1.9656
D	Road	16	26	1	0	0	4.3488	0.5293	-0.7020
E	Communication	11	26	4	2	0	4.0698	0.7366	-2.3868
	Population Parameter						4.4651	0.1656	

N=43

Source: Survey Data (2007)

Analysis thus revealed that the effect of such significant improvement in infrastructural facilities on capacity utilization will be most felt /pronounced with respect to electricity (z-score=2.6676) followed by water (z-score=2.3868) while the effect on provision of communication will have the least effect on capacity utilization (z-score=-2.3868).

It was considered appropriate to establish how adversely (an attempt by the manufacturing industries to provide some of these facilities) has affected operations in terms of production cost, loss of man hour, possible drop in quality of production or possible increase in units produced.

Results show that the most adversely affected

was the production cost (an increase, with a z-score=1.0689) but with no remarkable significant increase in the number of units produced. Nonetheless, the effect was less severe with respect to drop in quality of production (z-score=-0.7773) and loss of man hour (z-score=-0.2915).

It was also considered auspicious to ascertain the extent to which the manufacturing firms have made deliberate efforts to provide some infrastructural facilities by themselves. Invariably, it is pre-supposed that a company will only make a deliberate effort to provide infrastructural facilities when the lack of such a facility would most likely have a disrupting effect on their operational services. The respondents were therefore asked to point out the extent to which their respective organizations have made deliberate efforts to provide each of the infrastructural facilities on their own. Their responses were scored on a 5 point Likert-type rating scale ranging from 5 for "to a very large extent" to 1 for "not at all". The analysis based on z-score subsequently revealed that the most deliberate effort in the provision of infrastructural facilities was made with respect to electricity (z-score=2.5426) followed by water (z-score=1.4075), while the least effort was made with respect to road (z-score=-1.6954) see table .6 below.

Furthermore, the respondents were asked to indicate the extent to which infrastructural facilities are responsible for low level capacity utilization. Their responses on a 5 point Likert-type rating scale ranged from 5 for "to a very large extent" to 1 for "not at all".

Table 5 The Extent To Which The State Of Some Infrastructural Facilities By Manufacturing Firms Has Adversely Affected Operations.

		Very Adversely	Just Adversely	Not Sure	Not Adversely	Not At All	Sample Mean	SD	Z-Score
A	Increase in production cost	42	1	0	0	0	4.9302	0.3377	1.0689
B	Loss of man hour	32	7	2	2	0	4.6047	0.7910	-0.2915
C	Drop in quality of production	29	8	5	0	1	4.4884	0.8830	-0.7773
D	Increase in units produced	33	8	0	2	0	4.6744	0.7145	0.0000
	Population Parameter						4.6744	0.2393	

N=43

Source: Survey Data (2007)

Table 6 The Extent To Which The Manufacturing Firms Have Made Deliberate Efforts To Provide Some Infrastructural Facilities.

	Infrastructural Facilities	To A Very Large Extent	To A Large Extent	To Some Extent	To A Little Extent	Not At All	Sample Mean	SD	Z-Score
A	Water	31	10	1	0	1	4.5814	0.7938	1.4075
B	Electricity	40	3	0	0	0	4.9302	0.2578	2.5426
C	Telephone	7	27	7	1	1	3.9535	0.6530	-0.6356
D	Road	9	13	18	0	3	3.6279	0.9765	-1.6950
E	Communication	11	10	20	0	2	3.6512	1.0208	-1.6194
	Population Parameter						4.1488	0.3073	

N=43

Source: Survey Data (2007)

Table 7 The Extent To Which The Respective Infrastructural Facilities Are Responsible For The Currently Low Level Of Capacity Utilization

	Infrastructural Facilities	To A Very Large Extent	To A Large Extent	To Some Extent	To A Little Extent	Not At All	Sample Mean	SD	Z-Score
A	Water	37	3	2	0	1	4.7442	0.7589	1.4994
B	Electricity	42	1	0	0	0	4.9767	0.1525	2.2273
C	Telephone	11	24	5	2	1	3.9767	0.8861	-0.9026
D	Road	13	14	15	1	0	3.9070	0.8678	-1.1209
E	Communication	9	16	16	2	0	3.7209	0.9083	-1.7033
	Population Parameter						4.2651	0.3195	

N=43

Source: Survey Data (2007)

The result revealed that the effect of electricity was the most severe (z-score=2.2273) followed by water (z-score=1.4994) while the infrastructure with the least effect was communication (z-score=-1.7033).

Options For Effecting Improvement On The Current State Of Infrastructural Facilities

Since it is more or less obvious that the generally poor state of infrastructural facilities in the country have had some telling and undesirable effect on the operational efficiency of the manufacturing industries, it is compelling to explore ways of reversing this trend. Hence, the sampled respondents were requested to suggest specific measures that should be taken by the appropriate governmental authorities to effect improvement in the badly needed infrastructural facilities namely, water, electricity, telephone, road and communication. Their responses/

suggestions to the open-ended questions are summarized and presented as below:

Water: 100 % of the respondents recognized that there should be an improvement in the quality and quantity of water supply to the industrial areas. Over 60 % suggested the sinking of bore holes within a specific square meters as a short term measure. Majority of the respondents also suggested that privately generated initiatives should be employed and encouraged by the appropriate governmental authorities to provide a safe and reliable source of water for all the industrial areas.

Electricity: 100 % of respondents believe that PHCN/NEPA as it is currently constituted cannot improve electricity supply to the desired level. Almost all the respondents suggested that an independent/private concern should be encouraged to handle the issue of electricity supply, but in the interim the respondents suggested the use of large generators that will serve a cluster of companies at an affordable rate pending when a permanent solution is established. Some of the respondents suggested the construction of either an hydro-electric power station in one of the available dams in the state or a nuclear facility that can provide electricity efficiently and effectively

Telephone: Nearly all respondents commended the current level of telephone service (particularly the GSM and CDMA) but want the government to completely liberalize the sector to allow for more innovative ideas and a reduction in the currently high tariff

Road: Almost all the respondents believe that the roads leading to the factories and all other access roads for the conveyance of raw materials and finished goods are not regularly and properly maintained; they consequently appealed to the appropriate governmental authorities to show more commitment to the construction and maintenance of these roads. They also believe that since road construction and maintenance are capital intensive in nature, the government should vote a substantial sum that can meaningfully tackle this lingering problem

Communication: 100 % of the respondents want a cheaper way/method of communication to be made available to them

Conclusions

On the basis of the findings of this research, the following conclusions have been drawn:

The manufacturing industries in Kano are suffering from inadequate supply of the major facilities that are too essential for their effective and efficient operation

The manufacturing organizations that were used for this investigation could not operate at their level of installed capacity essentially because of the poor state of infrastructural facilities

Inadequate supply of infrastructural facilities has a pronounced disruptive effect on the operations of the manufacturing organizations. It has a notable adverse effect on the level of operation and capacity utilization. Attempt by the affected organizations to provide the facilities on their own was very unlikely to achieve the desired result, since it will result to an increase in cost of production without any meaningful effect on volume. Nonetheless, some of the affected organizations have made deliberate efforts to provide some of the infrastructural facilities particularly electricity and water

Based on the findings of this investigation it can generally be concluded that the state of infrastructural facilities in Kano metropolis is not far from the general state across the nation, if anything it seem to be worse than some other locations

Recommendations

Consequent to the findings of this investigation

and the conclusions arising there from, the following are the recommendations made by this researcher with a view to guiding the respective stake holders in the formulation and implementation of appropriate policies that might help to address some of the issues that are pertinent to this research effort:

There is a need for urgent and significant improvement on electricity and water among other facilities for the smooth and effective functioning of manufacturing industries in Kano metropolis

It is considered appropriate/beneficial to the economy if the manufacturing organizations are operating at full capacity. This is particularly so because of the potentially positive effect in terms of reduction in the level of unemployment. It is therefore necessary for the relevant authorities to embark on measures aimed at effective improvement on the various infrastructural facilities that are pertinent to ensuring optimal functioning of the manufacturing organizations

Concerted effort should be made to increase capacity utilization in the manufacturing industries to optimal level. To this end, the so much needed infrastructural facilities must be either upgraded or significantly improved upon
There is a general need for the appropriate authorities to utilize the useful suggestions of some of the manufacturing industries. Specifically, the improvement in electricity and water which appears to be more crucial needed inputs from a diverse group of stakeholders with a view to generating workable ideas.

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