

A DESIGN PROPOSAL FOR BIDA FURNITURE PARK

WITH EMPHASIS ON SPACE ECONOMY

M.TECH THESIS (ARCHITECTURE)

BY

MUSTAPHA, HAJARA

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Department of Architecture

School of Environmental Technology

Federal University of Technology, Minna.

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DECLARATION

I, MUSTAPHA HAJARA (MTECH/SET/1564/06/07) of the Department of Architecture, School of Post Graduate Studies, Federal University of Technology Minna, hereby declare that this thesis is an original work which was done by me. All works used in the preparation of this thesis have been duly acknowledged.

.....
MUSTAPHA, HAJARA

.....
DATE

CERTIFICATION

This is to certify that MUSTAPHA HAJARA (MTECH/SET/1564/06/07) presented this thesis entitled "Small scale furniture park Bida" and it has been read and approved as meeting the basic requirement of the Department of Architecture, School of Post Graduate Studies, for the award of Master of Technology (MTECH) degree in Architecture, and is approved for its contribution to knowledge and literary presentation.

.....
DR. A.A. MUHAMMAD-OUMAR (FNIA)
(SUPERVISOR)

.....
DATE

.....
DR. A.A. MUHAMMAD-OUMAR (FNIA)
(HEAD, DEPARTMENT OF ARCHITECTURE)

.....
DATE

.....
PROF. O.O MORONIKEJI
(DEAN, SCHOOL OF ENVIRONMENTAL TECHNOLOGY)

.....
DATE

.....
PROF. S.L. LAMAI
(DEAN, POST GRADUATE SCHOOL)

.....
DATE

DEDICATION

This Academic work is dedicated to God Almighty for his endless mercies, favour, protection and guidance. To my Parents Mr. and Mrs. Mustapha for taking a primal interest in my education and for their financial assistance. The journey would have been more strenuous without you. Thank you.

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ABSTRACT

The creation of industrial parks in urban area is quite important. This is because factors like unemployment and rural-urban migration has led to overpopulation in urban centres. Due to these factors, people, specifically the small scale business owners build shelter in any available location in which they can carry out their various activities. These shelters are usually built of poor building materials which contribute to the formation of unplanned settlements. The implementation of this concept will help in improving developmental control in the country, will encourage rapid economic development, infrastructure and other facilities may be shared among cluster tenants, and Nigeria will offer a better opportunity for social cohesion. It was discovered that small scale ventures especially the furniture ventures can be found scattered virtually in every part of the country except the country's state capital Abuja and this is because of the proper development control in the city. To address this issue, this project is aimed at proposing a Furniture park for small scale venture with emphasis on "Space Economy". To achieve this, case studies were carried out within and outside the state. These cases were thoroughly analyzed to serve as a guide for the proposal made.

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DEFINITION OF TERMS

Furniture: This is a collective term for any movable object which supports the human body, provides storage and holds objects on the horizontal surface above the ground.

Furniture making: This is the act of making or manufacturing furniture.

Small scale Venture: This is a form of business organization that operates in small quantity.

Space: In architectural context can be understood as having enough room to fit or accommodate something or somebody

Space Economy: This is the act of economizing space to achieve its maximum benefit.

CHAPTER ONE

1.0 INTRODUCTION

Furniture making is generally a common trade in Nigeria. It is a trade that serves as a source of income to a lot of Nigerians and can also be used to determine the level of industrial development in a nation. For a better understanding of this research work, it is important to look into the different definitions of furniture.

Wikipedia, the free Encyclopedia (2008, entry: Furniture) defines Furniture as the collective term for the movable objects which supports the human body, provides storage and hold objects on horizontal surfaces above the ground. Furniture may also be defined as the movable items in a room or patio. Furniture is a product of artistic design and can be considered a form of decorative art. Apart from its functional role, it can serve a symbolic or religious purpose. Domestic furniture works to create, in conjunction with furnishings such as clocks and lighting, comfortable and convenient interior spaces. In every age, furniture has been made to serve the same basic purposes. Tables, desk and workbenches have provided space for work and dining. Cabinets, cases, and chests have been built for storage. Beds, lounges, sofas and benches have been made for resting. Since the earliest days of civilization, furniture has been built to make lives more comfortable, to store belonging, and to add beauty to the surrounding.

There is furniture for every possible situation and for different purposes. People specialize in different aspect of furniture making based on their various functions. There are specialists in

applies to a wide range of tables, curio cabinets, room dividers, shelving units, grandfather clocks, and other accessories. Juvenile furniture includes all the baby items, such as cribs and high chairs, as well as furniture designed and built in smaller sizes for children of various ages. Chairs, tables, and other pieces that can be used either indoors or outdoors on patios and lawns are called casual furniture. The home furniture was classified by "Sherie H. Vangelderren (1979)" of the National Association of Furniture Manufacturers Germany.

Furniture may also be grouped by its style. This involves the era in which a particular style or design was invented, for example early American furniture, early Egyptian furniture, Modern furniture, and so on. Recliners and convertible sofas are sometimes called action furniture because they have mechanisms that open and close or glide and rock. (Source: Interview with the production manager Sokoto Furniture, at 12:00 on January 14th 2008

1.1 BACKGROUND TO THE STUDY

Furniture making is a common trade in the country hence the furniture makers can be found scattered in every part of the country. Most of them can be seen operating in poor and non conducive environment. This has proved a need for a furniture park where all the small scale furniture makers can come together to operate in their various specialty and in a more conducive environment. Though it is a peculiar problem in the country but this proposal is made in Bida local Government Area of Niger state.

The proposed furniture park is intended to provide lettable shops for the small scale furniture makers in Bida. It shall also help in proper developmental control of Bida thereby resulting into the formation of an organized and well planned settlement.

1.2 STATEMENT OF THE PROBLEM

Furniture factory is a popular trade in most towns and cities, Bida town in Niger State even though small, has a population of over fifty small to medium furniture ventures. Most of these ventures are converted buildings or temporary structures which can be found scattered about town. This has led to the formation of unorganized environment. Some of these ventures are located within residential area and may be a source of nuisance and pollution to the general environment.

1.3 AIM AND OBJECTIVES

Aim

The aim of this project is to design a furniture park with lettable shops for the small scale furniture ventures in Bida, so as to improve the organizational structure of the town.

Objectives

To achieve the aim, the following objectives are deemed necessary.

- To provide shops that can sufficiently meet the needs of small scale furniture ventures.
- To help improve developmental control in Bida town.
- To assist in the rapid industrialization of the state and the growth of Bida town.
- To provide employment opportunity to the people.
- To Increase revenue base for the state.

- o To boost the market for raw material such as timber.

In order to arrive at a befitting and functional design, existing structures that are similar to the proposed design were visited to easily understand the basic requirements of a furniture park and also to achieve the aim and objectives mentioned above. The case studies will be thoroughly analyzed and the discoveries made will serve as a guide in the proposed design.

1.4 SCOPE AND LIMITATION

The thesis discusses the design of a furniture park with emphasis on space economy. This work comprises the literature work and the design process. The design proposal was made after putting into consideration some factors which may likely affect the use of the proposal in some other location. Some of these factors include the population of Bida, the number of furniture makers in Bida town, the production processes to determine workspace and the accessibility of the shops to the consumers. All of this was considered to allow for a modern furniture park where the different types of furniture and furniture accessories will be available to consumers in one location.

The furniture park would be limited to accommodate 70 lettable shops including furniture accessories shops. Each of the shop has a workshop, storage area and office. The park has other supporting facilities like the restaurant, metal section and warehouse.

1.5 JUSTIFICATION

It is in view of the problem that a furniture park for the small scale ventures is proposed with emphasis on "economy of space." It is proposed to serve as a place to help reduce overcrowding in the town. There will be shops where the furniture makers can properly

manufacture and display furniture to maximally satisfy the need of the different classes of people in Bida town and its environs.

1.6 IMPORTANCE OF THE STUDY

The research will promote proper developmental control in the state, it will boost the commercial activities in the area, it will bring to light the extent of the problem on ground and also proffer a solution to the problem.

CHAPTER TWO

2.0 LITERATURE REVIEW

In Nigeria, studies that specifically focus on the small scale furniture ventures is very rare, and for this reason, this research made a review of the small scale ventures in Nigeria which also include the small scale furniture makers. Furniture making is a common trade in Nigeria whose history seems to be lost. Nigeria is presently dominated by small scale ventures and its work force is dominated by artisans and craftsmen like welders, metal fabricators, carpenters, furniture makers, masons and blacksmiths that litter the country. They also represent the bulk of Nigeria's private sector.

The government in conjunction with NGO continues to train people in various skill acquisition programs without providing suitable environment in which the skill acquired can be properly done. In the course of research, it was discovered that most of these artisans and craftsmen are underequipped and can be found in poor conditions. They often work in makeshift locations, under trees and mainly around undeveloped site. Hence, there is no secured tenure for their workshops. They work in the rain and under the sun as most of their shelters are not well constructed and materials used for the construction is poor. Some of them work close to dump sites with its health hazards (any where they find space). They also lack the basic tools necessary to ease their works. In spite of their inadequacies, they still struggle on a daily basis to meet the rising demand of Nigerians to live a comfortable life.

The pictures below show some of the conditions mentioned above.

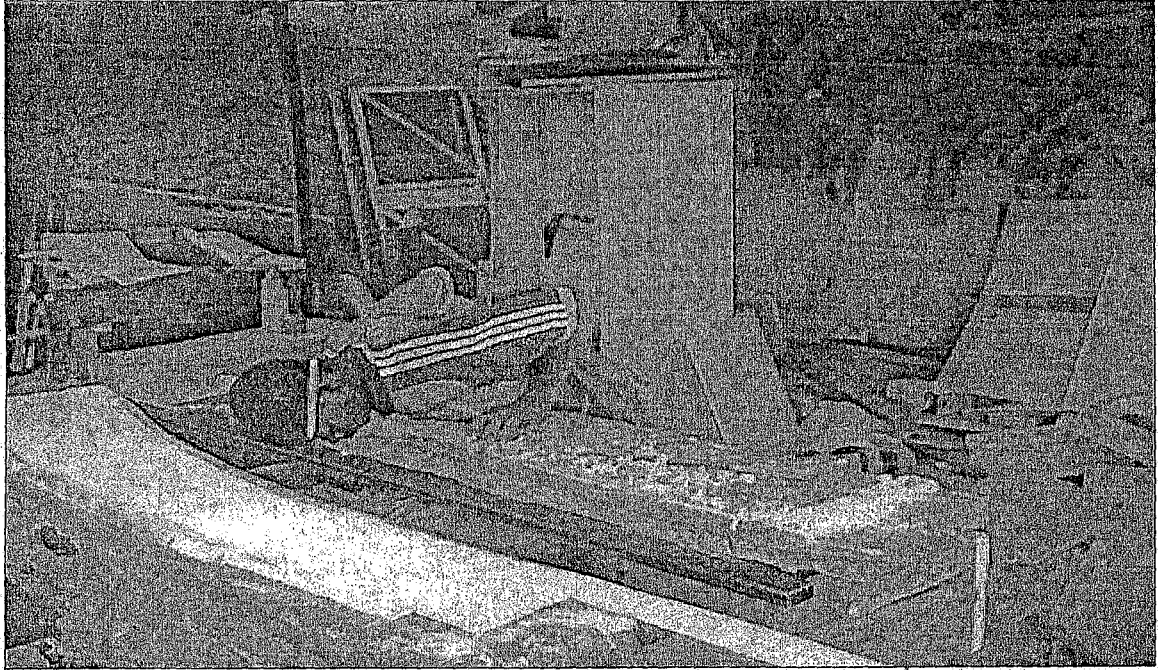


PLATE 1: SHOWING THE CONDITION OF THE INTERIOR SPACE OF A FURNITURE SHOP.

SOURCE: AUTHOR (2008)



PLATE 2: SHOWING THE ARRANGEMENT OF ANOTHER INTERIOR SPACE

SOURCE: AUTHOR (2008)



PLATE3: SHOWING SPACE USED AS WORKSHOP AND ALSOAN AVERAGE SIZE OF A TYPICAL FURNITURE SHOP

SOURCE: AUTHOR (2008)

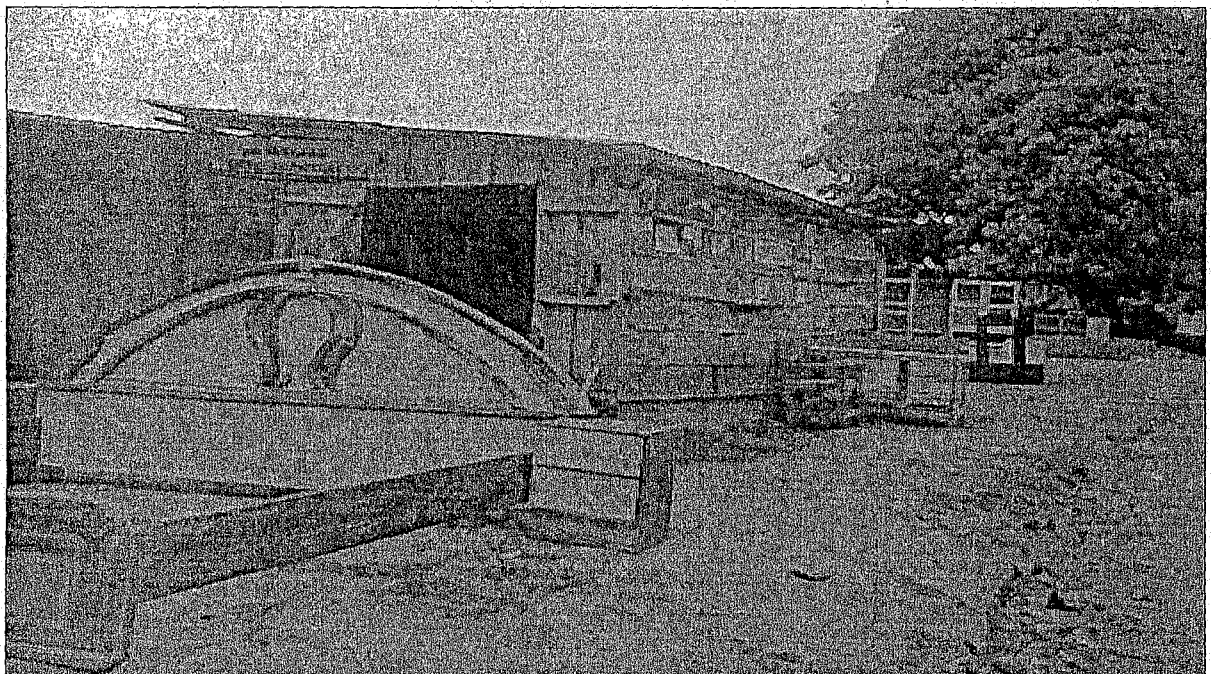


PLATE4: SHOWING SPACE USED AS SHOW AREA, CLOSE TO A DUMP SITE.

SOURCE: AUTHOR (2008)

The primary determinant of development in every economy is the level of activity (commerce and industry) within its territory. The development of Nigeria lies almost entirely in the efforts and resources of Nigerians but the task of building a virile economy capable of withstanding or gaining international recognition is too important to be either in the hands of the government or the private sector alone. This is because the Nigeria's private sector is so incapacitated at the moment and still at its infancy especially in terms of capital mobilization to undertake meaningful investments (ministry of commerce and industry, Niger state).

To improve on the country's economy, proper investment is very important as it is the desire of every nation to attract sufficient investments within its borders. But the ability to do this depends on the availability of an enabling environment which includes security, infrastructure, incentives and regulatory processes. Nigeria's efforts towards the growth of the small scale industry in the past have been hindered by the lack of favorable operating environment (Ugwuh, 2007: 3). The absence of enabling environment frustrated businesses and the total collapse of Nigeria's infrastructure has also put undue pressure on business and economic activities. Nigeria's long period of oil boom also greatly contributed to the neglect of the productive sectors of the economy. There are lots of opportunities in Nigeria that are yet to be explored, though the government has made some effort since independence to attract investments to Nigeria.

2.1 OPPORTUNITIES IN NIGERIA

Nigeria is a potentially rich country but some of its potentials are yet to be utilized and for this reasons, Nigeria has remained largely poor and underdeveloped. These potentials include:-

Availability Of Human Resource:

With a population of over 140million people (Census 2006), Nigeria is a viable market for both industrial products and services. Both skilled and unskilled labour can easily be found in the country to improve the productivity of the country.

Strategic Location:

Nigeria is strategically located at the influence of west and central Africa on the gulf of Guinea, which incidentally is home to the second largest known reserves of hydrocarbon fuels in the world.

Relative Peace:

There is relative peace in Nigeria to support economic growth and development. This will also encourage investors to invest in the country.

The Absence Of Major Environmental Disasters:

There are no major natural disasters like earthquakes, volcanic eruptions and hurricanes in Nigeria to hinder development or discourage investors.

Inspite of these potentials, Nigeria has remained largely underdeveloped with over 50% of its citizens living below the poverty line (Ibid 2004). This may be attributed to the following factors;

Policy Inconsistency:

There are hardly policies for anything in Nigeria and even the available ones are never implemented.

Little Attention To Human Development:

Little attention has been given to human development; perhaps, it may be due to the absence of enabling industrial environment. Nigerians need some modest training and orientation in an industrial environment to adapt to the needs and standards of industrial productivity.

Non-Participation Of Government In The Production Process:

The absence of government's involvement in the economy especially in terms of provision of infrastructure and enabling environment for industrial activities has resulted in an overburdened private sector incapable of competing in the global market.

2.2 EFFORTS MADE BY THE GOVERNMENT TOWARDS THE GROWTH OF THE INDUSTRIAL SECTOR

There have been several programmes and laws by the Nigeria government aimed towards the growth of the industrial sector of the country. Some of these laws includes: the import substitution policy of the 1970's, the prohibitive import restrictions (1982-1986) to encourage local manufacturing; the Nigerian export promotion scheme; the establishment of development banks and other investment promotion agencies; the comprehensive economic reforms introduced since 1999 with the aim of achieving overall turnaround of the economy; the Nigerian enterprises promotion decrees of 1972, 1977 and 1981, which tried to limit foreign ownership of shares in industries and subsequently shifted the manufacturing sector from foreign ownership to indigenous participation; By 1985, government selectively relaxed the indigenization decrees to encourage foreign investment in neglected areas. Example of

such is the large-scale agribusiness and manufacturing that used local resources. After 1988, foreign investors were allowed to increase their holdings in some sectors; And finally, the structural adjustment programme (SAP) 1986-1988. This resulted in larger increase in manufacturing contribution to GPP which grew by 8% in 1988. (Federal Ministry Of Commerce And Industry). The fallout of SAP includes Liberized regulations governing import of capital, raw materials and components, the creation of import substitution industries, privatization and deregulation. SAP increased production efficiently and reduced factory closures resulting from bans on essential inputs.

Despite the efforts by the government, little progress has been made but this could be because most of these policies were not comprehensive enough to engender the enabling environment to stimulate industrial growth. As a result of this, contribution of the manufacturing sector to Nigeria's GDP has decline by 4.81% in 2006. (Federal Republic Of Nigeria 2007). For this reason, Nigeria has taken some giant steps aimed at achieving the growth of industry and revitalizing its economy. Most of these reforms have started making positive impact specifically in the industrial sector. There are several ongoing efforts to rebuild Nigeria's infrastructure including the various independent power project (IPPs) that are in progress across the country. Approach and licenses have also been granted to many foreign investors to do business in Nigeria including to build refineries. Government has also established free trade zones (FTZ) in some strategic locations. These include the oil & gas (Onne), TINAPA (Calabar), snake island (Lagos) and others (Source: Federal Ministry Of Commerce And Industry).

2.3 CURRENT CHALLENGES TO THE NATION

Nigeria's economy is almost stagnant and this has made living a challenge. The country is confronted by problems which if not tackled, could lead to a deterioration in the economic situation of Nigeria. Some of these problems are:-

Unstable Infrastructure Lack of Enabling Environment For Business Development:

Nigeria's infrastructure cannot sustain meaningful and competitive economic activities. Issues like multiple taxation, lack of adequate incentives and the virtual absence of credit facilities have made it almost impossible for business to thrive.

High Unemployment Rate:

The growing unemployment rate especially in the cities are been worsened by the fact that life in the rural areas have also become difficult, resulting in mass movement of people to the cities where things are perceived to be relatively better.

Low GDP And Low Productivity:

Nigeria's GDPs (107billion in 2006) is rather too poor especially when compared to the country's population. Nigeria is mainly a consuming country as very little is produced locally.

Uncontrolled population growth rate:

The country's current population growth rate of 2.8% if not controlled is capable of frustrating current development initiatives.

Poor Capacity Utilization and Poor Skills:

Industrial capacity in the country is too low to support meaningful economic development and the lack of attention to human development has resulted in limited capacity to add values.

Until most of these challenges are tackled, Nigeria may not be able to improve on its economic situation.

2.4 NIGERIA AND OTHER DEVELOPING ECONOMIES

It is important to study the rate of economical development of the country and compare it with other developing economy. This is to help determine the position of Nigeria amongst other economy, to know how these nations have improved on their economy and to know if Nigeria is capable of withstanding global competition at its current growth rate. Some of the nations that will be discussed here include countries with developing and the developed economies.

China is the world's 4th largest economy in terms of GDP (\$2.68 trillion in 2006). With a population of 1.3 billion inhabitants, china has a per capital GDP of \$2,000, and ranks third in the world in terms of factory output. By 1980, up to 80% of china's population lived under \$1 per day. That number has been reduced to less than 20%.

India has a population of about 1.1 billion inhabitants. It is the 12th largest economy in the world with a GDP of \$1.0 trillion and also the second largest growing economy in the world with a GDP growth rate of 9.4% and a per capital income of \$3,800. Similarly, India is 14th

in the world, in terms of manufacturing factory output, while manufacturing accounts for 27.6% of GDP and employs 17% of total workforce.

Malaysia is another country with a fast economy growth. With a population of 25.3 million people, Malaysia has a GDP of \$308.8 billion with a per capital income of \$12,800. Manufacturing accounts for 31.7% of the country's GDP.

Indonesia is a country of 245 million people. It has a GDP of \$351.9 billion (2006) with an annual growth rate of 5.5% and a per capital income of \$3,600. Manufacturing accounts for 28.1% of Indonesia's GDP.

South Africa has a population of 48 million. With a GDP of \$507 billion, its economy is ranked 24th in the world. South Africa has a per capita income of \$3,018. The country has invested seriously in modern infrastructure development, which has supported an efficient distribution of goods throughout the southern African region.

Egypt's \$329.7 billion GDP makes her the 29th largest economy in the world. The country has a population of 80 million and a per capita income of \$4,836. It also has a developed energy market based on coal, oil, natural gas and hydro power. All these make her quite attractive to foreign investors.

Botswana is a small country with a population of 1.6million. However, for several years it was the fastest growing economy in the world, with a GDP of \$18.7billion and per capita income of \$15,692. Botswana has over \$8billion in its external reserves.

Nigeria on the other hand, has a population slightly above 140million. Also, its GDP is \$107 billion with a per capita income of \$1,105. Nigeria's economy is growing at the rate of 5.6%, while manufacturing accounts for only 4.81% of its GDP. Nigeria is competing with several other developed and developing countries, most of whose economies are already far ahead of her presently.

2.5 WHAT SOME OF THESE NATIONS HAVE DONE

In summary, these nations have industrialized rapidly ensuring sufficient value addition to their production processes; Liberalized their statutes enough to attract Foreign Direct Investment (FDI) especially by reducing taxes and duties and offering numerous incentives; Provided infrastructure and enabling environment sufficient enough to encourage private participation in business; Invested heavily in human development as a means of improving productivity particularly technical and skilled manpower; Their governments in some cases have participated directly in the production process through well organized state owned enterprises (PETRONAS of Malaysia, TEMASEK Holdings of Singapore, and other.).

2.6 SMALL SCALE BUSINESS IN NIGERIA

From the foregoing, it is apparent that Nigeria has not adopted the right strategy because there are certain inherent issues in economy that has frustrated business development. For instance, to what extent has Nigeria empowered citizens to ensure that they add value to the production process? In fact, Nigeria's development has been discovered to be slow because:

The country is yet to develop the productive sectors of its economy and has continued to pay lip service to the issue of both foreign and domestic investment. Nigeria's infrastructure is dilapidated and unreliable and to worsen matters, the government pays little attention to innovative research. Government policies do not encourage enterprise development. With limited value addition to oil and gas (hydrocarbon stocks) activities in the sector presently have very little impact on the wider economy. In fact, the Nigeria oil industry is almost an enclave activity and Nigeria does not have integrated Petrochemical Plant capable of churning out the bye-products/raw materials intermediates required by its growing industrial sector.

Though there are some organizations charged with the responsibilities of encouraging small scale industries to buster. These organizations can be found both at the federal level and state level. One of such program introduced by the federal government is the technology incubation programme and SME. There are also other non-governmental organizations that support the small scale ventures. In most cases, these organizations train people, gives them some fund and then provide them with basic materials to start their businesses with. Though none of these organizations has provided the trainees with a suitable environment where they can comfortably practice the skills acquired. Most of these trainees especially the carpenters need adequate space manufacture and display their products.

2.7 SPACE AND BUILDINGS

The word space has many definitions, but in architectural context, it can be understood as either having enough room to fit, accommodate something/somebody or an area set apart or available for a specific function. Economy here can be said to be the prudent management of available resources to avoid extravagance or waste. Space economy in a building allows the maximum utilization of space in the best possible way. The factors that influence the size of space allocated include the intended function of the space and the flow of activities in the space which determine the space layout. The economy of space was chosen as the area of focus because in the course of the research, it was discovered that the government continues to train youth in various skills without making provision for a place where the skills acquired can be practiced. Due to the problem of unemployment in the country, more people go to the training centers to acquire skills (especially in carpentry) that will train them to become independent. Most of these people, after acquiring the skills open up shops in any available location. As more people go for these training, the environment becomes more rowdy and tight hence comes the need for the economy of space. Space economy will create more opportunity to provide room for more people in the future. This is because there is constant increment in the number of people in the furniture business.

Architecture itself can be said to be the art of space based on certain physical and technical principles and the circumstances of the actual project. A room cannot exist unless defined by structures which encloses a space. Space is determined by certain physical units. A subtle demarcation of space is based on factual and spatial enclosures. The history of architecture follows the development of the constructional capacity of mankind. The discovery of the

beam, arch, vault, reinforced concrete, made possible various architectural epochs. Other secondary changes that occur in architecture are type of form, idea decorations and ornaments. They are variations of the look of the primary elements and the created spaces. The primary and secondary element of architecture occupies space but the really good architecture is originated when the primary and secondary elements of architecture are in harmony with each other, and they can only be in harmony with each other when the spaces are properly allocated.

For every design, it is important to accomplish the necessary space supply with minimum of investments, i. e. to produce interior shelter space (rooms for resting and working) at the lowest possible cost. At the same time the high quality of the products must be guaranteed, i.e. the function of the building must be achieved. Some of the requirements of this design proposal are: the ability to work comfortably, the ability to sufficiently display their goods, and the ability to provide a comfortable environment to both the customers and workers. Space economy is another way of reducing cost. To properly execute space economy, the planning and layout must be thoroughly considered. Space planning include the functional relationship between the various unit of a building or effective organization of space, while space layout includes the arrangement of furniture within a space or unit. Organizational effectiveness today means using space more wisely.' This does not just mean cutting costs, it means designing for flexibility to enable space to change as work groups and projects evolve' (the space management group: pg 54). Wise use of space also means creating the right context for concentration, learning, communication, and collaboration—the building blocks of productivity.

2.71 Space Efficiency In Buildings

Space efficiency cannot be overlooked in the process of space economy. Space economy helps in the provision of the space that will just be enough for a specific function with a little extra space that may be required for circulation and any possible future change that may occur in the design. This is to allow flexibility in the design. The space efficiency of any building relates to three factors: The quantity of space, generally calculated in terms of floor area though occasionally volume may also be relevant; the number of users, potential and actual; Amount of time the space is used.

A building can be said to be 'designed for space efficiency' when it provides: The minimum necessary space for the desired functions to be properly accommodated, with minimum 'waste' between net internal area and gross internal area (NIA: GIA, commonly expressed as the ratio net: gross) or between net usable area and net internal area (NUA: NIA). These measures are normally expressed as percentages; the minimum space necessary for effective and maximum performance by the workers (space per worker); A high level of space utilization because the space is used for the maximum possible amount of time.

An efficient furniture shop should promote worker's efficiency by minimizing distance of necessary travel between frequently used spaces; allow easy visual supervision of trainee by the trainer; include all needed spaces, but no redundant ones., this requires careful pre-design programming; Make efficient use of space by locating support spaces so that they may be shared by adjacent functional areas, and by making prudent use of multi-purpose spaces; group or combine functional areas with similar system requirements

To achieve this, emphasis was placed on understanding the culture and working methods of those who will use the facility. Buildings were designed from the inside out to ensure that space planning and interior layout are properly considered.

2.72 Space Efficiency On The Site

Considering briefly the site on which the building stands, a space efficient building is one that makes most use of the site, and therefore has a maximum gross external area in relation to the site area (GEA:site area). This concept can be extended to the entire park. A park can be considered efficient if it uses all the land it has for buildings, landscape and access route, while taking into account the need for future expansion, and the density that is suited to the surrounding development. Many of the case study buildings are part of the formation of unplanned settlement which has no rational method of space allocation.

2.73 Resource and Cost Efficiencies

Some efficiency measures incorporate concepts of lifetime cost and use patterns over time. As space economy is also a way of reducing cost in a building and maximizing its efficiency, cost is relevant in building projects that seek to maximize efficiency benefits overall. Efficient space in these terms is: Space that can be modified cost-effectively when functional requirements change, thus permitting reuse of buildings in the long-term; Space that has been specified and detailed to give reasonable cost in use; Space that is built to last and will have a long life.

The proposed design for the furniture park is of a framed structure with major wall at the intervals of 10metres and partition walls demarcating the various interior spaces. This is to allow flexibility in the design.

2.74 Space Attributes for the Furniture Park

There are different space types, but the furniture park can be classified under the light Industrial space type. Industrial buildings must be designed to accommodate a structured working environment with a heavy reliance on machinery and technology. Well laid out circulation spaces are crucial to the safety and well being of building occupants, and will also increase productivity. In the process of economizing space in design, the items listed below should not be overlooked.

Account for Functional Needs:

Light Industrial space types are often designed with higher bays to take advantage of vertical storage. Utilization of space is maximized while providing adequate circulation paths for personnel and machinery. This was especially considered in the factory area.

Design for Live Loads:

Designs should anticipate the loads of stored materials and associated handling equipment.

Power and Utility Requirements:

While general assumptions about power and utility needs can be made, specific machinery and industrial practices will mandate certain essential steps. Typical electrical requirements for the Light Industrial space types include high voltage service to every shop area and a dedicated circuit for every machine station. This was fully being considered on site.

Adequate provision was made for power house on site and space was also considered in the factory for waste collection system attached to the machineries in the factory.

Hazardous Material Handling:

As the storage and handling of hazardous materials may be a common daily activity in the Light Industrial space type, designs can include areas within the space that can accommodate such materials safely. This was achieved by the provision of storage facilities where necessary.

2.8 TOOLS USED IN THE ALLOCATION OF SPACE FOR THE PARK

A brief post-occupancy evaluation of existing furniture shop was carried out to determine the efficiency of certain space and to determine amount of space required to carry out some activities. A post-occupancy evaluation (POE) is a key element in the feedback loop that allows: Minor problems to be corrected, successes to be replicated and repetition of mistakes to be avoided.

An approximate dimension of the sizes of the shops visited was taken and the various activities carried out in the shops were determined to serve as a guide for the proposal made.

Table 1 showing the analysis of the study made

SHOPS	AREA(M ²)	SHOWROOM	STORE	TOILETS	OFFICE	CHANGING ROOM
SHOP 1	12	Open space	-	-	-	-
SHOP 2	16	Open space	-	-	-	-
SHOP 3	6	Open space	-	-	-	-
SHOP 4	9	The corridor	-	-	-	-
SHOP 5	20	The corridor	-	-	-	-
SHOP 6	25	A shelter	-	-	In the shop	-
SHOP 7	24	A shelter	Shop corner	-	In the shop	-
SHOP 8	18	Open space	Shop corner	-	In the shop	-
SHOP 9	16	Open space	In a box	Nearby toilet	-	-
SHOP 10	12	corridor	In a box	-	-	-

Source: author's field survey (June 2008)

2.81 The Use of Space in Nigeria Furniture Shops

The shop in all the cases studied serves as the workspace except in the cases of extremely small shops where the workers work in a nearby shelter, leaving the main shop to serve only as a storage facility. Most of the shops are very small, hence cannot meet with the functional requirement of a furniture park in an ideal situation. Virtually all the shops visited use the space in front of their shops as the display area and also, most of them do not have a proper space to store their working tools and raw materials. Some of the furniture makers that operate in roofed open space are faced with the inconvenience of having to carry some of their tools to safety at the end of each work day. An estimation of the various sizes of the shops was noted, activities carried out in the shops were studied and the space used for the various activities was also noted. After a critical evaluation of the analysis, a suitable deduction was made to guide in the proper allocation of space in the proposed design.

2.9 DESIGN BENEFITS OF SPACE ECONOMY IN A BUILDING

Buildings can be more effective, exciting places to work by encouraging adaptability, improving comfort, supporting sense of community, and by providing connections to the natural environment, natural light, and view. A well planned space yields the following design benefits.

Promote Health and Well-Being

Indoor environments strongly affect human health. An effective workplace helps to support and enhance the health and well-being of its occupants. Sustainable designs principles helps to achieve this objective.

Provide Comfortable Environments

A workplace that can be operated to provide the highest achievable levels of visual, acoustic, and thermal comforts for its occupants which is the underpinning of worker effectiveness.

Design for the Changing Workplace

Provision of spaces with flexibility, social support, and technology to promote new ways of working which is a cornerstone of change and innovation.

Integrate Technological Tools

effectively integrates technological tools and distribution networks required in today's office environments to enable workers to perform their duties.

Assure Reliable Systems and Spaces

Reliability is one of the greatest concerns for building occupants and can be achieved with a proper space organization. It directly affects their safety, health, and comfort. Workers should be able to rely on building systems, equipment, and tools that function consistently and are properly maintained.

2.91 List Of Abbreviations

GEA Gross external area

GIA Gross internal area

NIA Net internal area

NUA Net usable area

POE Post-occupancy evaluation

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 RESEARCH METHOD

The research method used in executing this work is the descriptive survey method which involves the following procedures:

1. Oral interview; Interview with some furniture makers where some useful facts were gained which have a positive effect on this design proposal.
2. Case studies: case studies of some existing furniture shops were carried out. Photographs taken where necessary, sketches produced and deductions made to bring out the merits and demerits.
3. Literature review: Architectural journal, newspaper, design journals, were used to extract some useful in formations.
4. Web Site: information was gathered also from the internet linking with the world to be part of the day to day technological advancement.

3.2 INTRODUCTION TO CASE STUDIES

It keeps coming up that a suitable and befitting environment for a furniture making is yet to be achieved. Small scale furniture makers can be seen dispersed around the town, working in unsuitable locations and in poorly constructed shelter. Most of these shelters are demountable structures i.e. temporary structures built using substandard building materials. This has resulted into the formation of an unplanned settlement. To avoid this, it has become necessary to make a critical study of the patterns of building, the activities taking place in

similar areas, to discover problems associated with them and to proffer possible architectural responses of improving them. The process of doing this is called "case study".

The purpose of this chapter is to present the case studies carried out, which include two furniture parks and a small scale furniture park. The case studies are furniture park kudo in Abuja, furniture park Tunga in Minna and Franco de Niger in Bida. The important of these case studies is to have an understanding of the basic requirements of a furniture maker and to make a thorough appraisal in relation to its merits and demerits. This will in turn serve as a guide for the new proposal that will be made. In the course it was discovered that there is no well planned furniture park in existence. The available ones were organically formed by independent furniture makers. The rationale for choosing these locations is that their being situated in Niger state and Abuja will give a proper insight into the problem on ground as the new proposal is being made in Niger state. For better understanding and to compare the situation in Niger State to other states, a visit was also made to other small scale furniture ventures in other states. In this research work, furniture parks were studied and a single furniture venture was also studied to compare which is more effective.

3.31 Case Study One:-Furniture Park Kudo, Abuja.

Furniture park Kudo is located along Karo road. It is made up of several rows of blocks that are used for furniture making or as shops to sell furniture related items. The park is owned by a private sector and is 32 hectares in size. It has been in existence since the early 90s but became busier during the period of the execution of the Abuja master plan by the then Minister of FCT, Mallam El- Rufai.

Some of the shops are temporary shelter made of zinc. The park is basically constructed of block wall. It is exclusively a furniture park as it comprises of independent furniture makers, factory- made furniture sellers and accessories related to furniture. It has shops and a timber shed at the back where they sell timber. The park has two major entrances.

Merits

Kudo Furniture Park is well located and has a large expanse of land that can be used for future expansion. It is located in the outskirts of the town as recommended and suitable for industrial areas. The park is well distanced from the highway as can be seen in plate 5. Plate 6 shows how easily each shop can be assessed. It can also be seen from plate 7 that the shops are well arranged in rows. It has a timber shed where the furniture makers can easily get there raw materials from. Plate 8 shows the arrangement of the structures in the timber shed. The photographs are presented as plate 7-8 below.



PLATE 5: SHOWING THE DISTANCE OF KUDO FURNITURE PARK FROM THE HIGH WAY.

SOURCE: AUTHOR (2008)

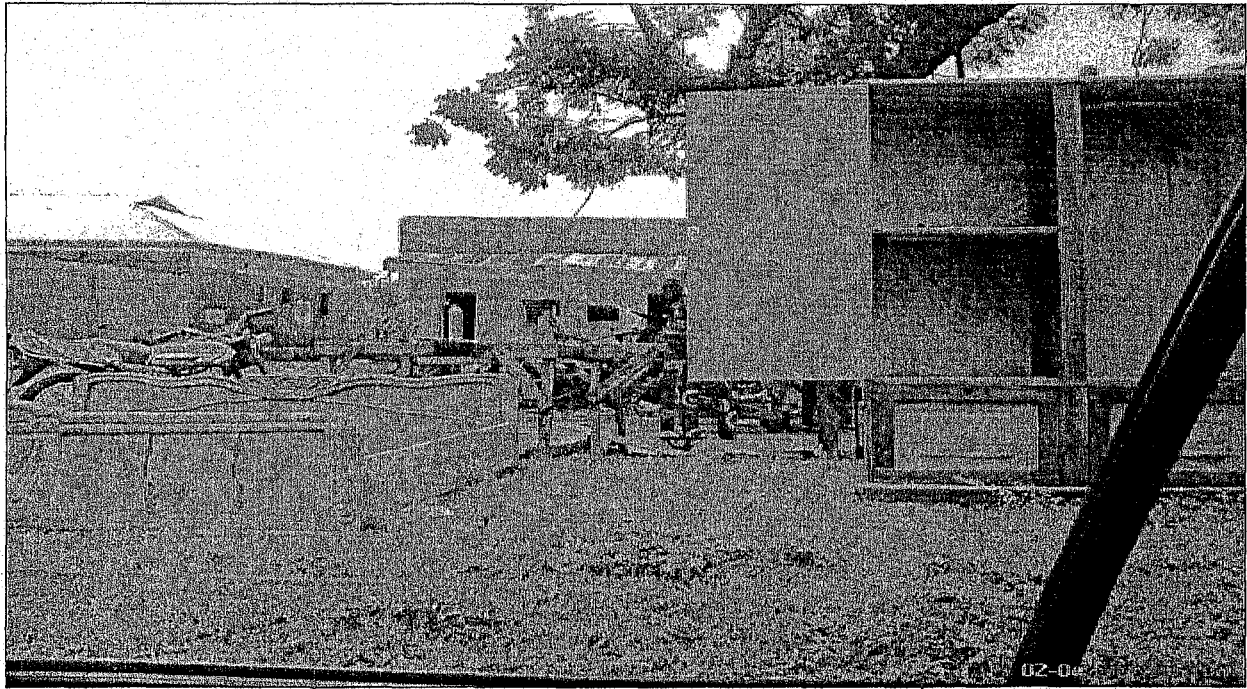


PLATE 6: SHOWING THE ARRANGEMENTS OF SHOPS IN KUDO PARK..

SOURCE: AUTHOR (2008)

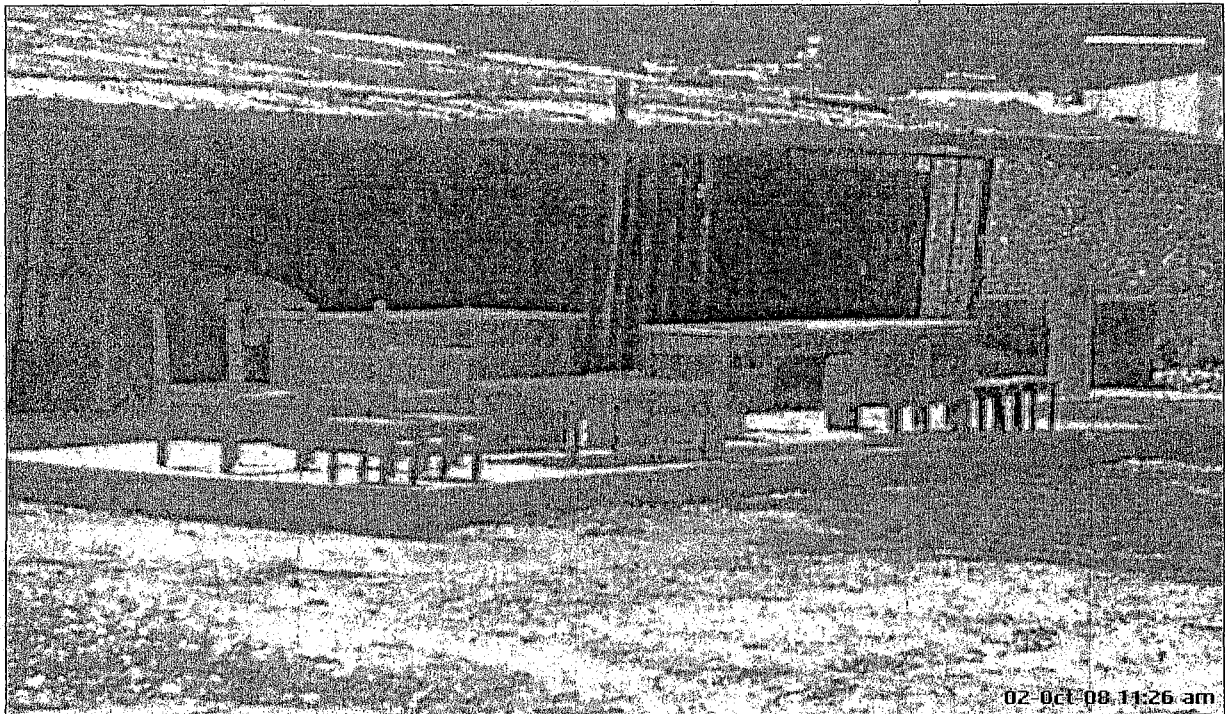


PLATE 7: SHOWING HOW EASILY SOME OF THE SHOPS IN KUDO PARK CAN BE ACCESSED.

SOURCE: AUTHOR (2008)



PLATE 8: SHOWING THE TIMBER SHED OF KUDO FURNITURE PARK.

SOURCE: AUTHOR (2008)

Demerits

It is apparent that virtually all the shops in the park do not have a defined workshop. They either rent a shop to serve as a workshop or work in a shelter nearby (plate 9). There is no external display area and the open spaces in front of the various shops are used for this purpose which makes the goods vulnerable to external weather condition (plates 10). Plate 11 shows that the horizontal space between two rows is too narrow. The park is vulnerable to flood and erosion which can make parking difficult especially during the wet season (plate 12). Also, spaces around the shops are being developed by petty traders making the environment look unorganized. There are no landscape elements as can be seen in some of the pictures. The park also lacks toilet facilities. Below are pictures that show some of the inadequacies discovered in the park.



PLATE 9: SHOWING THE CONDITION OF ADDITIONAL SHELTER USED AS WORKSHOPS.

AUTHOR (2008)

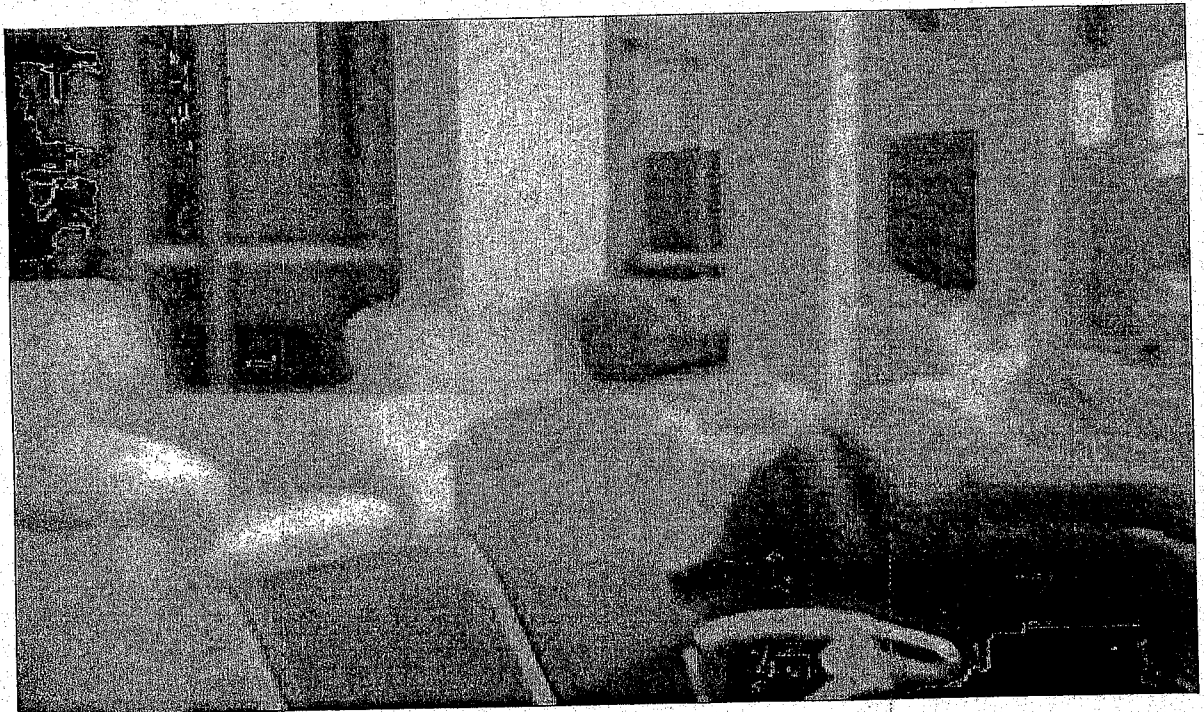


PLATE 10: SHOWING THE FRONT SPACE OF A SHOP AND TURNED INTO ADISPLAY AREA.

SOURCE: AUTHOR (2008)

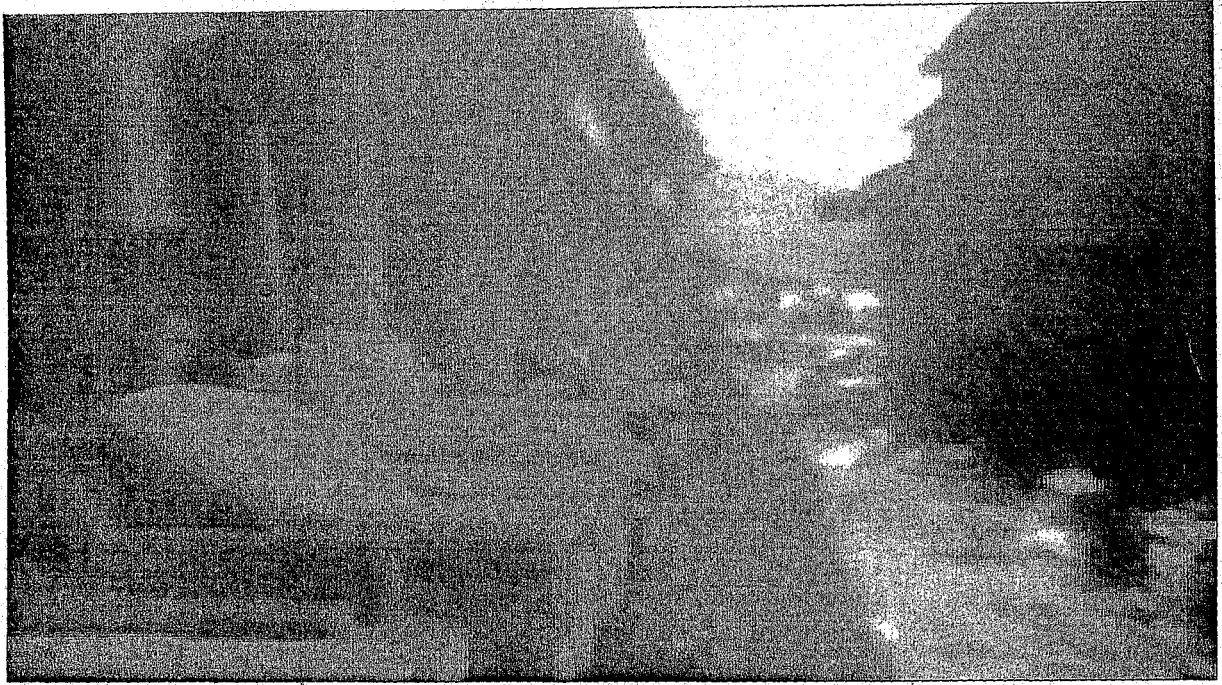


PLATE 11: SHOWING THE HORIZONTAL DISTANCE BETWEEN TWO ROWS IN KUDO PARK.

SOURCE: AUTHOR (2008)

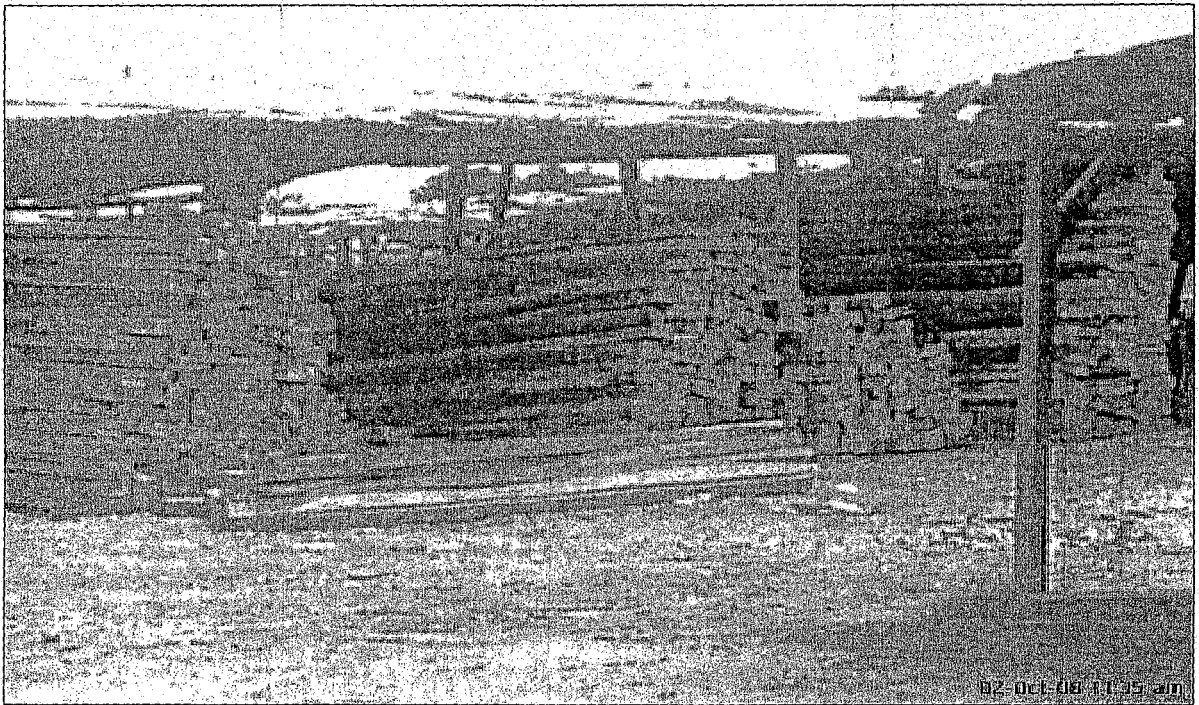


PLATE 12: SHOWING THE UNTREATED SURFACE OF THE PARK WHICH MAY CAUSE PROBLEMS DURING THE RAINING SEASON.

SOURCE: AUTHOR (2008)

3.32 Case Study Two: - Furniture Park, Tunga, Minna Niger State.

Furniture Park Minna is located along Tunga road. The park operates on government land and has been in existence since 1987. Most of the structures on the park are illegal. It is made up of shops owned by different individual. The shops in the park are constructed of woods and zinc with no serious foundation. It represents a typical example of an unorganized settlement.

The shelter which is constructed of woods and zinc serves as the workshop while the goods are displayed outside. Except for the shops, they do not have other facilities like toilets, showrooms and restaurant on the site. They manufacture all kinds of furniture ranging from upholstery to carpentry products. Though they have some all readymade goods for display but in most cases, the furniture makers in this park make their production based on demand from customers.

Merits

The site is located along a busy road which makes the goods displayed outside immediately visible to the passersby (plate13). There is adequate space in it surrounding that could be used for future expansion (plate14). The location makes it easier for customers to access. It can be seen from plate 15 that the workshops are well lighted as some of them are opened structures with roofs. Plate 16 shows that the workshops are roofed to protect the furniture from external weather condition. Photographs showing the view of the park are presented below.



PLATE 13: SHOWING A TYPICAL EXAMPLE OF A SHOP IN MINNA FURNITURE PARK WITH GOODS EASILY VISIBLE TO PROSPECTIVE CUSTOMERS.

SOURCE: AUTHOR (2008)



PLATE 14: SHOWING THE ARRANGEMENTS OF THE SHOPS IN A STRAIGHT ROW.

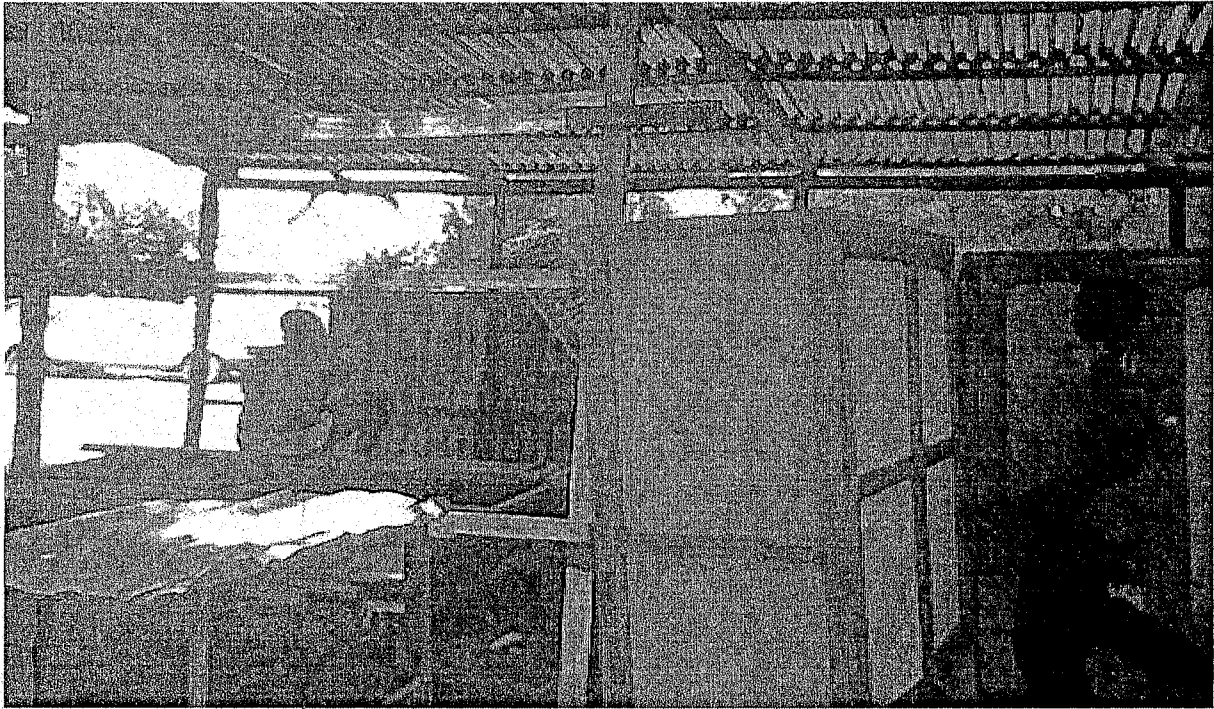


PLATE 15: SHOWING THE EFFECT OF NATURAL LIGHTING IN ONE OF THE SHOPS IN MINNA PARK
SOURCE: AUTHOR (2008)

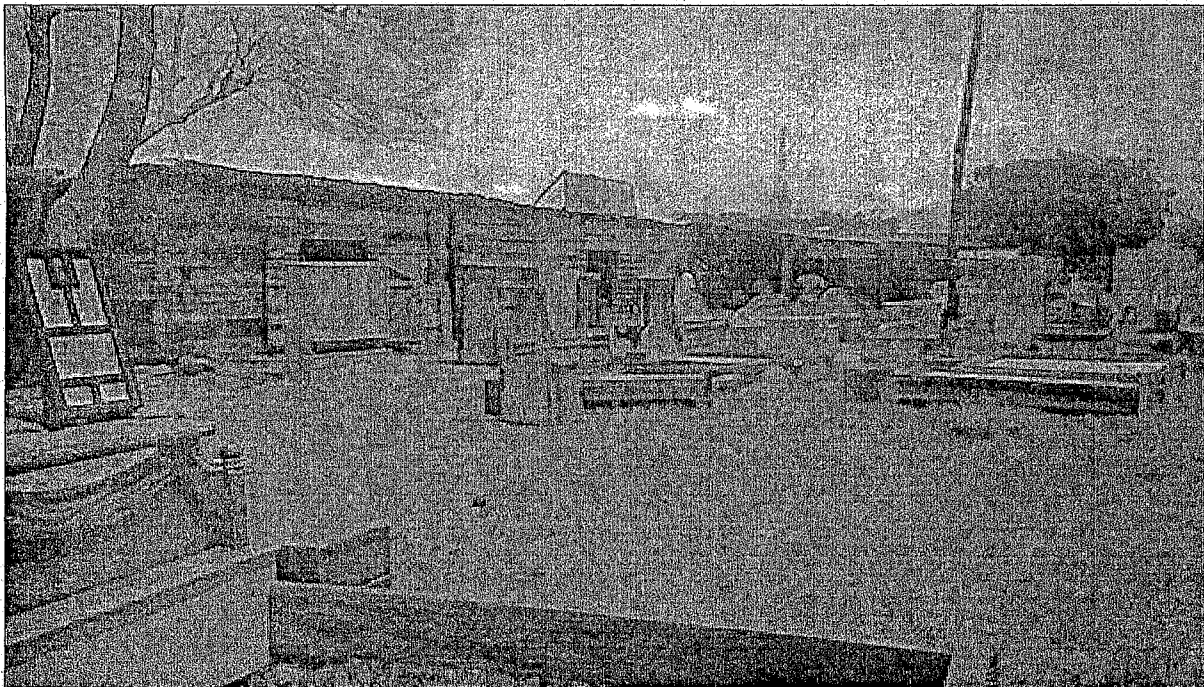


PLATE 16: SHOWING THE COVERED WORKSHOPS WITH SOME NATURAL LANDSCAPE AROUND IT
SOURCE: AUTHOR (2008)

Demerits

The shops in this park do not have storage facilities where working tools and other items can be stored. They also lack a showroom and the interior space is not spacious as can be seen in plate 17. Some of the shops in this park are too close to the main road, hence, those shops lack space for proper parking (plate 18). The vehicular and pedestrian traffic is mixed and the parking area is not demarcated (plate 19). Plate 20 shows that most of the structures in this area have a poor structural base and are constructed of poor building materials. The photographs are presented in plate 16-20 below.



PLATE 17: SHOWING THE INTERIOR SPACE OF A SHOP IN MINNA PARK.

SOURCE: AUTHOR (2008)

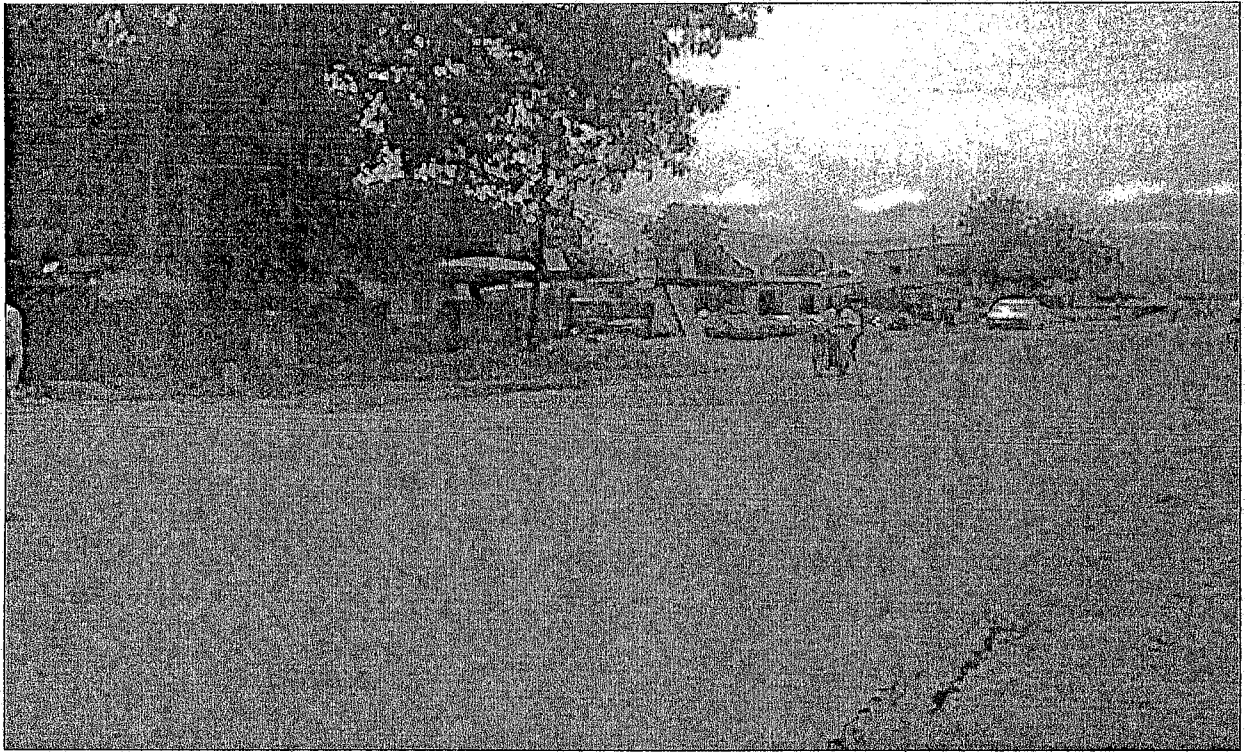


PLATE 18: SHOWING THE LITTLE DISTANCE OF THE SHOPS FROM THE MAIN ROAD.

SOURCE: AUTHOR (2008)



PLATE 19: SHOWING THE LITTLE DISTANCE BETWEEN THE SHOPS AND THE PARKING SPACE IN MINNA FURNITURE PARK.

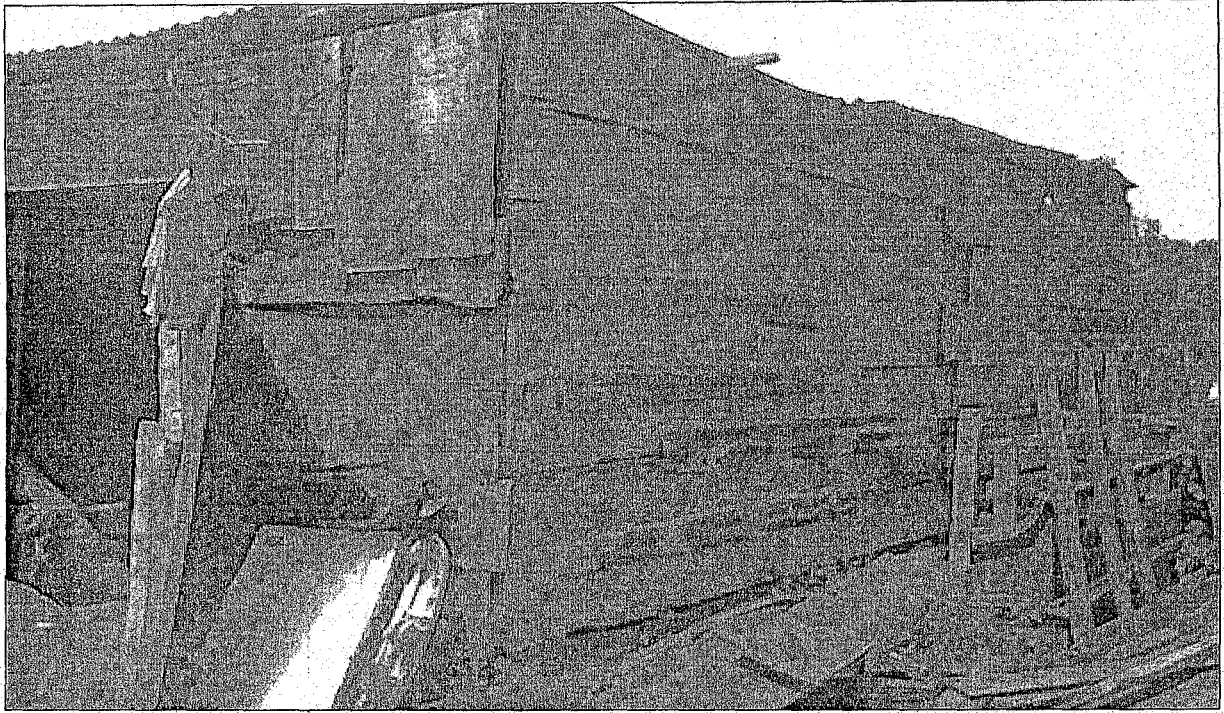


PLATE 20. SHOWING THE BUILDING MATERIAL USED FOR THE SHOPS IN MINNA FURNITURE PARK

SOURCE: AUTHOR (2008)

3.33 Case Study Three: - Franco De Niger Bida

Franco De Niger is Located along BCC road in Bida local government. This is not completely a park but represent a typical example of a small scale furniture venture in Bida town. Other small scale furniture venture can be seen within its vicinity. Bida town does not have a park, not even an organic park but there lots of small scale (Road sides) furniture makers scattered around the town.

It is privately owned by Mr. Frank Ughochukwu and has been in existence since 1988. He has nine staffs and they manufacture all kinds of furniture. They manufacture based on request.

It has a showroom, an office, a mini shop and an opened space used as a workshop. The showroom is supported by beams and columns which help in transferring load to the ground. The entrance porch which also serves as the external display is built of demountable material.

Merits

The foundation of the building is in good condition. It has a spacious showroom which is supported by columns to strengthen its structural stability (Plate 21). It also has an external display area which is roofed to protect displayed furniture against external weather conditions (plate 22). It is easy to locate and it has good access road as it is located along a major road in Bida. The observations made can be seen in the photographs below.

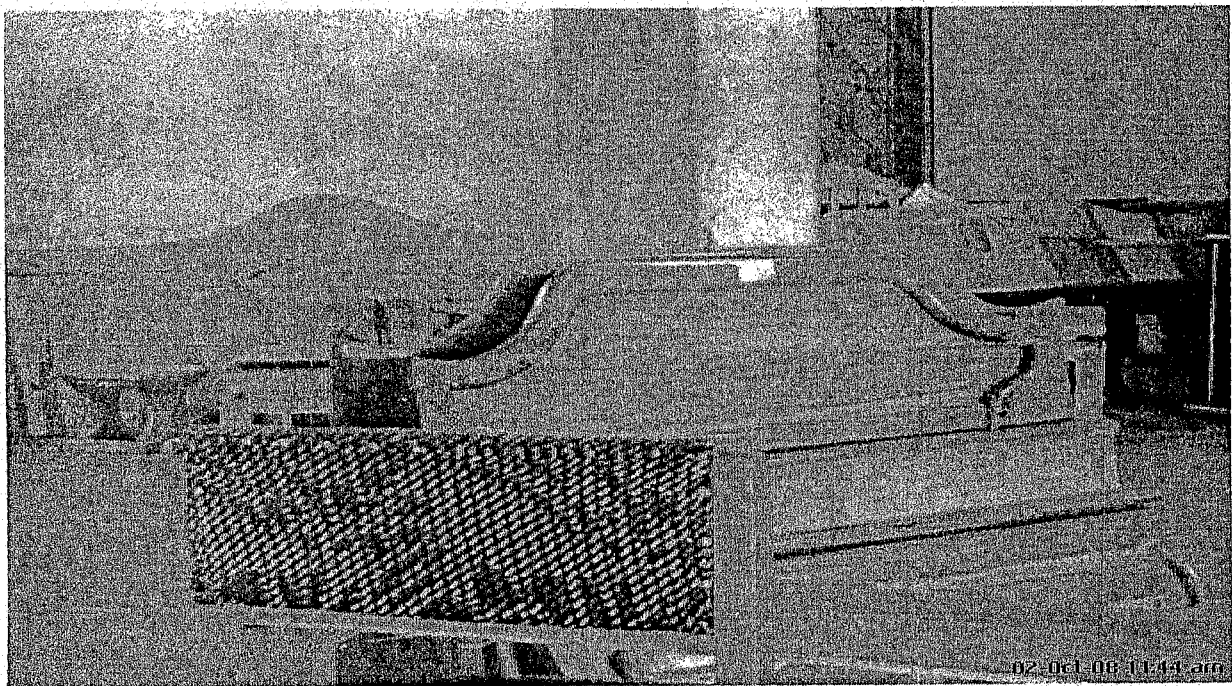


PLATE 21: SHOWING THE SHOWROOM OF FRANCO DE NIGER FURNITURE VENTURE BIDA.

SOURCE: AUTHOR (2008)



PLATE 22: SHOWING THE ENTRANCE PORCH OF FRANCO DE NIGER FURNITURE VENTURE Bida.

SOURCE: AUTHOR (2008)



PLATE 23: SHOWING NATURAL LANDSCAPING ELEMENTS AND SPACE AROUND FRANCO DE NIGER FURNITURE VENTURE BIDA.

SOURCE: AUTHOR (2008)

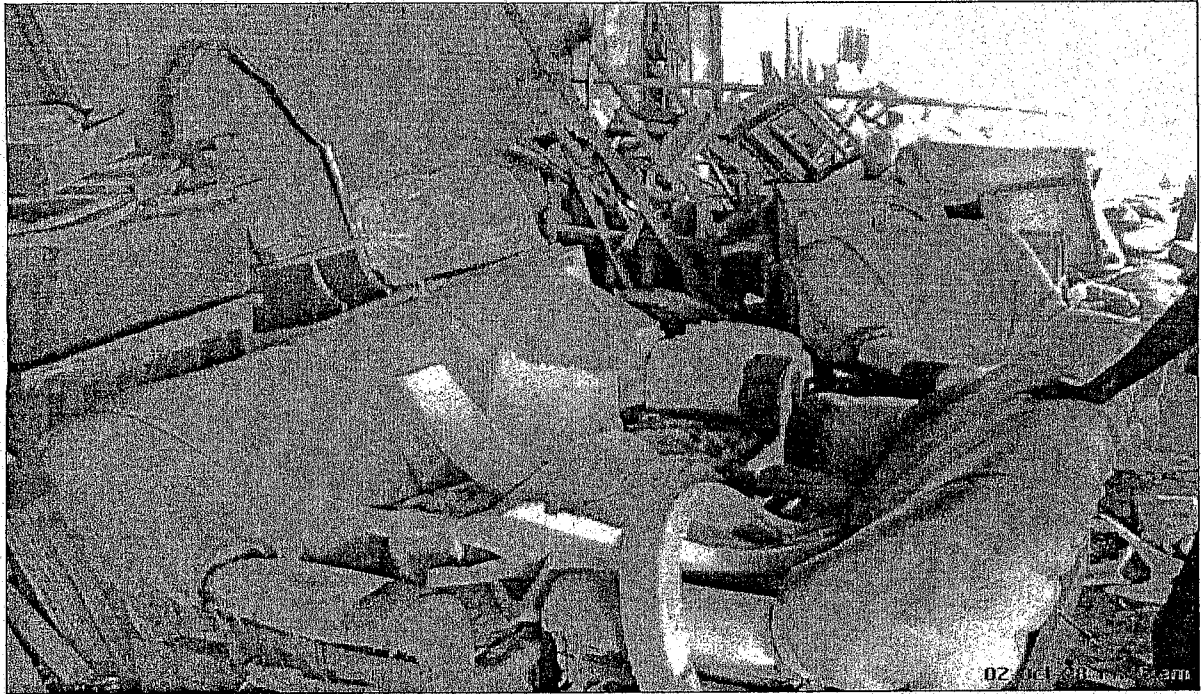


PLATE 24: SHOWING THE STORE ROOM OF FRANCO DE NIGER FURNITURE VENTURE BIDA

SOURCE: AUTHOR (2008)

Demerits

They work in an open space; hence they are not protected from the weather condition. Plate 25 shows the space used for the workshop. It can be seen from plate 26 that some section of the building is not structurally fit. It lacks storage and toilet facilities. Plate 28 shows the space used for the storage of their equipments.



PLATE 25: SHOWING THE CONDITION OF THE UPHOLSTERY SECTION IN FRANCO DE NIGER FURNITURE VENTURE BIDA

SOURCE: AUTHOR (2008)

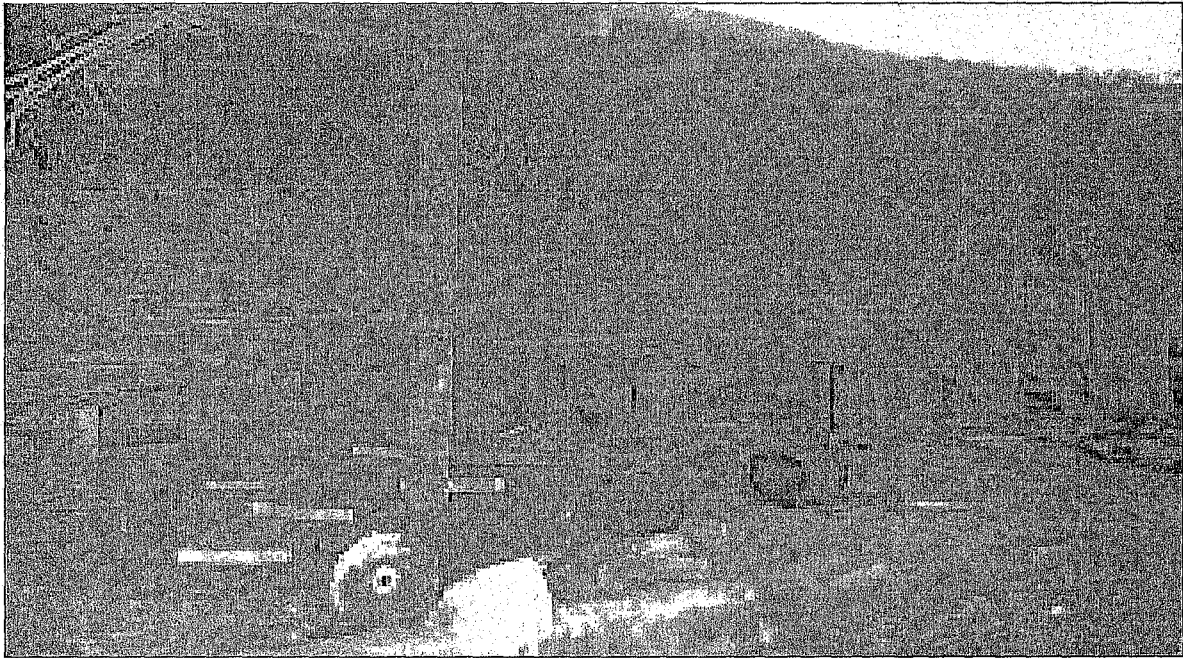


PLATE 26: SHOWING A SECTION OF THE WORKSHOP IN FRANCO DE NIGER FURNITURE VENTURE BIDA

SOURCE: AUTHOR (2008)



PLATE 27: SHOWING RAW MATERIAL STORED OUTSIDE FRANCO DE NIGER FURNITURE VENTURE BIDA.

SOURCE: AUTHOR (2008)



PLATE 28: SHOWING THE STORAGE AREA OF FRANCO DE NIGER FURNITURE VENTURE BIDA

SOURCE: AUTHOR (2008)

3.34 Summary of Case Study

A lot of positive and negative observations were made after a critical analysis of the various case studies. It was observed that all the cases studied have a direct vehicular access to the shops to make loading of goods easy. Also, most of the furniture parks are located along a major road for proper and easy marketing of their products.

Despite all the merits observed, some shortcomings were also observed. In all the cases studied, vehicular traffic and pedestrian movements are not separated. It was noted that none of the cases have showrooms, restaurants, stores or even toilets. Their premises were not well landscaped and they all lack adequate parking spaces. Except for the furniture park in Kubo, the other two were constructed of sub-standard building materials.

In conclusion, lots of improvements need to be made on the proposed design as a result of the observations made. The merits will be improved on and the demerits will be eliminated. In the proposed design, a mini workshop, showroom, store, external display area and an office will be provided for each shop. Vehicular and pedestrian traffics will be separated. Parking spaces will be clearly defined. The park will be well landscaped; it will have a garden and a relaxation area for the comfort ability of the workers and customers. This will help to uplift the aesthetics attributes of the park and also make it more appealing.

3.4 DATA COLLECTION

Collection of data is the bases of every research work because it gives the required need for the project. Also by enlightening the researcher on what has been achieved and what is yet to be achieved, it gives an insight and perspective to the project at hand.

3.41 Brief Background Information On the location

Bida town lies on the latitude 9°06'N and longitude 0°01'E on the Nupe sandstone formation. It is located north of river Kaduna along Mokwa Bida road. It is the headquarters of Bida local government area and is situated 84km southwest of Minna, the capital of Niger State. It is situated between the Ciken and Wuya streams (Tributaries of the Gbako river). A third stream Landzu bisects the town. To the Northwest, there is a continuous gentle spread of sedimentary rocks limiting any urban development in that direction. A major drainage valley flows from the centre of the town, eastwards with many minor drainage channels feeding into the stream.

It is the first Nupe dynasty and was founded by Mallam Dendo, a learned Fulani court adviser, who rose to prominence and power after deposing Mijiya (1767-1777), the then Etsu Nupe at Raba. The throne of Etsu Nupe is run in succession between three ruling families, the Etsu Ndayeko, the Etsu Usman and the Etsu Masaba families. The present Etsu Nupe is Alh. Yahaya Abubakar from the Etsu Usman family. He became the 13th Etsu Nupe on the 1st September 2003 after the death of the previous Etsu Nupe Alh. Sanda Ndayako.

The general climate of Bida can be described as an average Nigeria weather not as cold and comfortable as the eastern part of the country, neither as hot nor uncomfortable as the extreme north. The tropical climate is the climatic zone into which Nigeria falls. The tropical climate can be further broken into the tropical rain forest and the savannah. Bida falls into the savannah.

The last census figure put the population of Bida town at 170,725 with 87,908 males and 82,81817 females (Census 2006). Majority of the dwellers are Nupe. People from different ethnic tribes can be found in the town. The native indigenes of Bida are mostly Muslims but many churches can be seen built for worship by non-natives dwellers.

Bida town is the main business centre for many communities around it and is therefore a bursting commercial town. The central market is the heart of its commercial life but there also exist modern shopping centers, super markets and roadside shops and stalls that deal in different types of goods. Bida is also known for its craft especially the masaga beads and Twata mukun brass work. There are also good embroiders, mat and hat weavers in Bida. There are lots of small scale ventures like block industries, saw mill, and over fifty furniture making industries in the town (source: interview with Mal Sanni, member of the association of Bida furniture makers). Banks and insurance companies can also be found in Bida town. Some of the inhabitants are involved in the agricultural sector while a considerable number of them are government workers.

The Minna-Kateregi-Bida road, which was completed in the early 80s, reduced the distance from Bida to Minna from 161km to 80km. This road also links the northern part of Nigeria to the south through Mokwa and Jebba. There are various means of transportation to the town. Within the town itself, taxis and motorbike provide efficient means of transportation.

3.42 Climatic condition

Bida town experiences distinct wet and dry season. The wet season starts sometime in April-May and ends in October. The dry harmattan wind ushers in the dry season which gradually becomes hot between march and may at the onset of the rain.

The general climate of Bida could be described as at average Nigeria weather not as cold and comfortable as the eastern part of the country, neither as hot and uncomfortable as the extreme north. Some of the factors that determine the climatic condition of Bida town are analyzed as follows:-

3.43 Temperature

The temperature is highest in march at about and lowest in August . The town is generally blessed with a moderate climatic condition all year round as the extreme of cold, heat or rain are absent.

3.44 Rainfall

The rainy season usually starts in the month of April and lasts for about six months. The average rain pressure at September is quite heavy.

3.45 Humidity

The humidity in Bida is high in terms of the south-west prevailing wind and mainly due to the surrounding rivers like landzun, and ciken. This coupled with transpiration from the soil and the natural vegetation is accountable for the relatively high humidity in the town.

3.45 Sun and Cloud Cover

Following the trend in the middle belt, Bida receives longer hours of sunshine between November and early may. It experiences shorter periods of sunshine in the month of August when the cloud cover is very dense and rain heaviest.

3.46 Wind

Wind pressure is at an average speed in Bida unlike in most northern town. This is less destructive and has also made the need for flat roof unnecessary as in extreme north.

3.47 Geology and soil

There are large but isolated rock outcrops in the landscape of Bida town. The land offers easy development possibilities due to the absence of large hills. Though it is characterized by the three soil types namely sandy soil, loamy soil and clay soil but the dominant soil type is the loamy soil.

3.47 Topography and Drainage

The town is situated in a valley created by the ciken and wuse streams. A third stream, ladzun bisects the town. To the north-east of the town, there is a continuous gentle outcrop of sedimentary rocks limiting any urban development in that location. A major drainage valley flows from the centre of the town eastwards with many minor drainage channels feeding into it.

3.48 Economy and Commerce

Bida town is the major business center for many communities around it and is therefore a bustling commercial town. The central market is the heart of its commercial life but there also exist modern shopping centers, supermarkets, and innumerable roadside shops and stalls that deal in almost every imaginable goods.

Bida is well known for its craft especially the masaga beads and twata mukun brass work. There are also good embroiders, mat and hat weavers. Small scale industries such as the block making saw mills, and furniture making also exist. Organizations like banks, insurance companies are available in Bida.

Some of the inhabitants are involved in the agricultural sector and the three main stream (ladzun, ciken, and wuse) provide good irrigation.

Considerable numbers of people are involved in the tertiary education sector in the federal polytechnic, school of nursing, Niger polytechnic and the National Cereal Research Institute.

There are quite a number of filling stations providing fuel for travelers and indigenes.

3.49 Transportation and Traffic Flow

The minna –kataerigi road which was completed in the early 80's reduced the distance from minna to Bida. This road also links the northern part of Nigeria to the south through Mokwa and Jebba. Taxis and commercial vehicles are available daily to various part of the country. Motorbikes and tricycle provide efficient means of transportation in the state.

3.5 LOCATION OF THE SITE

The proposed site is located along Mokwa road, after the abandoned Vesper factory. It is flanked by yet to be developed sites which extend all the way to the outskirts of Bida town. The total area of the site is 35 hectares. This will be enough for the proposed design and also, there will be space for future expansion.

3.3 CRITERIA FOR THE SITE SELECTION

There are factors to be considered before siting the location of a furniture park. Most towns have master plans which have marked out the areas for commercial, industrial and residential activities. The fact that this is an industrial design must not be overlooked. Hence, the proposed site is located within the industrial area of Bida town.. The choice of the location of this furniture park is guided by the following criteria: -

a. **Accessibility:** It is required that any proposed development should have good access road. This particular site has a good access road; it is also in an opened area which will allow for easy identification. The proposed site can be easily accessed from the north- east direction.

b. **Area of Coverage:** The site for any intended development should be able to conveniently house the proposed project. This particular site is a vast land which meets this requirement. As there are many furniture makers in Bida, with the government's continuous effort in training youth in carpentry, a large land is needed for this project to allow for easy expansion in the future when the need arises.

c. **Soil Type:** The soil type in an area is important as this affects the type of foundation to be used in the area and to some extent, the intended use of the site. The soil type in the proposed area is basically loamy soil. This soil type can support buildings and plants with minimal maintenance.

d. **Site Topography.** It is important especially when cost is involved to consider the terrain of an area before deciding on a site. In any design, the cost of having to either fill up or to level down a site to a desired level may attract additional cost. The proposed site happens to be a virtually flat and also bear which is best as there will be no need to trim down any building.

3.4 SITE INVENTORY AND ANALYSIS

A site inventory is of importance because it enables the designer to take record of the features on the site both natural and man-made. Natural features include the vegetation of the site and likely trees that may be retained if they do not fall directly on the construction area. It also includes the geological formation of the site, rocky outcrops and hills. Man made features

include electrical transmission lines, telecommunication cables, water pipes and oil pipe lines.

3.41 Site Inventory:

The site is characterized by vegetations of shrubs and trees such as, cashew, mango and palms which are evenly distributed over the site. Electrical transmission cables pass by the front of the site. There are no water pipelines passing through the site and the site is devoid of any temporary structures.

3.42 Site Analysis:

a. Vegetation: The vegetation on the proposed site is evenly distributed. There are grasses mango trees, palm trees and shrubs on the site.

b. Soil: The soil type on the proposed site is loamy soil. The loamy soil is well compacted and as such; it has good bearing capacity to support the structures. The soil type in this site will also enhance the growth of trees, flowers and grasses to achieve a good landscape environment.

c. Topography: The site is relatively flat, but it has a gently slope to the east which will help to achieve easy run-off of surface water to the eastern direction. The drainage system will also follow the natural course of the slope. The site being relatively flat will help in minimizing cost of project as there will be no need for serious leveling or filling.

d. Trade Winds: There are two belts of prevailing winds that blow on the site. These two prevailing winds characterized the air movement in the state and they are also characterized by their great consistency of direction. On the site, the trade winds blow from the northeast, and from the southeast. The north eastern trade wind (The tropical continental) brings the dryness of the harmmatan and the south western trade wind brings moisture from the Atlantic

Ocean causing rain. The duration intensity of each wind over an area is a function of the interface between the two air masses. The building will be properly oriented on the site to minimize the effect of the wind on the building.

e. Temperature: There is daily drop in temperature level during the raining season to a low level, minimum temperature remains fairly steady till after raining season. Maximum temperature begins and increases, and then it becomes fairly sustained until it rises after January to April and start dropping again. This makes the mean monthly temperature highest in March 30.5°C and lowest in August at 25.1°C .

Site analysis serves as a guide against the necessary precautions that should be taken before the execution of the project. It helps one to become familiar with the site. Based on the observations made from the site analysis, it can be said that the site will be good for the proposed design.

3.5 IMPORTANCE OF CLIMATIC STUDY IN DESIGN

Climate has a major effect on building performance and energy consumption. The process of identifying, understanding and controlling climatic influences at the building site is perhaps the most critical part of building design. The key objectives of climatic study in design include: To reduce energy cost of a building; to use "natural energy" instead of mechanical system and power; to provide comfortable and healthy environment for all users of the building. For this reason, climatic study of the area intended for the proposed design cannot be overlooked. This is to avoid severe consequences after the execution of project.

CHAPTER FOUR

4.0 RESULTS

4.1 Design Concept

In the design of buildings there are different concepts which are adopted for the purpose of conceiving a design. These are the metaphorical, analogical and canonic concept. The one used in this design is canonic in nature which is also logical. It is that of the industrial cluster which can also be referred to as the cluster concept. It involves the bringing together of several independent trades of similar category in one place, to promote unity in the state, to create a better environment by effecting proper environmental control and to provide customers with easy access to various options in one location. It helps to create a community business located together in which members will receive an enhanced environmental, social and corporate performance towards effective global trade competitiveness. Each shop was designed such that it can operate independently. Also, the 'O' like shape was to ensure equal right to the various shop owners as none of the shops is hidden from public view. The site arrangement as a whole is based on the relationship of various units of the park and safety consideration of activities carried out in the various units. Proper orientation of the various units determines the final arrangement of the facilities on site. The arrangement of the units on the site was influenced by the direction of the sun and to avoid the penetration of sunlight into the building, the shorter side of the building was made to face the east direction. This was easy to achieve as the site is inclined.

4.2 DESIGN BRIEF

The proposed design for a furniture park Bida comprises of the following facilities in order to achieve maximum performance from the park.

1. Shops for the furniture makers
2. Shops for furniture related items
3. Restaurant
4. Factory
5. Timber shed
6. Parking space and other facilities for the effective functioning of the park.

4.3 SCHEDULE OF SPACES

Table 2: schedule of space for the furniture shop

Section	Length(m)	Breath(m)	Unit	Area (m ²)
Furniture shops	8.5	10	14	85
Showroom	5	7	14	35
Office	2.5	3	14	7.5
finished product store	2.5	3	14	7.5
Raw material store	3.5	1.5	14	5.25
Changing room	1.75	1.5	14	2.3
Equipment store	1.75	1.5	14	2.3
Workspace	3.5	7	14	24.5
Shops for other items	8.5	5	32	42.5
toilets	1.5	1.2	16	1.8

Source: proposed design

Table 3: Schedule of space for the Factory

	Length(m)	Breath(m)	Unit	Area (m ²)
Factory	65	30	1	1950
Offices	4	3	4	12
Changing room	4	3	1	12
Toilets	1.5	1.2	4	1.8
Utility room	4	3	1	12
Factory hall	40	30	1	1200

Source: proposed design

Table 4: Schedule of space for the Restaurant

	Length(m)	Breath(m)	Unit	Area (m ²)
Restaurant	20	14	3	280
kitchen	5	5	1	25
Store	4	3	1	12
Changing room	1.5	1.5	2	2.25
Toilets	1.5	1.2	4	1.8
Servery	1.2	6	1	7.2
Eatery	15	14	1	210

Source: proposed design

4.4 MATERIALS AND CONSTRUCTION

Materials and construction include the finishes and construction method used in the building. To ensure proper stability and functionality of the proposed design, the materials and construction method to be used will be carefully chosen after due consideration of the cost, durability, availability, aesthetics, maintenance of the material and the appropriate method of construction. The roofing system used for most part of this design is treated wood trusses as the design is majorly a short span building and treated timber also has the ability to withstand fire for two hours (Canadian wood council, 2007). Lattice steel truss, an example of a large span roofing system was used for the factory because the factory is 30m in width which fits into the category of a large span area. Roofing system can be categorized into short span, which is up to 7.5m, medium span which is between 7.5m to 25m and large span is that above 25m (R.Barry, 1972). In the factory area, the metal sections are supported by reinforced concrete columns at an interval of five meter. The triangular lattice frames of light angle steel sections are welded together to support the light section steel angle purlins which also supports the roof and the roof covering. The roof covering to be used is long span aluminum roofing sheet which is light weighted and will not affect the strength and rigidity of the structure. As the roofing system of the propose design has already been discussed, the other structural components shall be classified into the following headings: -

- a. Foundation
- b. Floor
- c. Wall
- d. Columns and beams

4.41 Foundation

The most critical factor in determining the foundation system of a building is the type and capacity of the soil to which the building loads will be distributed. It is an essential part of the building that transmits the loads (dead, live and imposed load) of the building to the bearing level in the ground. In selecting the foundation of a building, the geology of the soil and the intended load of the building must be considered. The strip foundation system will be used for the walls while the pad foundation system will be used for the column points since it is a storey building. This will be designed according to the engineer's specification.

4.42 Wall

The wall is the vertical element of a building structure which is used to enclose and protect the interior against prevailing weather condition. It is also used to divide the interior space into rooms. The walls will be constructed of bricks while the internal partitioning of the shops will be partition walls of 1.5m height. Plastering will be applied on the internal walls with two coats of paints.

4.43 Floor

Floor is the horizontal plane in a building which support loads (live and dead loads). Floors transmit loads laterally to the beams, columns and then transmits it all through to the foundation. The floor slab for this design proposal is 150mm thick cast-in-situ reinforced concrete slab to be constructed of concrete laid on 300mm consolidated hardcore. The floor finish for the workspace, raw material store, changing room, and the equipment store is terrazzo. The floor finish for the offices and showroom is 300 by 300mm ceramic tiles and for the toilet area, it is 150 by 150mm.

4.44 Structural System

The structural system that will be employed in this design proposal is basically the beam and column system. They are the main structural components of the building. It involves the construction of reinforced concrete frame. The structural load of the building will be carried by the beam through the column down to the foundation.

4.5 DESIGN SERVICES

Services that will be provided for the park and how they will be achieved to ensure maximum comfort and user satisfaction are discussed below.

4.51 Electricity and Lighting:

The power supply demanded by a facility of this magnitude is enormous. The regular public power provided by the Power Holding Company of Nigeria (PHCN) will be adequate when available. When it is unavailable though, there will be an alternative power provided by the stand by generators which will be placed on the site of the park.

Natural lighting will be well utilized through the use of simple form, good orientation, and provision of courtyards as well as adequate window openings.

4.52 Ventilation:

There are two different types of ventilation system used in the building; they are the natural and artificial ventilation types. Natural ventilation in the building will be achieved and maximized through the use of fenestrations that are cross ventilated. Provision will also be made for the easy installation of electric fans and other artificial sources of ventilation.

4.53 Water Supply:

Water is an essential part of any design. Water will be basically supplied from the town's main supply but this will be supplemented by boreholes which will be distributed around the site and connected by the use of pipes and submersible pumps.

4.54 Drainage and Sewage Disposal

Rain water will have to be well drained to avoid flooding of saw dust and other waste. There will be a well laid out drainage and sewage disposal system to ensure a clean environment. This can be achieved by provision of covered gutter that follows the natural slope of the site.

4.55 Refuse Disposal

Containers for refuse collections will be strategically distributed both in the exterior and interior spaces of the park. Incinerator will also be provided at a suitable point on site where all the refuse collected can be burnt together. The sawdust from the factory will be collected together by the use of a collector that is connected to the various machines. The collectors are connected to pipes which are in turn connected to the machines. On the start of the machine, a valve is activated which sends the waste (saw dust) to a collector, then to the pipes and then to a central collector.

4.56 Fire Safety:

To curb the incidence of fire in the park, water hydrants will be placed at strategic locations within the park which fire trucks can plug into in case of a fire. Fire alarm system, fire extinguishers and sprinkler system will be inserted in the design. The building is constructed of bricks which are known to have a high fire resistance capacity. Other materials will be carefully selected to also meet this requirement. Provision was also made for easy evacuation

of the people from building in case of fire outbreak. There are openable windows in the glazed section of the stair case to allow for service entrance incase of fire outbreak.

4.57 Security:

Security in any building cannot be compromised even in public buildings. For this reason, the design will have only one entrance into the site which will eventually split into two to give easy access to people going to the different sections of the site.

CHAPTER FIVE

5.0 DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 DISCUSSION

Furniture business is an international trade, but the level of technological advancement in the field differs from country to country and this is due to the fact that the rate of growth of development differs between countries. For years now in Nigeria, the small scale furniture venture has been known to having manufactured their product manually. To most, it only serves as a means of meeting their daily needs. They have been operating without support from the government, in poor working environmental condition and sometimes, with inadequate capital. They can be seen scattered around in most urban or rural areas in any available location and they gradually grow to form an organic settlement. These problems will remain until they are properly addressed. Therefore, it is encouraged for the Nigeria government to improve on its laws on developmental control and also to actively include the small scale venture in its plans before they litter the entire country. Nigeria government having realized this had made plans for what is referred to as the 'cluster concept' but unfortunately, nothing has been done to actualize it. In order for the concept to be successful and achieve the expected results, there is a need for provision of adequate parks to bring together trades of similar categories.

5.2 CONCLUSION

Adequate parks should be provided for small scale venture especially the furniture makers as they seem to be among the fastest growing trade in the country. This concept should equally be adopted in other towns and not only in Bida where it is currently being proposed. The execution of the cluster concept would help in the creation of a better environment, it will

help to reduce pollution, it will allow for proper developmental control and will also reduce rate of overcrowding in the country.

5.3 RECOMMENDATIONS

- Most of the case studies in this research were basically done in the northern part of the country hence; a similar research in another part of the country may yield a different result which may lead to changes in the space allocation of the design proposal.
- A similar research at a later date may produce a different plan depending on the level of technology which can affect the process of production.
- The possibility of a park for other small scale ventures like the mechanic, tailors and others are yet to be established.

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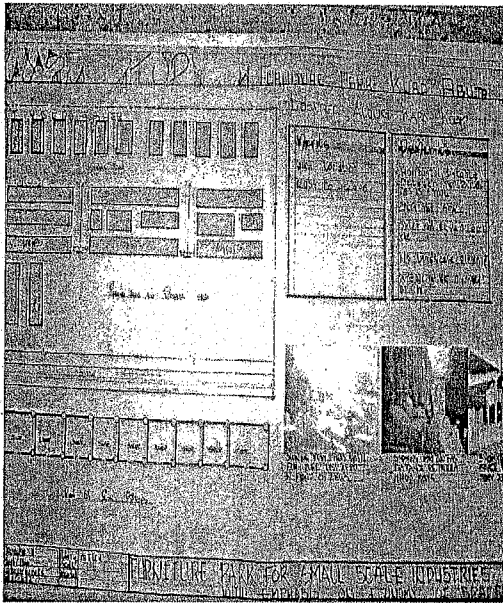
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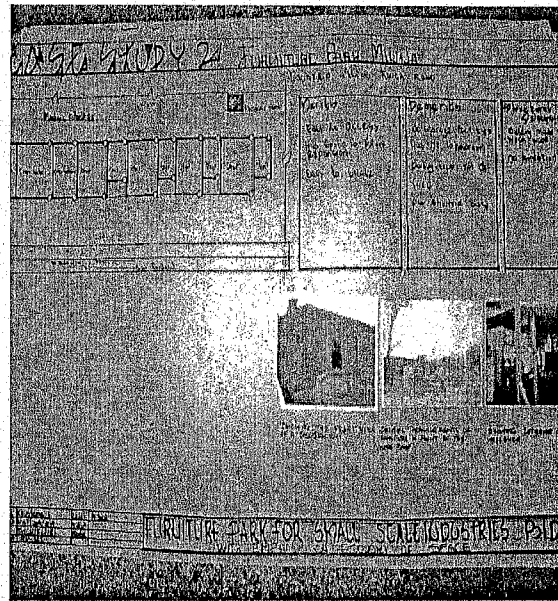
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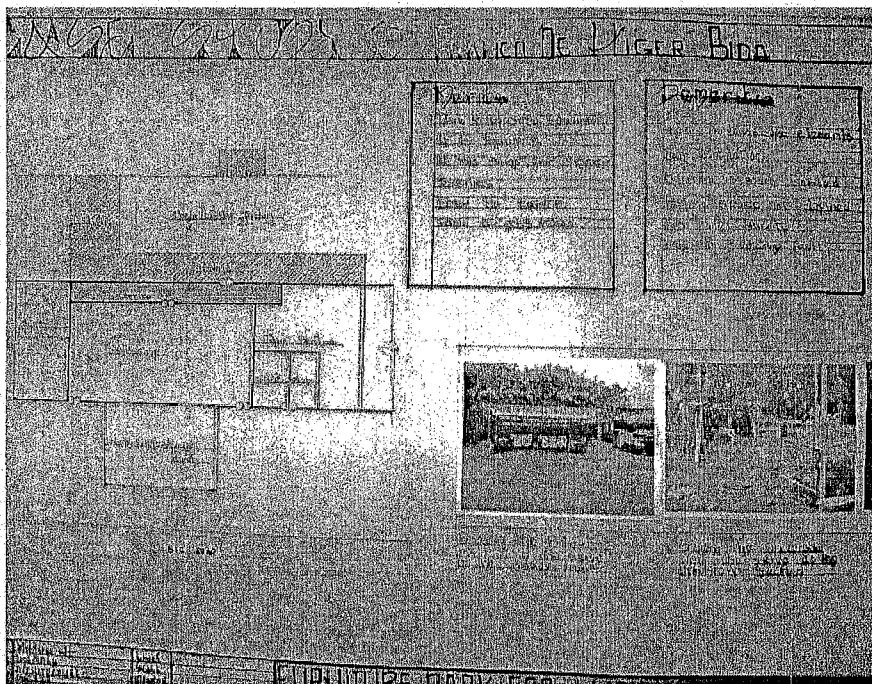
APPENDICES

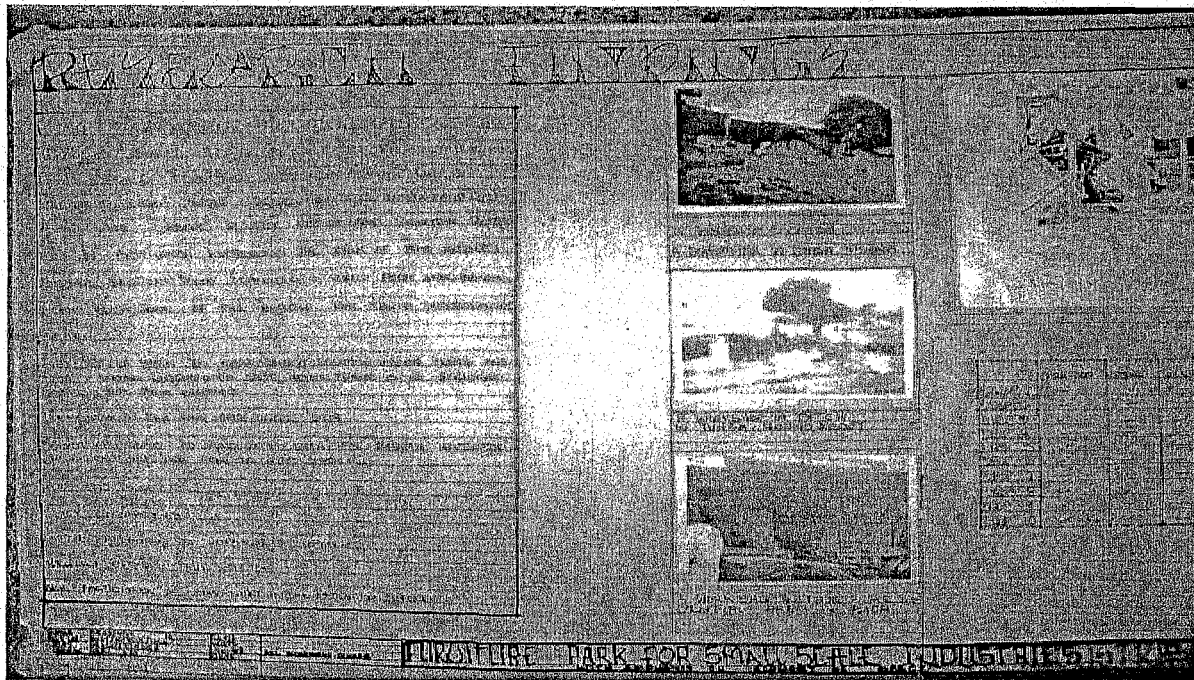


Case Study One

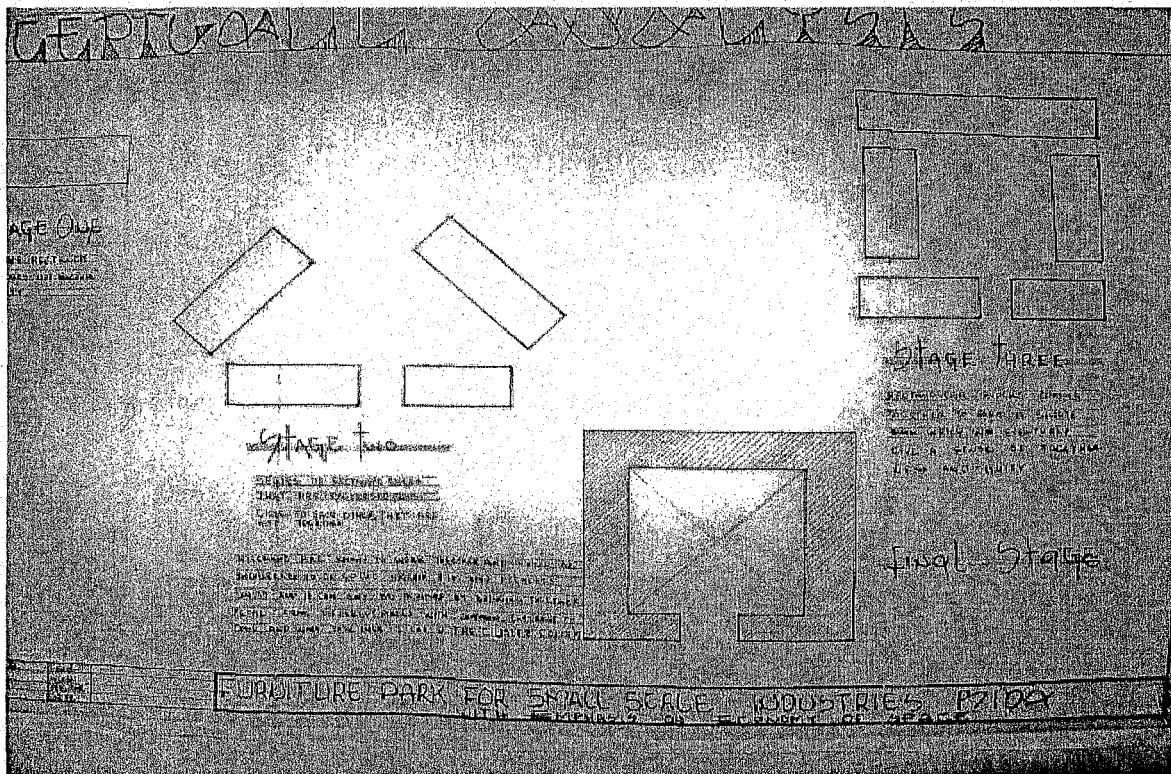


Case Study Two





Research Findings

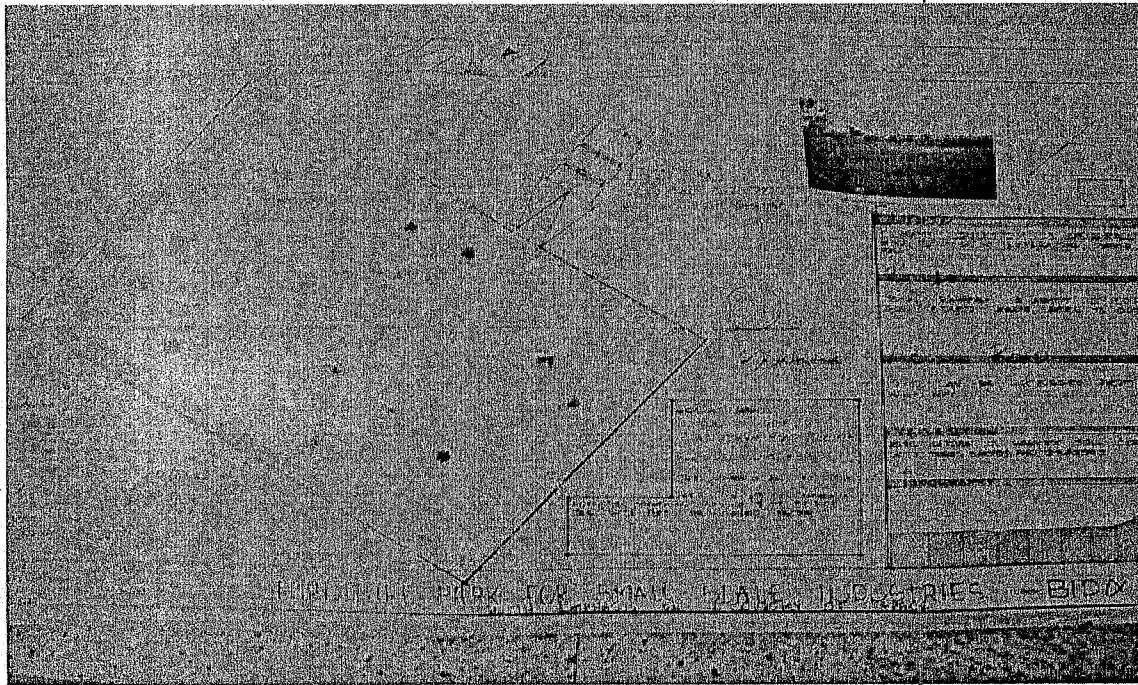


Appendix 2

Conceptual Analysis

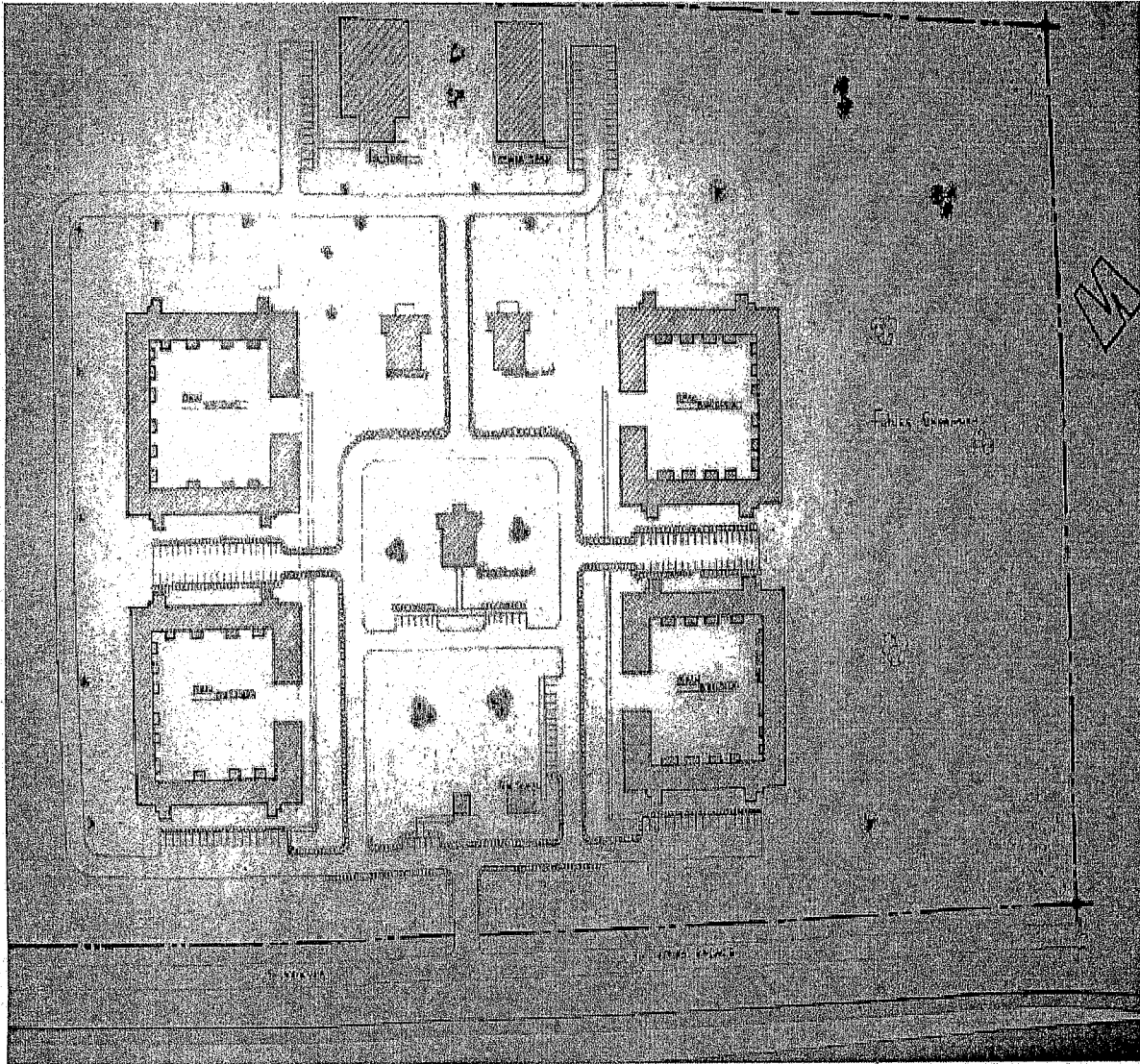


Location Map

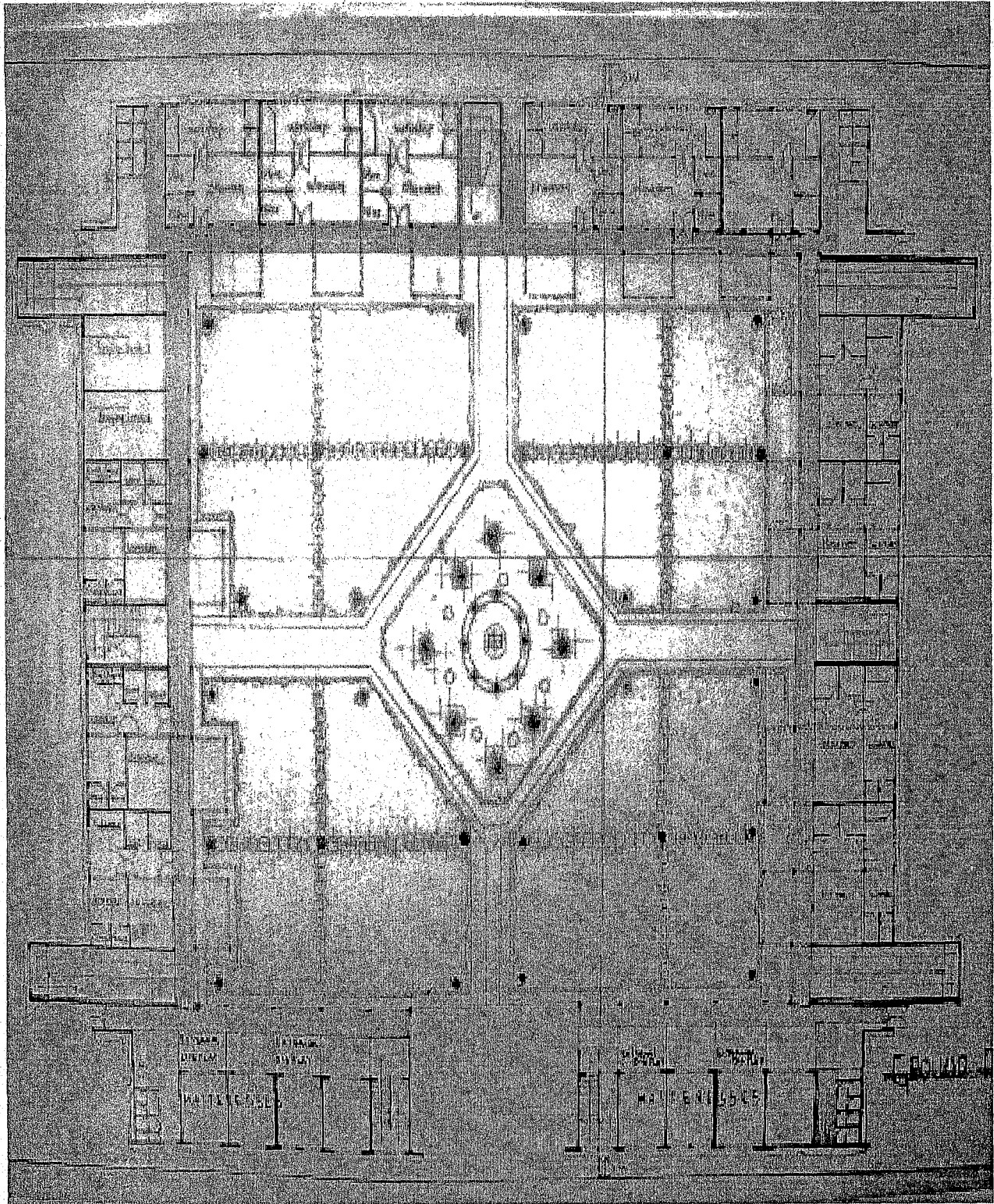


Appendix 3

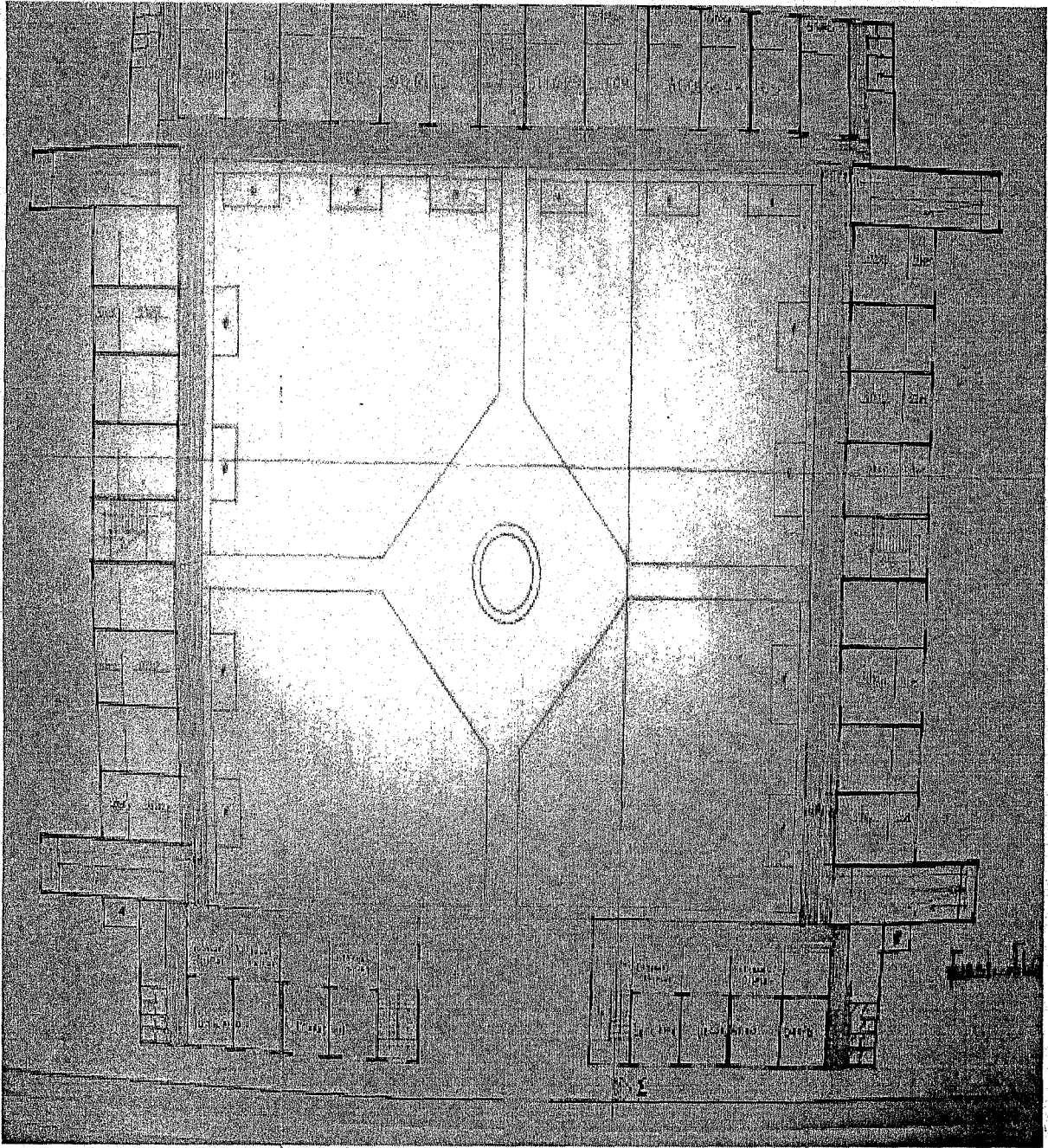
Site Analysis



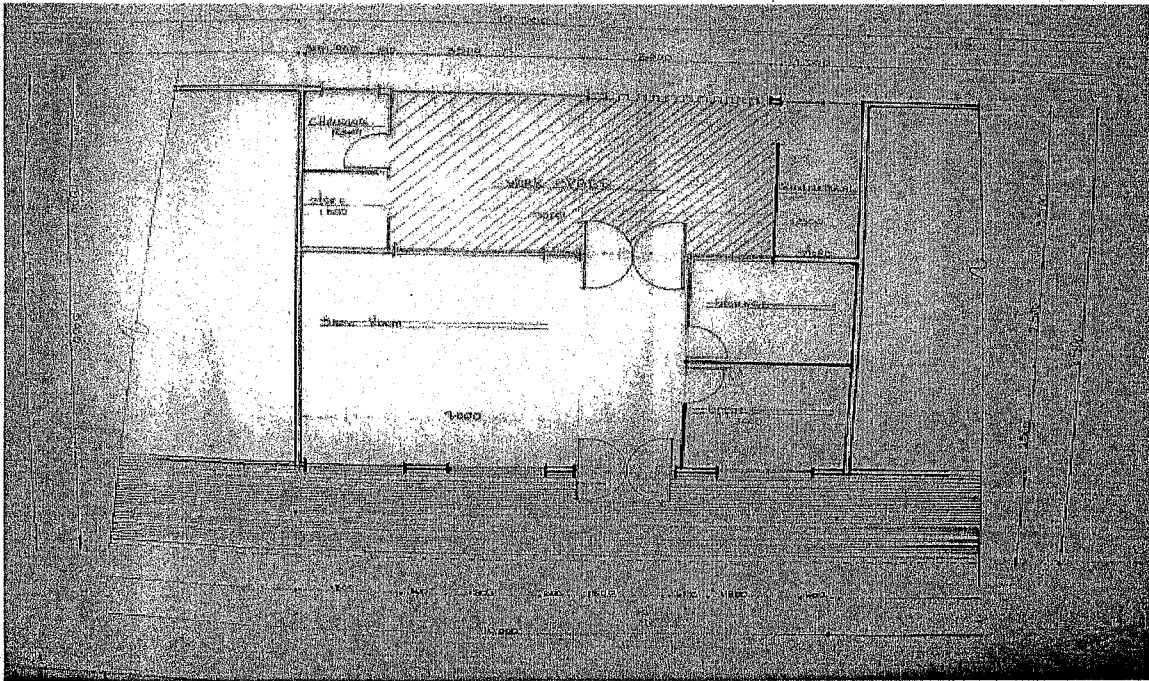
Appendix 4: Proposed Site Plan



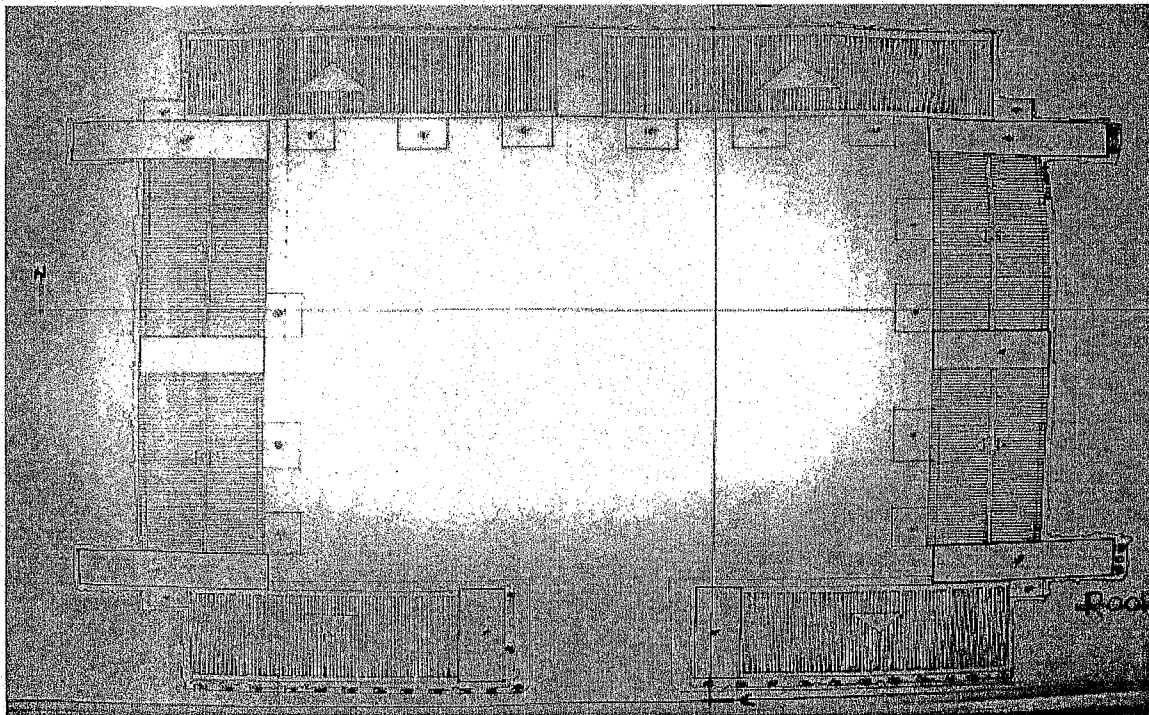
Appendix 5: Ground Floor Plan of the Furniture Park



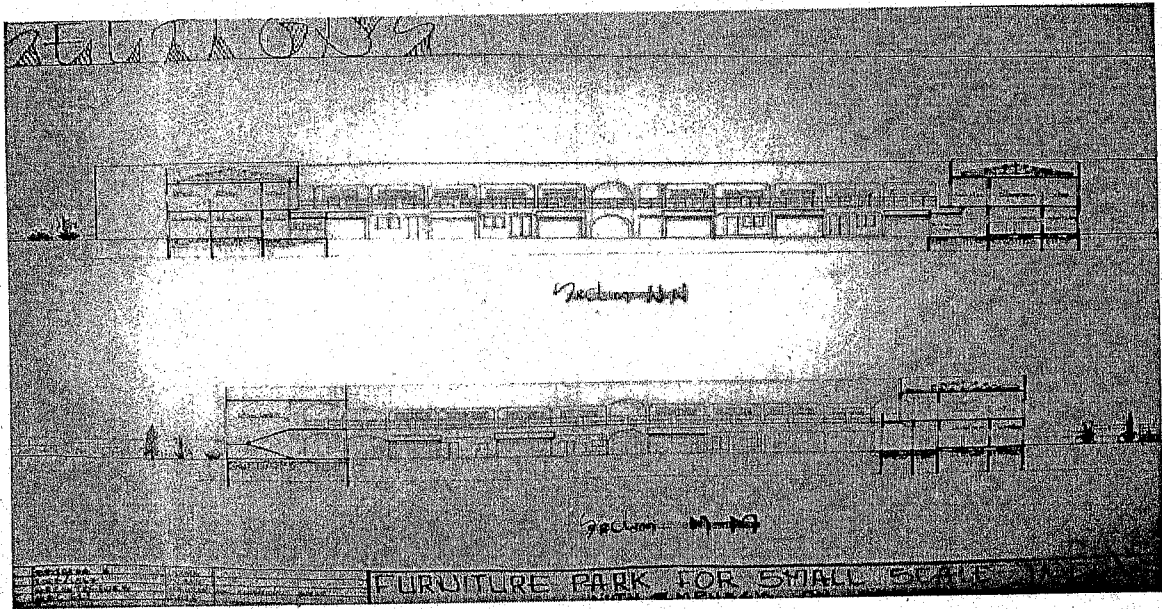
FIRST FLOOR PLAN



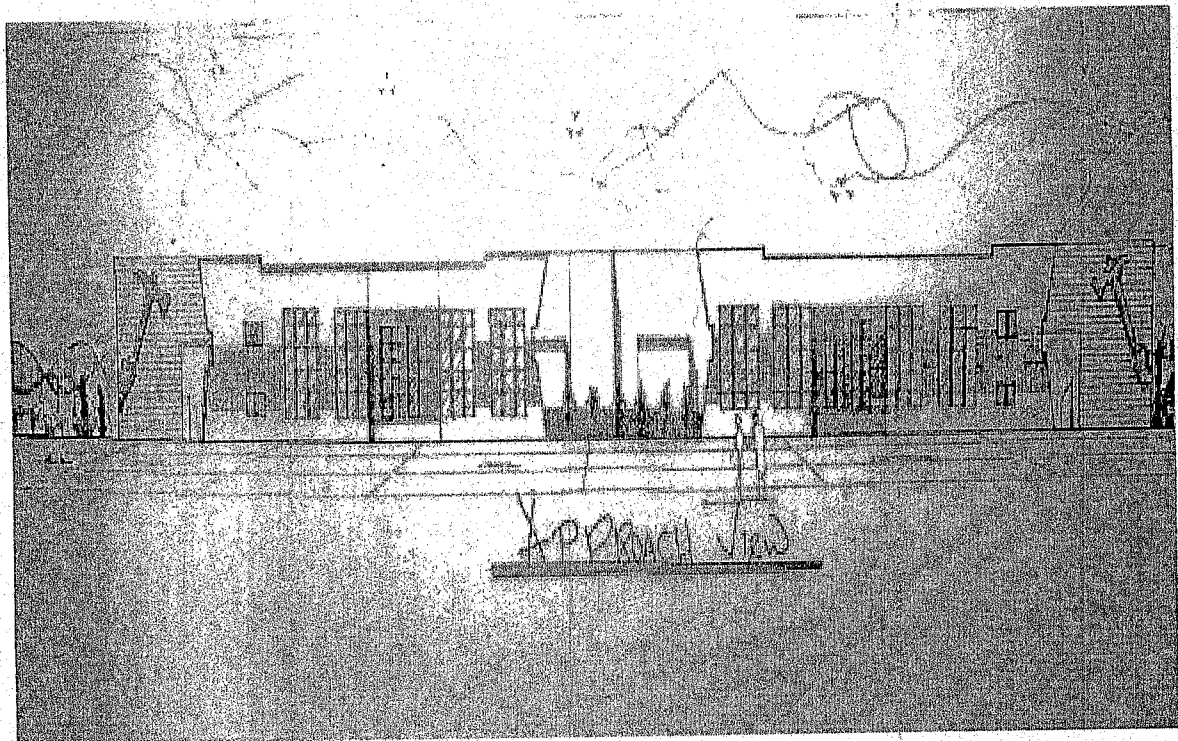
Appendix 6: Typical Example Of A Shop



ROOF PLAN

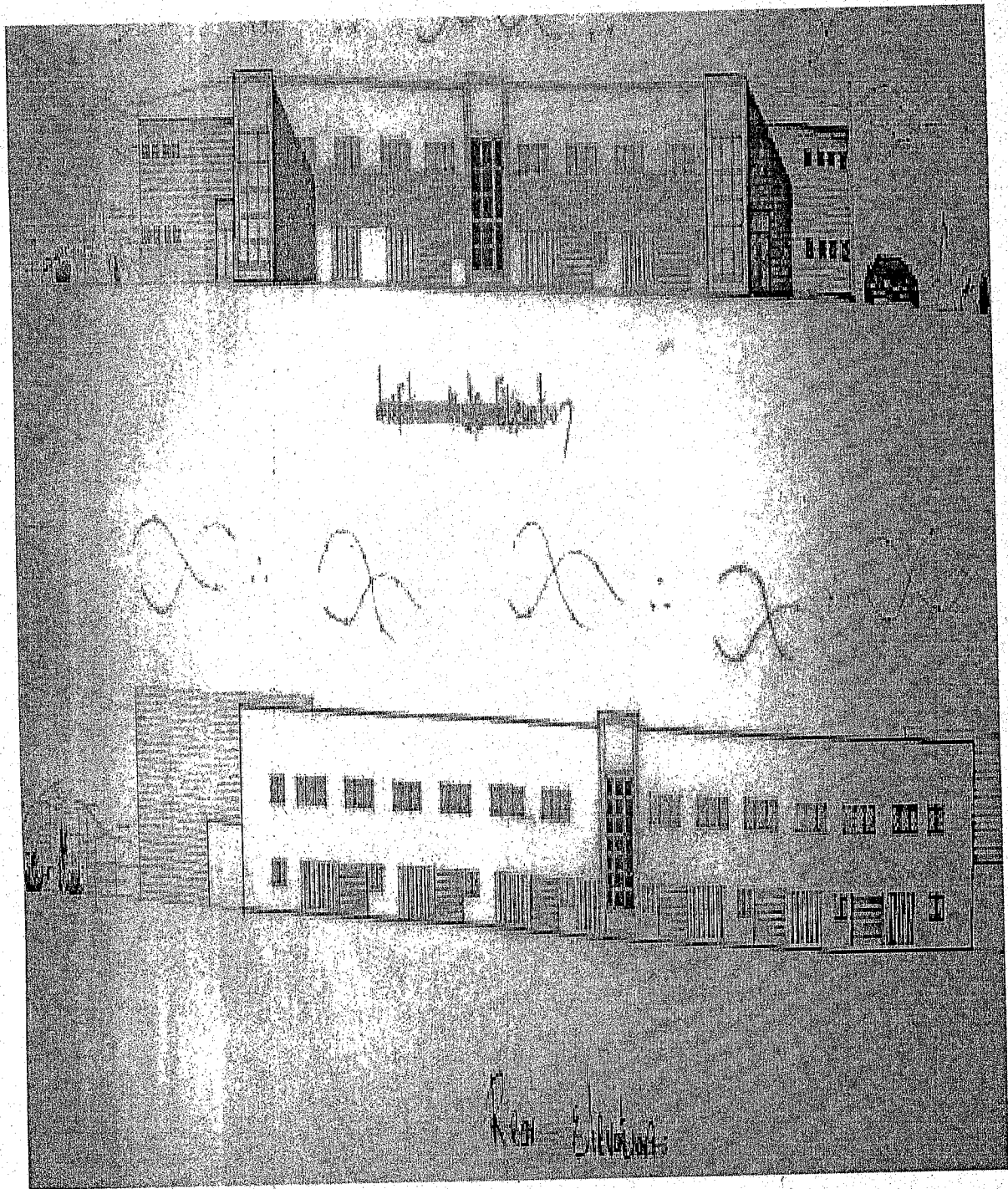


Sections

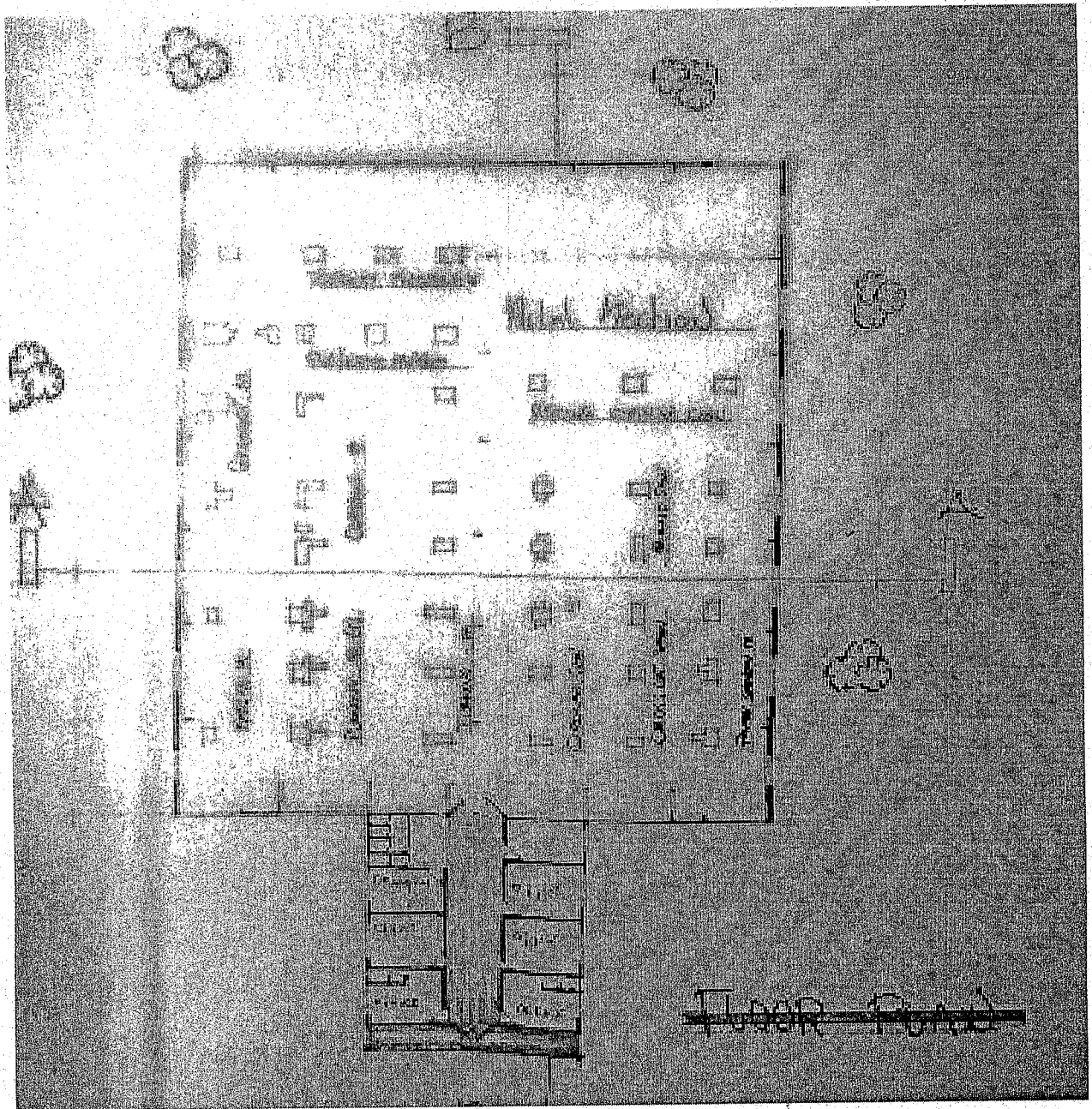


Appendix 7:

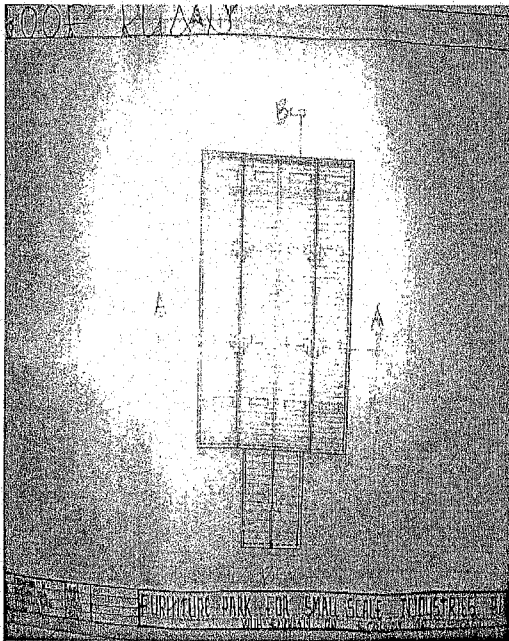
Approach View



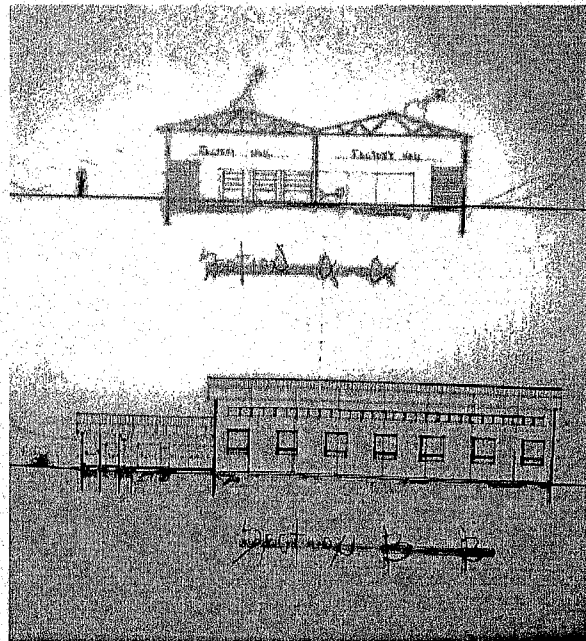
Left and Right Side Elevation



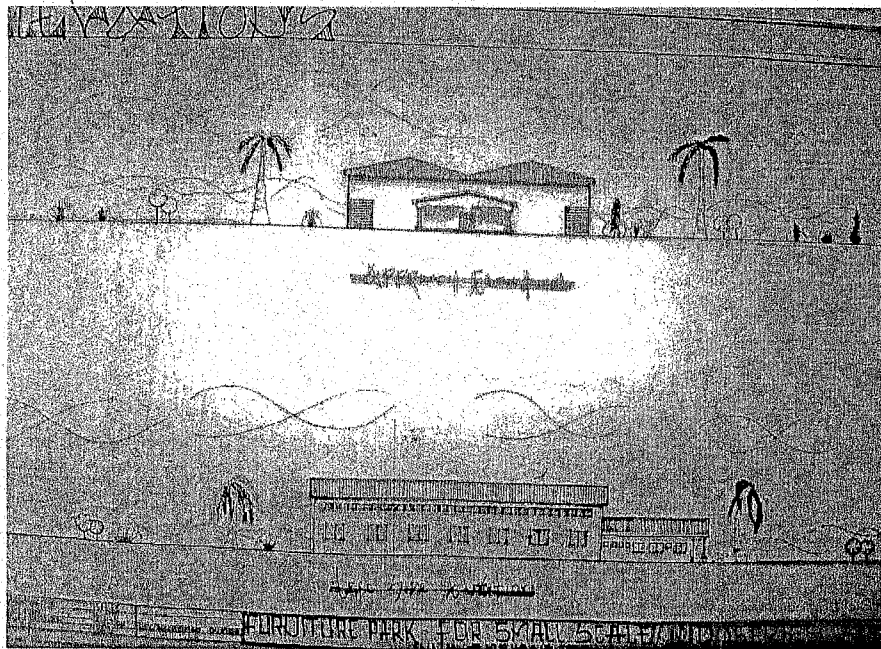
Appendix 8: The Factory Plan



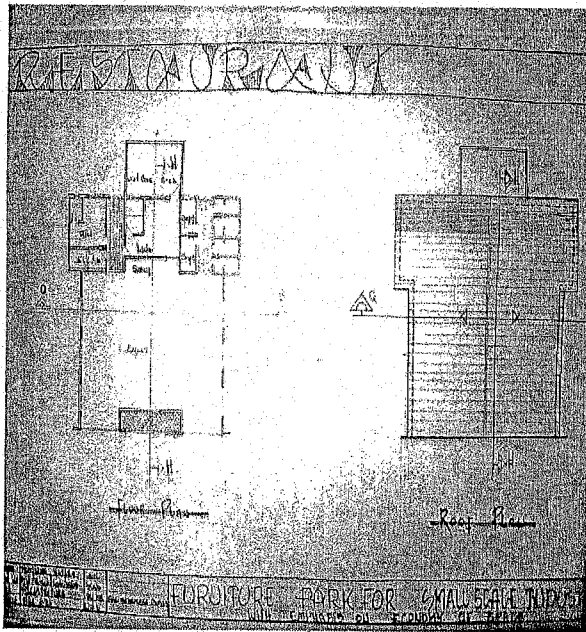
ROOF PLAN



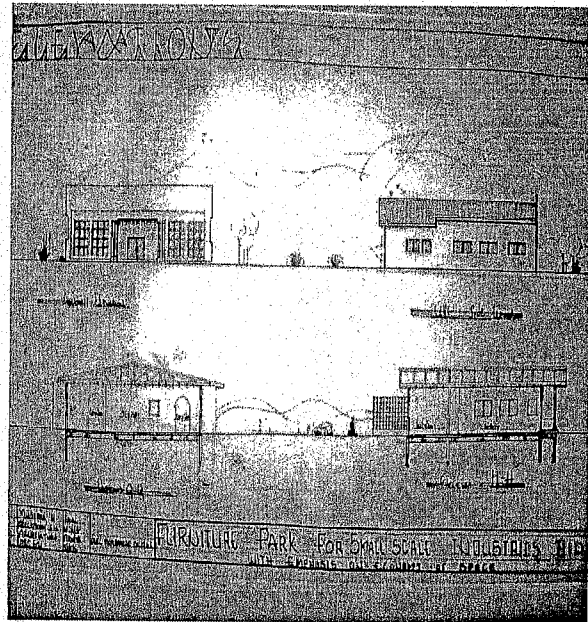
SECTIONS



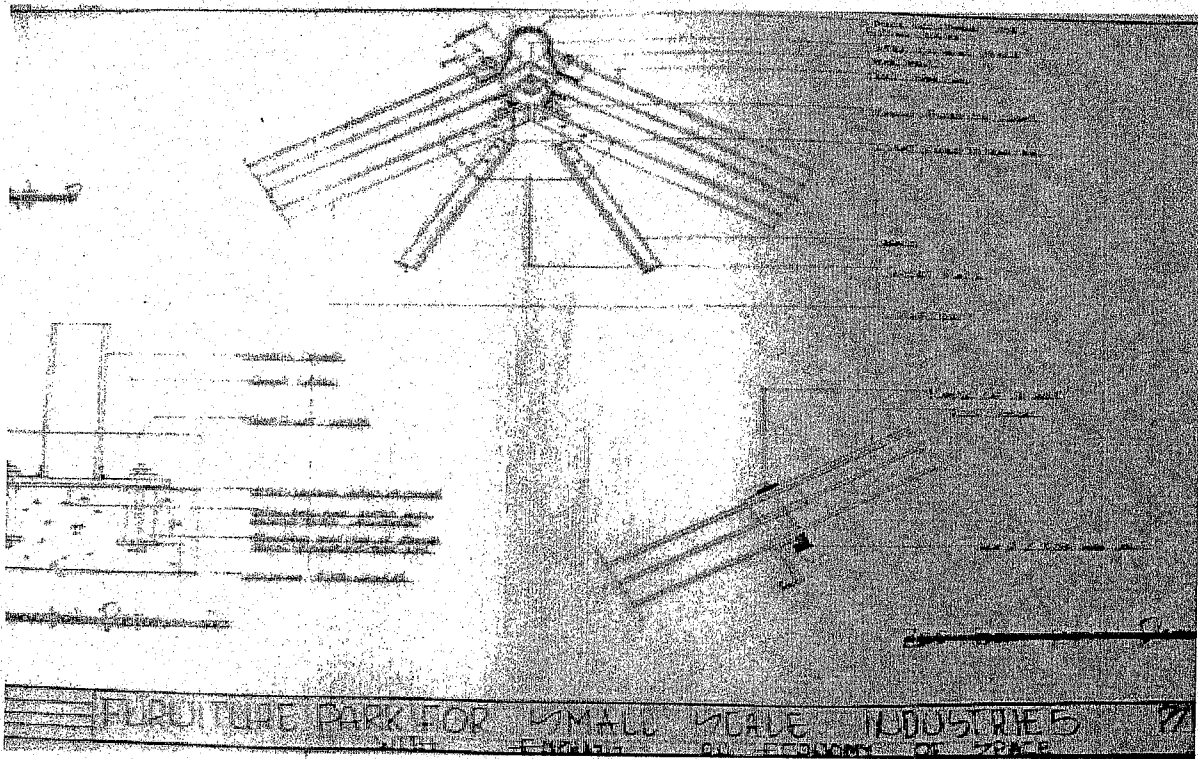
ELEVATIONS



RESTAURANT



ELEVATIONS



Appendix 9:

Details