Thesis

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The relationship between structure and context in manufacturing in the Sudan

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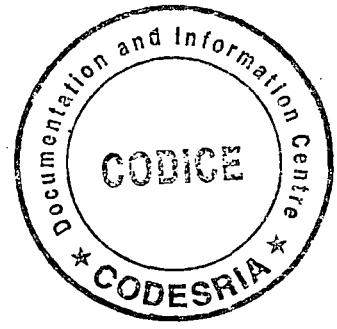

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CONTENTS

Chapter Four: Organization Structure and Context: A Critical Review to some Selected Methodological-Empirical Evidences

Chapter Five: Research Methodology and Design

Chapter Six: The Relationship Between Structure and Context: Empirical Findings and Analysis

Chapter Seven: Summary, Conclusions and Suggestions

List of Tables

List of Figures

List of Appendices

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Abstract

The Relationship between Structure and Context in Manufacturing in the Sudan.

Based on the on–going debate among organization scholars on the relationship between structure and context, the primary objective of this research is to specify the relative importance of the contextual dimensions in determining structure of the manufacturing firms in Sudan with cross-cultural comparisons.

The research devoted a separate chapter to familiarize the reader with the societal level of industrialization in Sudan, which is characterized by the domination of light industries operating at relatively low capacities. The literature review revealed that in spite of the numerous researches conducted on the relationship between context and structure, little agreement was reported about the results and the nature of this relationship.

The disagreement among researchers with respect to the relationship between structure and context may be attributed to the different "operationalizations" adopted by the researchers for the organizational dimensions under question, in addition to the variations in the sample selection and organizational levels of analysis.

Unlike the majority of the other researches using structure-contingency models to study the structural variations among organizations on bivariate basis, this research deals with multivariate relationships by using more sophisticated statistical models. The analysis of variance (ANOVA) and the multiple analysis of variance (MANOVA) have been adopted to test the research hypotheses.

The Aston Group (1969)'s measures have been adopted to operationalize most of the research concepts, beside the attempts of the researcher to operationalize the others.

The analysis of the research findings revealed that there is some sort of interdependence among the contextual dimensions (e.g. size and location, ownership and dependence) which may complicate and distort the research results. Some of the structural variables seem to reflect the same organizational aspect although they are treated distinctly in the analysis. The analysis has shown that "size" is the most important determinant of organizational structure in the Sudan followed by ownership and control. The other contextual dimensions -including technology- have not shown any significance vis-a-viz the overall structure even thought they have some bearing on some of the structural variables on an individual basis.

Cross-cultural comparisons have been made between the results of this research and the results of similar researches conducted in the Western milieu. In spite of the differences between the Sudan and those Western countries, similar results have been obtained with respect to the relationship between structure and context. This may suggest that the "culture bound" organizational behaviour is not as strong as it is perceived by many researchers. Globalization, transfer of technology, training and education of the Sudanese decision-makers in the Western countries help to minimize the impact of culture upon management practices in Sudan.

The research has suggested a structure-contingency model that shows the contextual pressures and their impact on the structure on an overall basis and the individual structural variables constrained by the perception of the decision-makers.

Suggestions have also been made to expedite the research in this area by conducting longitudinal studies to investigate the causal effect of different organizational dimensions including performance.

More cross-cultural studies have to be conducted, using similar methodology to settle the on-going debate on the "universality" and "culture-bound" organizational behaviour. All this should be done in the framework of building and establishing a sound "organization theory".

خلاصة البحث

العلاقة بين الهيكلة والأبعاد الظرفية فى قطاع التصنيع فى السودان

نظراً للجدل الدائر بين الباحثين في ماهية العلاقة بين هيكلة المنظمات والأبعاد الظرفية التي تؤثر عليها، فقد هدف هذا البحث إلى تحديد الأهمية النسبية للأبعاد الظرفية (مثل الحجم، التقنية، الملكية....الخ) في تشكيل هيكلة المنظمات في قطاع التصنيع في السودان ومقارنة ذلك بنتائج بعض الدراسات التي أجريت في بيئات ثقافية مختلفة.

وقد أفرد البحث فصلاً كاملاً لعرض مستوى التصنيع في المجتمع السوداني والذي يتميز بسيادة الصناعات الخفيفة والتي تعمل بطاقات منخفضة نسبياً. وقد أوضحت الأدبيات أنه بالرغم من البحوث العديدة التي أجريت في مجال العلاقة بين الهيكلة والأبعاد الظرفية التي تؤثر عليها إلأ أنه لم يصل الباحثون إلي اتفاق تام حول ماهية هذه العلاقة. ويعزى هذا الاختلاف حول ماهية العلاقة بين الهيكلة والأبعاد الظرفية التي تؤثر عليها إلى الاختلاف في الترجمة العملية لبعض المفاهيم التي تبناها هؤلاء الباحثين والمتعلقة ببعض الأبعاد التنظيمية ذات الصلة إضافةً إلى الاختلاف في اختيار العينات ومستوى التحليل فى التنظيم.

وخلافاً للبحوث الأخرى التي استخدمت نموذج العينة-الظرف لدراسة التباين في هياكل المنظمات على أساس العلاقة بين متغيرين، فقد استخدمت هذه الدراسة العلاقة بين عدة متغيرات لدراسة هذا التباين وباستعمال نماذج إحصائية أكثر حداثة .وقد تبنى البحث نموذجي تحليل التباين وتحليل التباين المتعدد لاختبار فرضيات البحث. وأستخدم البحث

مقاييس مجموعة الأستون (1969) والتي ترجمت عمليا معظم المفاهيم التي تم تناولها في الدراسة إضافة إلي محاولات الباحث ترجمة البعض الآخر.

وقد أوضح التحليل أن هنالك نوعا من الاعتماد المتبادل بين الأبعاد الظرفية نفسها الأمر الذي قد يؤدى إلى تعقيد وتشويه نتائج البحث. ويبدو أيضا أن بعض المتغيرات المتعلقة بالهيكل تعكس نفس الجوانب التنظيمية مع انه قد تمت معاملتها بصورة منفصلة أو منفردة في التحليل. وأوضح التحليل أن الحجم هو أهم محددات الهياكل التنظيمية في قطاع التصنيع في السودان ويأتي عامل الملكية والتحكم في المرتبة الثانية. الأبعاد الظرفية الأخرى- بما فيها التقنية- لم تظهر أي أهمية بالنسبة لتشكيل الهيكل ككل ولكنها ذات تأثير على بعض المتغيرات الهيكلية بصورة منفردة.

تمت مقارنة نتائج هذا البحث مع بعض نتائج البحوث الشبيهة التي أجريت في بعض الدول الغربية. وعلى الرغم من الاختلاف بين السودان وتلك الدول فقد وجد البحث تشابها في النتائج فيما يتعلق بماهية العلاقة بين الهيكلة والأبعاد الظرفية. وهذا الأمر قد يدحض فرضية قوة تأثير الثقافة على السلوك التنظيمي التي يراها معظم الباحثون. العولمة، نقل التقنية، بالإضافة الي التدريب الذي تلقاه متخذي القرار السودانيين في بيئات غربية ربما تكون قد أسهمت في تخفيف حدة أثر الثقافة على الممارسات الإدارية في السودان. أقترح البحث نموذجا للعلاقة بين الهيكلة والأبعاد الظرفية التي تؤثر عليها موضحا تأثير تلك العوامل على الهيكل بصورة كلية وعلى المتغيرات الهيكلية بصورة أحادية مقيدة بإدراك متخذي القرار.

وقد أقترح البحث أيضا إجراء مزيدا من الدراسات العرضية لبحث العلاقة السببية بين مختلف الأبعاد التنظيمية بما فيها الأداء.

كما أوصي البحث بإجراء مزيدا من الدراسات في بيئات ثقافية مختلفة وباستخدام منهجية شبيهه من أجل الوصول إلي نقاط إلتقاء فيما يتعلق بالجدل الدائر حول "عالمية " "التأثير الثقافي"على السلوك التنظيمي وكل ذلك في إطار العمل من أجل وضع نظرية متكاملة لفهم المنظمات.

Chapter One

Introduction

1-1 Prelude:

Organizations are not contemporary phenomenon, their existence dates back to the start of human history. At that time the need for survival forced the people to organize themselves in groups. As time passed by, organizations have evolved when people knew that they have to organize themselves to overcome their limitations to achieve their objectives.

Organizations are inevitable features in our contemporary life. By one way or another our lives are significantly affected by organizations. As Etzioni (1961) stated "we are born in organizations ..... and most of us spend much time of our lives working for organizations". Even when we die, Etzioni added, and the time comes for burial, the largest organization of all -the state- must grant official permission. No doubt our society today may be charactrized as an "organization society" since we live in a world surrounded by and made up of organizations.

Organizations, specially socio-technical ones, help in creating the possibility of realizing the economies of scale. This can be achieved by capitalizing on the potential benefits from coordinating the behavior and skills of relatively large number of individuals. In addition to this organizations can provide multiple skills which are required to perform certain activities, in case when an over-all task is sufficiently complex

that one or few persons can not have the knowledge and skills for task performance (Kimberly and Evanisko 1979).

Organization researchers have a number of reasons to study organizations; one reason is that by studying organizations they can gain more understanding of their functions which, in turn, helps them predict organizational behaviour performance and in some cases control and change them. The question of why do organizations function and perform as they do is becoming a vital question in our contemporary society because they exert major influence on today's lives.

Due to the vital role that organizations play in our lives, some researchers emphasize the importance of developing an "organization science". Pugh (1971), for example, defined an "organization theory " as "the study of the structure, functions and performance of organizations and the behavior of individuals and groups within them". The study of the environmental factors and the contextual dimensions and their relations to the structures and processes of organizations is a major concern of the "organization theory". An "organization science" is an emerging interdisciplinary science drawing on the discipline of sociology, psychology, economics and ton a lesser extent on production engineering.

To develop a sound "organizational theory" we need well integrated studies about the relationship between the different elements of the organization theory; structure, process, performance, individuals, groups and the contextual factors that influence them. However, the development of a sound "organization theory" in the full sense is a difficult task if not impossible. This may be attributed to the fact that studying individual and group behavior is an important part in the process of building the theory, and, of course , the prediction of this

behaviour is surrounded with uncertainty. That is to say the "uncertainty" in predicting human behaviour-at least in some instances- complicates the process of building a sound "organization theory'.

1-2 **The Research Problem:**

Organizational structure, as one of the elements of "organization theory", has been the focus of this research, specifically its relationship with contex and environment of organizations. It is axiomatic that the establishment of a sound "organization theory" requires that evidences should be provided from different cultural environments. Thus, for most of the studies carried out on the relationship between structure and context took place in the Westrn milieu. Unless other evidences are provided from countries of different cultural backgrounds and industrialization levels, it will be difficult to establish such a relationship that can contribute effectively to the process of establishing a sound universal "organization theory". In addition to this, most of the researches conducted in the Westren countries relevant to the above-mentioned subject have been conducted on the bivariate rather than the multivariate basis. This might raise a methodological problem that makes it different to establish concrete findings to be relied on to establish such a sound universal "organization theory".

1-3 **The Importance of the Research:**

A significant part of the research using structure-contingency models to study the structural variations among different organizations may be characterized as bivariate studies dealing with bivariate relationship, for example; technology-structure, size-structure and environment-structure.

Moreover, there has been a noticeable lack of empirical evidence and theorizing related to multivariate relationship (Bobbit and Ford 1980). This research is using a structure-contingency model to study the relationship between structure and context in manufacturing in the Sudan. In this model a number of contextual dimensions have been included, thus the study deals with multivariate relationships by using more sophisticated statistical models.

1-4 The Research Objectives:

The structure-contingency model assumes that organizational structure is usually constrained by many contextual dimensions. Thus, contradictory imperatives of situational constraints may require changes and alterations in organization structure. For example, a situation where an organization is large, and constrained to be more bureaucratic, and at the same time is located in a turbulent environment and therefore constrained to be more flexible and adaptive in its structural arrangements (Ranson, Hining and Greenwood 1980). Hence, the primary objective of this research is to specify the relative importance of the contextual dimensions (size, technology, environment, ownership and control...etc.) in determing organizational structure in manufacturing in the Sudan.

The secondary objectives of the research are:

(i) to investigate the relationship between the individual contextual dimensions and the individual structural elements.

(ii) to investigate the possible interdependence among the contextual dimensions and that among the structural variables.

(iii) to investigate the "universality" of the relationship between context and structure by making a cross-sectional comparisons.

The overall objective of this research is to establish relationships like other cross-sectional studies. Of course, causal relationships should be inferred from a theory that develops dynamic models about changes over time. Thus, the contribution of the study is to establish a framework of operationally defined and empirically validated concepts which will enable logitudinal studies to be carried out at a much more rigorous basis.

1-5 The Organization of the Study:

This research is made up of seven chapters which cover the followings; introduction, a review of the structure and performance of the manufacturing sector in Sudan, the theoretical framework, a review of some selected studies relevant to the research variables, the research methodology and design, the analysis of the findings and the research summary, conclusions and suggestions.

Chapter one is an introductory chapter which states the research problem, importance, objectives and organization of the research.

Chapter two investigates the evolution, structure and performance of the manufacturing sector in the Sudan. This chapter is intended to familiarize the reader with the level of industrialization in Sudan and the performance of this sector relative to other sectors in the economy.

Chapter three introduces the conceptual framework of the study, where the basic research variables are defined. These research variables include the structural elements and the contextual dimensions of organizations. The selected structural elements are; specialization, centralization, configuration, standardization and formalization. The contextual dimensions include; size, technology, task environment, ownership and control, charter, location, origin, history and dependence.

A critical review of some selected methodological and empirical evidences about the relationship between structure and context is presented in chapter four. The majority of these evidences either support "the technological imperative rationale" or "size imperative rationale". Only few studies have highlighted the importance of task environment and other contextual dimensions to structure.

Chapter five describes the research design and the methodology. The research methodology explains the sampling technique adopted and the sources of data. The measurement of the analytical variables of the research are also presented. Both the structural variables and the contextual dimensions have been operationalized and measured. The statistical models utilized in the data analysis are also stated. This chapter includes also the limitations of the research and the research hypotheses.

Chapter six presents the empirical findings and analysis of those findings with respect to the relationship between structure and context in the manufacturing sector in the Sudan. In this chapter the research hypotheses have been tested and the inferences were made. Comparisons are made with some earlier studies on cross-sectional basis.

Chapter seven gives a brief summary of the research, conclusions, and suggests a structure-contingency model applicable to the manufacturing sector in Sudan, in addition to and suggestions for further research studies.

CHAPTER TWO

Evoluation , Structure and Performance of The Manufacturing Sector in the Sudan

2-1 Introduction :

Industrialization is claimed to be the most vital vehicle for aiding the process of economic development. Most of the developing countries have shown great interest in achieving economic development via industrial development. In spite of the fact that a number of countries have achieved economic development through specialization in the production and export of agricultural products, yet industrialization is still considered the main avenue to economic development.

This chapter aims at providing a portrayal of the evoluation, structure and performance of the manufacturing sector in the Sudan .

2-2 Evolution of The Manufacturing Sector :

Subsistance agriculture was the dominant economic activity since Sudan came into existence as a political unit in 1899, and only a petty trading and crafts existed (Hameed 1974).

The effort to create and develop a manufacturing sector in Sudan started in 1900 by the colonial government . However limited experience was gained during (1900-1933) to finance infra-structural projects like railways, road construction, post and telegram and other public works (Abu Affan 1985).

The British planned that Sudan should remain an agricultural country and should, therefore, develop its agricultural resources so as to finance the import of needed products .

In the post 1899 era the industrial activities in Sudan were confined only to some traditional manufacturing activities, mainly "anagreeb" and the "damours" industries, producing shoes, beds and cloth for the local market (Nimeiri 1977). Only small capital , local raw materials and native craftsmen were needed as inputs of the production operations.

Before the outbreak of World War II, and exactly in 1925 the Gezira scheme was set up to produce cotton for export, in accordance with the British economic policy in the Sudan which aimel at directing the country towards the creation of an export-oriented economy of primary products based on agriculture (ibid). This developmental led to the emergence of the first stage modern manufacturing sector represented by the establishment of four ginning factories in the Gezira in 1925 . Atbara also witnessed the construction of two other ginneries. By 1933 about twenty-one ginneries were established in th Sudan .

Some sort of second stage industries, mainly oil milling and textile processing came into existence due to the development of cotton ginning. Cotton oil seeds processing started in 1943 by the establishment of three oil mills at Senar. A modern manufacturing textile mill was planned to be constructed in 1938, but the plan failed due to the break of world war II , hence the textile manufacturing in the Sudan did not start until the late fifties (ibid).

The development of industry in Sudan was boosted by the outbreak of world war II. As a result of the War Supply Department advice on the type of industries that should be established in the Sudan, a number of enterprises, such as oil mills, soap factories, confectionaries, syrups and squash, and spinning and weaving plants were erected. The then British government in Sudan felt that it was necessary to establish certain industries in order to supply goods which were no longer being imported. Unfortunately, those newly established enterprises were not able to withstand the tough competition of the imported goods when importation was resumed immediately after the war, the result was the close down and failure of the local firms (ibid).

By the early 1950's the Sudan private sector was apparently dominated by the a group of "Middle Eastern" immigrant businessmen who came to the Sudan in the 19th as well as the 20th century. The Sudan was seen as relatively attractive country for business after the British rule in 1899, and especially after 1919 when rapid economic development -largely based on the cotton of the Gezira scheme- was in progress. The third generation of those immigrant businessmen established some manufacturing enterprises producing confectioneries, vegetable oil, soft drinks, soap, perfumes and building materials such as cement and floor tiles (Hameed 1977 and Abu Affan 1985). By the late 1960's the political climate had changed, and the exodus of those businessmen was accelerated until 1970 when most of those industries were either nationalized or confiscated by the May Regime.

2-3 The Rise of The Modern Manufacturing Sector:

The origin of the modern manufacturing sector dates back to 1955/56, when the Sudan gained political independence. After the independence, the first national Sudanese government faced a weak economy with low standards of living, low percapita income, and limited opportunities for employment, in addition to the prevailing poverty and misery. Having a percapita income equivalent to 100 dollar per annum at that time, made the Sudan one the least developed countries. As an agricultural country, Sudan's economy was exposed to great flucuations in the revenues from its export crops . This was due mainly to the natural hazards and the fluctuations in the international prices of all the primary products .

To alleviate the deteriorating situation of the Sudan economy , the national government which took over following indepedence have over the years adopted various economic development programs to improve the economic conditions in the country. Industrialization was visualized as a vital means of achieving such objective.

The Ten Year Plan of Economic and Social Development of the Sudan (1961/62-1970/71) was the first comprehensive development plan to be set by a national government. Concerning the manufacturing sector, the plan aimed at increasing the contribution of the sector to the national product from 4% up to 10%. This trend reflects the interest of the then new military government in industrialization as an important vehicle to the process of economic development.

2-3-1 The Public Manufacturing Sector :

The participation of the government in the field of manufacturing started at the end of the fifties by undertaking certain industrial ventures during the period of The Ten Year Plan. Only nine public industrial firms were owned by the government until 1970. Due to the nationalization and confiscation polices, the public ownership of manufacturing firms increased substantially. After 1972 the government decided that the public sector should play a leading and pioneering role in industry. Accordingly, the government established a number of industrial firms in different regions of the country. About twenty four public firms were planned during the period 1970-1981. Those firms include sugar factories, weaving mills, textile mills, tanneries, spinning factories and other industries. About 7 firms of those twenty-four were not completed. The initial investment in these firms was financed by a number of Arab and western countries in addition to China .

Almost all public firms experienced long delays in their execution. The majority of those firms were reported to be operating at very low capacities. There are others that have not yet started production. This was attributed to technical problems detected after the completion of these projects. The government has allocated the sum of Ls 22.2 millions to the rehabilitation of the public industrial projects in its Investment Program for the period (1980/81 - 1981/83) (Abu Affan 1985).

2-3-2 The Private Manufacturing Sector

The activities of the private sector dominated the industrial investment until the early seventies. Food-stuffs, chemicals, textile and

leather manufacturing constitute the major industrial activities operated by private investors.

The textile industry employed substantial number of workforce relative to those employed by the food industries, although the food sub-sector was composed of more firms. This is because the textile industry is relatively labour intensive and the size of the textile factories was relatively large.

Vegetables processing dominantes the food sub-sector. By the endof 1980 there were about 128 oil mills, which process cotton seeds , groundnuts and sesame seeds. These oil mills have been operating at low capacity (below 40%) in recent years (Abu Affan 1985). This was due to the shortage raw materials, high world price of groundnuts and sesame- that encouraged export- in addition to the excess capacities of oil mills installed country-wide. Other types of food stuff were processed in this sub-sector (e.g. wheat flour, canned vegetables and fruits, soft drinks, alcoholic beverages ...etc.). The private sector entered the field of processing vegetables and fruits in the mid-seventies. The public sector has invested in this field since the early sixties.

Up to the early seventies, the private sector dominated the textile industry . Thereafter, the public sector started to construct the public textile factories to satisfy the local demand and export the surplus of fabrics and yarn. Leather products are manufactured in a number of small and medium size factories. Also chemical products such as soap, perfumes, cosmetics, pharmaceuticals, dry cells, rubber and plastics are primarily produced in the private sector. The production of many of these chemical products is undertaken under licenses from international manufacturers. The production of building materials such as tiles,

asbestos pipes and sheets, zinc sheets, bricks and furniture are dominated by this sector.

Included in the private manufacturing sector are foreign firms which constituted only a small part of it. Before 1970 there were few foreign industrial firms in the country and some joint ventures. By 1970 all foreign ventures were nationalized . All foreign investments that took place after 1970 were in the form of equity participation with public and / or private local capital (ibid).

2-4 The Structure of the Manufacturing Sector

In this section of the study the purpose and the objectives , classification of the types of industries operating in this sector , and the regional distribution of the firms will be discussed.

2-4-1 The Objectives of The Manufacturing Sector

Industrialization as an important economic activity in the Sudan is expected to be guided by predetermined goals and objectives.These goals were set either by the colonial government or the successive national governments after independence.

Before World War II the British government in the Sudan was directing the Sudan economy towards the creation of an export-oriented economy of primary products only based on agriculture. The establishment of the Gezira scheme in 1925 was compatible with this goal.

The outbreak of the second world war led to some modification in the goals of the industrial sector. The colonial government decided to create an import-substitution manufacturing sector that could utilize the

local raw materials to relieve the country of the need to rely on imports (Nimeiri 1977).

When the Sudan obtained its political independence in 1956 , the national governments worked on building a framework of a balanced and integrated economic and social development plan. The role to be played by the industrial sector was to diversify the economy and achieve high levels of national income and improve the standards of living.

It was stated in the Ten-Year Plan of Economic and Social Development of the Sudan 1961/62 - 1970/71, that industries should be established to help substituted for imports especially those products, which depend on local raw materials. This target was set in the attempt to remove major bottlenecks in the economy that could hinder the development process.

The original "Five Year Plan" of 1970/71-1974/75 was aimed to increase the manufacturing output by 57.5 m. by the end of the plan period, that is to say, an annual average rate of 9.4%. The gross domestic product was expected to increase by 9.6% due to the contribution of the manufacturing sector only.

The "Six-Year Plan" of 1978-1983 targeted an annual growth rate of 7.5% in the manufacturing output , assuming that the same pattern of the foreign investment flows will be maintained. However, this target was not achieved. "The Six-Year Plan" was modified and replaced by the "Three-Year Plan" of 1979-1982 which concentrated on rehabilitating the existing industrial projects and developing the infra-structural aspects of the economy .

"The National Comprehensive Strategy 1992-2002" sets several objectives for the manufacturing sector to be achieved over three phases:

(i) Phase one (1992-1995) included the following targets :-

- To exploit all the available resources to realize self sufficiency and export the surplus .

- To concentrate on improving the quality of the industrial products.

- To rehabilitate and replace the obsolete industrial equipment and adopt modern technology to improve the quantity and quality of the national output.

- The above-mentioned targets should be preceded by detailed plans and programs, detailed technical and economic feasibility studies.

(ii) Phase two (1995-1998) included the following targets :

- To remove the imbalances between the industrial sub-sectors and between the industrial sector and the other productive sectors, through promoting spare-parts manufacturing, packing and packaging, other services industries related to the manufacturing process and the manufacturing of raw material substitutes.

- to expand the production of sugar, textile, foodstuff, leather products, cement so as to generate a surplus for export.

-to establish new industries (e.g.assembling agricultural equipments, electronic devices, insectidess, petrochemical and metal industries)

(iii) phase three (1999-2002) include the following targets:

- to operate the basic metals and petro-chemical industries.
- to complete the expansion in the export industries and improve the quality of the production to match the international standards.
- to a chieve integration with the other productive sectors in agriculture, services, basic infrastructure and science and technology sector.

The government industrial policies in the Sudan, during the seventies, have failed to identify any specific priorties or to set targets for industrial growth (ibid). It seems that this is the case during the eighties. The National Comprehensive Strategy -durig the ninties- also failed to set the objectives of the industrial sector in a quantitative manner for control and evaluative purposes .

2-4-2 Sectoral Classification of Manufacturing:

The manufacturing sector in Sudan is characterized by the domination of the light industries. The major sub-sectors that constitute the manufacturing sector in Sudan are :

(i) food industries .

(ii) weaving and spinning.

(iii) Leather products.

(iv) Drugs and chemicals

(v) Metallic industries

(vi) packing industries

(vii) Building Materials Industries

2-4-2-1 Food Industries:

This sub-sector is considered as the leader in the manufacturing sector because of its contribution to the policy of food security in the country. The food industry is expected to increase the economic value of some of the major agricultural products.The main industries constituting this sub-sector are :

(a) Sugar Industry:

Sudan possesses five sugar factories, four owned by the government and the fifth one is a joint venture. The designed capacity of the five factories is 700,000 tons, but the estimated average annual production is 450,000 tons. The utilized capacity at 1998 is 64%. The industry suffers from the scarcity of foreign currency for replacing obsolete machineries and provision of spare parts.

(b) Milling Industry :

There are about seventeen milling factories in Sudan. The total designed productive capacity is estimated to be 1,152,000 tons per annum, but the actual utilized capacity in 760,000 tons per annum. The

rate of the capacity utilization is 63%. Most of the milling factories need rehabilitation and regular supply of spare parts.

(c) Edible oils Industry :

This industry constitutes an important segment of the manufacturing sector in the Sudan. There are about 210 mills in the country with a designed capacity to crush about two millions tons of oil seeds. But the actual productive capacity does not exceed one third of the designed capacity. This is attributed to the shortage in the supply of raw material and the obsolesce of most of the working mills. It is ironic to know that the designed capacity of milling is three-fold the available supply of the raw material in mid 1990's.

(d) Fruits and Vegetables Canning Industry :

There are ten factories of fruits and vegetables canning factories owned by the private sector.The government used to have two factories which have been closed down. The total designed capacity of these ten factories is 17,761 tons per annum, but the actual productive capacity is 5,615 tons per annum i.e 30% capacity utilization. The scarcity of raw material and foreign currency are the major reasons behind the low productive capacity.

(e) Fodder and Diary Products :

There are about six factories of fodder production in Sudan. Sudan has plenty of inputs for fodder production. Diary products are also available, and there is an ever growing demand for it. Sudan imports more han one thousand tons of milk and its derivatives annually.

2-4-2-2 Weaving and Spinning Industry:

This industry has old rootsd in the Sudan. The Gezira Scheme provides the industry with the main input which is cotton. The weaving and spinning industry started as simple rural cottage industry and developed gradually until the establishment of the Sudanese Textile Factory in the year 1962. A number of weaving and spinning factories were established afterward, by both private and public sectors. This sub-sector contains the following industries :

(a) Spinning Industry :

There are seven large spinning factories in Sudan with a designed capacity amounting to 24450 tons of yarn annually. This in addition to spinning sections in the integrated factories (spinning, weaving and finishing) with estimated designed capacity of 25850 tons of yarn annually. There is also "Gado" factory with a designed capacity estimated at 1800 tons of yarn annually. The total designed capacity of all factories is 62,100 tons. The actual productive capacity in 11,286, constituting only 18.3% of the designed capacity.

(b) Weaving Industry :

The weaving factories can be classified into four categories :

- integrated factories (both public & private sectors).
- the state owned (public sector).
- small Scale factories.
- manual weaving processing.

The total designed capacity of these categories of factories is 363 million yards per annum. However , the total actual production of this industry is 56.2 millions yards , constituting only 15.5% of the total designed capacity.

(c) Other Relevant industries :

In addition to the spinning and weaving , there are a number of industries which depend mainly on cotton. The following table (2-1) shows the designed and actual capacity of the other cotton - based industries

Table (2-1) : The Designed and Actual Capacity of Some Cotton-based Industries.

Particulars	Designed Capacity	Actual Capacity	Utilized Capacity
Treeco	12 million yards	1.7 million yard	14.2%
Ready-made cotton	10 million piece	1.2 m. piece	12%
Blankets	350,000 unit	155,620 piece	44.5%
Medical cotton	400 tons	294 tons	73.5%
Medical gauze	20 million yard	4.2 million yard	21%

Source : Ministry of Industry & Commerce, Internal Records (1997)

The Weaving and spinning sub-sector is facing several problems; the contamination of the raw cotton with sticky substance, production

bottle-necks, competition from imported cloth, lack of spare parts and the high turnover of the technical personnel.

2-4-2-3 Leather Industry :

There are seven modern tanneries in the Sudan with a designed capacity of 21 million square feet of sheep skins and 25 millions square feet of cattle skins. This in addition to 240 traditional tanneries scattered all over the country with a capacity of 19 million square feet sheep skins and 30 millions square feet of cattle skins. All these tanneries operate - on average - at a productive capacity of 80% of the designed capacity .

Concerning footwear products, there are seventeen factories with a capacity of 1,650,000 pairs of shoes a year, however , only three factories are operating now with an actual capacity of 30% of the designed capacity. The rest of the factories are not in operation since 1991. One of the major problems facing the leather industry in Sudan is the lack of appropriate technology to maximize the utilization of the local raw materials.

2-4-2-4 Drugs and Chemical Industry :

(a) Drugs Industry :

The number of established drugs factories is estimated to be 14 , in addition to, at least two factories which joined this industry during the last two years. Table (2-3) displays the different types of drugs and the available installed capacity of the producing factories. This productive capacity is calculated for one shift.

Table(2-2) :Installed Capacity of Drugs in the Sudan.

Particulars	Designed Capacity	Uit of measurement
Tablets	1750	million unit
Capsules	280	million unit
Dry Insoluble	10	million unit
Liquids	7	million unit
Intravenous Solution	30	million unit
Medical gases	30	Tons
Powder	400	Tons
Cream & pastes	590	Tons

Source : Ministry of Finance and Economy , Central Breau of Statistics , Statistical Year Brook , Khartoum 1999.

The established factories are expected to add new lines for producing new drugs for import substitution , however , the industry can not produce all the required drugs because of technical and legal reasons. The existing productive capacity of the drugs industry is about 30% of the installed capacity.

(b) Chemical Industries:

This sector produces several products that satisfy the needs of the consumers in the agricultural, transport, health field. The chemical industry incudes; soap, paints, gases, perfumes, plastics, tubes, batteries,

insectides..etc. The installed capacity of this sector is about 6432 thousands tons, 865 cubic meter and 1574 thousands units. However, the actual productive capacity is not more than 40% of the installed capacity.

2-4-2-5 Metallurgy and Engineering Industries:

(a) Metallurgy Industry:

This branch of industry is still in its infancy, inspite of its economic importance. The vitality of this industry stems from its itegrative relationship with the industrial, agricultural, mining, transport and construction sectors. This of industry consists of the steel industry and the industry of other metal like cooper, zinc, Aluminum...etc. The output of this industry is mainly used in the engineering industry.

(b) Metallurgy Related Engineering Industries :

This constitutes a large base for several engineering industries like agricultural equipment, pumps, spare parts, airconditions and water coolers, water pipes, metallic furniture ..etc. Table (2-3) displays the designed and actual productive capacities of the metallurgy related engineering industries.

Table (2-3) : The Designed and Actual Capacities of the Metallurgy Related Engineering Industries.

Type of Industry	Unit of Measurement	Designed Capacity	Actual Capacity	Utilization Rate
Foundries(32)	Thousand Tons	8.7	4.35	50%
Refregrators	Thousand Tons	3460	32	0.94%

Type of Industry	Unit of Measurement	Designed Capacity	Actual Capacity	Utilization Rate
Air & Water coolers	Thousand Tons	38.3	19.25	50%
Solder	Thousand Tons	4.2	2.1	50%
Zinc Industry	Thousand Tons	33	21.5	65%
Iron rods	Thousand Tons	70	35	50%
Water pipes	Thousand Tons	12.5	6.25	50%

Source : Ministry of Industry and Commerce (1997)

2-4-2-6 Packing and Packaging Materials Industry :

The packing and packaging materials is considered as one of the important industrial products which have largely influenced and contributed to the trading and industrial development. The individual consumption rate may be used as an indicator for the level of the economic development of the country. Packing and packaging materials help preserve the food products and it also facilitates the physical distribution of those products. The packing and packaging materials can be categorizes as follows :

(a) The plastic Products :

There are more than ten plastic product factories in the Sudan. The total designed productive capacity of all this industry satisfies the requirement of the food industries. Imported raw material is the only source of inputs for this industry.

(b) Packing Glass:

Sudan has three factories for producing packaging glass with a designed capacity of 1200 tons annually. The factories produce glass bottles with varying sizes.

(c) Tin-Plate Products:

This branch of industry produces metal vessels, barrels and tins which are used in packaging petroleum products, edible oil, painting cans, etc.

(c) Carton Paper:

There are four factories which produce carton as packaging materials. The designed capacity of those factories is 28,000 ton per annum, however, the utilized capacity is 50% only.

(d) Kenaf Sacks :

There is only one factory in the Sudan which produces kenaf sacks. The designed capacity of the factory is 11 millions pieces per annum. However, the actual productive capacity is about 24.5% of the designed capacity. Table (2-4) portrays the designed and the actual capacity of the packing and packaging industry.

Table (2-4): The Designed and Actual Capacity of The Packing and Packaging Industry sector

Type of Industry	Unit of Measurement	Designed Capacity	Actual Capacity	(%) utilized capacities
Plastic containers (1lit.)	Million	105	21	20%
Plastic Cotainers(5 lit)	Million	67.5	13.5	20%
Plastic Containers (18 lit)	Million	37.5	7.5	20%
Plastic cups	Million cups	12	3.6	20%
Plastic cases	Thousand tons	16	3.2	20%
Plastic sacks	Thousand tons	30	-	-
Plastic barrels	Thousand barrels	500	-	-
Plastic boxes	Thousand boxes	900	220	25%
Packaging glass	Thousand tons	24.8	2.5	10%
Carton	Thousand tons	28	5.6	20%
Kenaf sacks	Million sacks	11	2.7	24%
Tin-plate	Thousand tons	23.4	5.4	23%
Paper vessels	Thousand tons	28	14	50%

Source : Ministry of Industry and Commerce (1997)

2-4-2-7 Building Materials Industry:

The Building materials industry is one of the most essential industries in the country. All the plans and the development schemes depend largely on the availability of the output of this industry. The gap between the supply and demand for the product of this industry is getting wider due to the increasing activities in the building and construction sector. The products of this industry consist of the following:

(a) Cement Industry and Cement Products:

There are two factories in Sudan , Attbra Cement Factory and The Nile Cement Factory . The designed capacity of Attbara Cement Factory is 150000 tons per annum. An extension was added to the old factory to raise the designed capacity to 375,000 ton per annum. However, the actual capacity of the factory is about 49200 tons per annum, a utilization rate of 13% only. The designed capacity of The Nile Cement Factory is estimated to be 100,000 tons annually. Now the factory is operating at 80% of the designed capacity, supplying 12% of the total local consumption.

The cement products include , tiles , pipes, cement bricks, but this branch of industry is operating at a very low productive capacity not exceeding 8%.

(b) Asbestos:

The maximum designed capacity of the idustry is 36,000 tons per annum, but the actual capacity represent only 4% of the designed

capacity. This branch of industry suffers from the shortage of cement and the competition from the imported substitutes.

(c) Mechanized Bricks:

There is only one factory which is designed to produce 30 million pieces. However, the factory operates at 9% of the designed capacity. This industry suffers from the shortage of foreign currency for importing the needed spare parts.

(d) Sanitary Equipment:

Unable to complete with the imported branch, the sanitary equipment factory was forced to stop production, it only produces plastic water reservoirs. This industry needs to be upgraded to meet the increasing demand for its products which is estimated to be 9700 tons annually by the turn of the 20th century.

(e) Marble Products:

There are three small factories of marble products located in Khartoum. This industry produces on request. The production was estimated to be 1250 cubic meters in 1992.

(f) Gypsum and Calcite:

Most of the factories operating in these industries are located in the Eastern States of Sudan. The factories are operating at a very low capacity not exceeding 6.5% of the designed capacity, and this is attributed to the high cost of transporting the raw materials in addition to the shortage in the energy inputs.Table(2-5) displays the designed and actual capacity of the building materials industry

Table (2-5) : The Designed and Actual Capacity of the Building Materials Industry

Type of Industry	Unit of Measurement	Designed Capacity	Actual capacity	Utilization rate
Cement	Thousand Tons	500	295	58%
Gypsum	Thousand Tons	45	21	50%
Calcite	Thousand Tons	3.6	2	55%
Mechanized bricks	Million Pieces	80	50	62%
Marbles	Thousand cm	67	33.5	50%
Tiles	Million cm	4.6	2.3	50%
Washing Basin	Thousand units	42.4	19.2	50%
Shower basin	Thousand units	63.2	21.6	50%
Toilet stools	Thousand units	43.4	19.2	50%
Front panel	Thousand units	42.6	16.8	50%

Source : Ministry of Industry and Commerce (1997)

2-4-3 Regional Distribution of the Industrial Enterprises in the Sudan:

The total number of the industrial firms in Sudan is estimated to be 6756 firms(including modern industry and small industrial firms) scattered all over Sudan. The permanent labour force in 1990 was 144, 503, but if we add the casual labour the number will exceed 2000,000 representing 3% of the total labour force in the country.

Most of the industrial enterprises are concentrated in the centre of the Sudan (the national capital and the central states). Table (2-6) shows the distribution of the industrial enterprises and the labour force in different geographical locations in the Sudan.

Table (2-6): The Distribution of the Industrial Enterprises and the Industrial Labour Face in Sudan.

Geographical Area	**No. of Ind. Enterprises**	**%**	**No. of labour face**	**%**
Khartoum State	1922	28.4	49576	34.3
Central States	1782	26.4	64572	44.7
Eastern states	777	11.5	12807	8.9
Northern states	933	13.8	4879	3.4
Darfur state	411	6.1	3376	2.3
Kordufan state	915	13.5	8261	5.7
Equatoria states	19	0.3	1041	0.7
Total				

Source : Planning and Industrial Programs Directorate, Ministry of Industry (1990)

2-4-4 The Size of Investment in the Manufacturing Sector :

The total invested capital in the manufacuring sector amounts to 4,282,3 millions dollars in the year 1994. More than half this amount was invested in the foodstuff (industry sugar) sub-section. The second sub-sector in terms of size of investment is the textile and weaving and ready made clothes with 1,272 million dollars. The least investment is in the

wood and paper sub-sector with 7,1 million dollars. Table (2-7) displays the abovementioned information.

Table (2-7) : The Distribution of the Total Investment in the Manufacturing Sector According to Sub-sectors.

Sub-sector	Million Dollars	%
Foodstuff and sugar	2,550	53.91
weaving , textile & R . M. cloth	1,272	26.93
Drugs, chemicals and tanneries	411	8.7
Engineers and electric industries	10.3	2.9
Wood and paper industries	7.1	1.5
Building materials and mining	10.8	2.28
Handcrafts and others	21.1	4.47
Total	4,282.3	100

Source : Ministry of Industry Statistics (1994)

However, in the mid-nineties substantial investment was made by the private sector in the drugs industry .

2-5 Public Industrial Policies in the Sudan:

The manufacturing industry was practically nonexistent before 1956. But in the early 1950's the concentration of population in the Gezira area provided a basis for the development of some industries . Up to that point a policy of particularly free trade had been adopted. The national government in 1955, aware of the absence of industry, began to aim at reinforcing and highlighting industrial opportunities through the initiation of a policy of concessions for the encouragement of pioneering industries (Hammeed 1974). The governemnt policy was to promote industry and at the same time to expand agriculture, all within a framework of a balanced and integrated economic and social development plan (Nimeiri 1977).

According to this new policy, the "Approached Enterprises Concessions Act 1956" was issued in order to encourage both local and foreign capital to invest in industry. The act was the cornerstone in promoting the industrial growth in Sudan. Accordingly, many industries of vital importance , and a number of small and medium size industries to meet domestic demand, have been established. These industries include; textile, footwear, flour, other foods, beverages and plastics. Accordingly the share of the manufacturing sector in GDP, at current prices, rose from 1% in 1955/56 to 9.4% in 1970/71 and the employment in the industrial sector rose from about 9000 employees to over 40,000 employees during the same period (ibid). However, Hameed (1974) believes that the initiation of the government's industrial incentive policy is meaningful only in relation to the emergence of the competitive-traditional sector, unless the policy was directed wholly or mainly towards foreign enterprise, which was not the case. Hameed adds that, an

industrial incentives policy has little justification in an economy predominately approximating to the traditional or cooperative models. What supports Hameeds's view was that in 1961, the government, inspite its intention to encourage the private sector to undertake new industrial ventures, was forced to rely upon public resources to establish some major types of industries. This was because the government felt that the private sector would not have either the interest or resources to invest in certain industries . Accordingly, the government set up a tannery in 1961, followed by a large sugar mill in 1962 , and a cardboard factory in 1963 (Nemeiri 1977).

The "Approved Enterprises (Concession) Act 1956" contained a number of criteria to determine the eligibility of an industrial enterprise for state assistance. This Act continued to be in operation for almost twelve years. It was reviewed in 1967 and was replaced by the Organization and Promotion of Industrial Investment Act 1967 which came into effect in March 1968 (Abu Affan 1985).

When the Mary Regime came into power in 1969, a nationalization and confiscation policy was adopted by mid 1970. The government took over almost all the large firms operating in the country at that time. Hence, 59% of the total invested capital in the industrial sector became publicly owned (the Industrial Survey 1970/71). In view of the nationalization measures , public ownership of industrial enterprises was expanded and the Industrial Development Corporation which was established in 1965, had to be replaced by the Industrial Production Corporation (IPC). The IPC controlled five sub-corporations with a net fixed assets in 1971 of over Ls 39 millions distributed over 46 enterprises (Nemieri1977).

The objectives of the nationalization of the industrial enterprises as stated in the "Enterprises Nationalization Act 1970" were:

(i) To ensure national control of key industries e.g. the exploitation and processing of natural resources.

(ii) To bring foreign owned enterprises into domestic hands and thus accelerate the process of indignation of the industrial sector.

(iii) To prevent the domination of the industrial sector by private entrepreneurs .

The Act also outlined the procedures by which compensation to the nationalized companies would be paid and how they would be managed thereafter

Because the May government was in a hurry to complete the nationalization process in the shortest possible time , the top management of the nationalized companies were changed suddenly. This speedy reaction led to immediate and gross inefficiencies in business operation because new management needed time before they become sufficiently aware of the right decisions to take. During the first two years of nationalization and confiscation (1970/72) the country witnessed severe shortage of goods. Rapid deterioration in the financial positions in all the confiscated and nationalized companies was reported (Hameed 1974).

After one year, the government started to reverse its polices by returning most of the confiscated Sudanese firms to private businesses and some of the nationalized firms to their original owners. Political observers attributed this move to the crushing of the communist-inclined

elements in the regime after their abortive coup d'état in 1971.Others attributed this reversal of policy to the remarkable expropriation (Hameed 1974).

To restore the confidence of the private local and foreign investors in the new policies of the government, The Development and Encouragement of Industrial Investment Act 1972 was put into force in 1972, giving even more favorable conditions for private investment relative to the previous two acts. The new Act, which marked the beginning of return to private initiative embodied a number of incentive polices. This Act was replaced by "The Development and Encouragement of Industrial Investment Act 1974 which came out similar to the previous one concerning the concessions offered to the industrial enterprises. The 1974 Act also placed the power to supervise the industrial sector in the Ministry of Industry.

In 1981 "The Encouragement of Investment Act 1981" was passed. This new Act covered all types of investment, and accordingly, the Ministry of Finance and Economic Planning became the only body which has the right to exercise all the authorities and responsibilities to approve and offer concessions to all the investment projects including the industrial ones. This Act was issued in order to achieve the followings:

(i) To vest all the authorities and responsibilities of the investment planning in the country in the hands of one centralized body to supervise the execution of the national investment plan.

(ii) To facilitate the procedures of obtaining licenses and concessions to the approved investment projects.

(iii) To create a body able to promote investment both internally and abroad.

(iv) To create the optimal climate for foreign investments.

The Encouragement of Investment Act 1981 was repealed by The Encouragement of Investment Act 1990. Like the 1981 Act , this new Act covered all types of investments . This Act encourages the investment in fields of agriculture, industry, mining, transport, tourism, storage, housing, contracting services, basic services and other fields prescribed by the Council of Ministers. The most significant advantage in the 1990 Act is the validity of its provision in case of contradiction with any other law. It differs from the 1981 Act in that it grants concessions to the investor without discretionary power of the minister concerned. Also the 1990 Act established the Investment Public Corporation (IPC) as the sole organ responsible for handling Investment in the Sudan. The President of the (IPC) is in the status of a minister and is appointed by the President of Republic (Abnouf 1995). Investment units were also established at every ministry concerned with investment so as to facilitate the process for the investor.

According to The National Comprehensive Strategy1992-2002, the government decided to dispose off a substantial number of public enterprises either by privatization, restructuring or shifting the ownership to the states. The privatization of the public enterprises is a policy that is not based on the profitability or otherwise of the enterprise.

2-6 The Problems of The Manufacturing Sector:

Inspite of the efforts undertaken by the different national governments to improve the economic performance by activating its different productive sectors, the manufacturing sector is still facing many obstacles, the manifestations of which is the remarkable contraction in this sector as reflected in the fact that the productive capacity of most of the factories was between 20-30% of the designed capacity, (TheMinistry of Industry 1997).

Following are the most important problemss that face the modern manufacturing sector in the Sudan (Ministry of Industry and Commerce 1997):

2-6-1 The General Climate of Investment: The Organizational Aspects:

The general investment climate in Sudan can be described as very fluid. Since the issuance of the first act with the objective of promoting private investment in Sudan a number of amendments have been introduced. The "Approaved Enterprise(Concession) Act" was issued in 1956, however it was amended in 1967, 1974, 1980, 1990 and 1996. This indicates the defeciencies in the area of planning for investment promotion in the Sudan. The industrial sector was influenced significantly by this shortcoming. During the period 1956-1996 the job of controlling and supervising the investment activities in the Sudan has been assigned to a number of authorities ranging from the Ministry of Industry to the Ministry of Commerce and the Ministry of Finance. However, lately, the supervision and control of the investment activities was assigned to a separate authority.

The job of investment planning and promotion in Sudan is getting more complex due to the fact that planning of investment has a regional dimension. There is an urgent need for a central coordinating authority to lessen the negative impact of this decentralization in making decisions regarding investment planning.

It has been found that a number of government department have undertaken many investment decisions without referring to the governing authority in this respect and the result was emergence of huge idle capacities in the industrial sector (The Ministry of Industry and Commerce 1997).

2-6-2 The Infra- Structural problems

The infra-structural problems are considered as one of the main obstacles facing industrial development in Sudan . These obstacles can be indicated as follows :

(i) the lack of an effective land transport system especially during the rainy season, which usually isolates some of the industrial areas and consequently hinders the workers from reaching their work place. It also makes difficult for the output to reach the market place.

(ii) Problems associated with the sanitation system which leads, sometimes, to the stoppage of production in the industrial areas.

(iii) shortage of electricity supply which negatively influences the industrial enterprises, especially those which depend

completely on the supply of electricity from the national grid.

(iv) Although there is a remarkable progress in the maintenance of the communication system in the country, yet there is still some weaknesses in the communication systems-especially the telephone system-which conistitute extra burden on the administrative aspects of the industrial enterprises.

(v) The rise of fuel prices due to the presistent devaluation of the value of the national currency, which in turn, increases the cost of production.

(vi) The absence of some industries which represents a basic inputs for the production of other products e.g. Soda, paper, iron and steel ...etc, i.e lack of itegration.

2-6-3 The Financing Problems:

The financing problems can be classified into two types; one type concerns the finance of imported production inputs, machinaries and spare parts . The other type concerns the finance of the working capital.

It was noticed that the adoption of a rigid or a flexible monetary policy toward the import or export sector is highly related to the shortage or availability of foreign currency. The investment projects in the country always face difficulties in importing production inputs and spare parts at times when the foreign currency is scarce. The allocation of the reserves of the available foreign currency is always subject to priorities. Unfortunately, the needs of the industrial sector of foreign currency are not considered a top priority.

It is found that the fiscal and monetary policies of the government have expedited the rate of inflation which is reflected in the rising cost of production. The increase in the cost of production and the expansion of the government expenditure accelerated the inflation rate which consequently resulted in a remarkable devaluation of the local currency. The deterioration of the value of the Sudanese currency made it impossible for the industrial sector to secure the needed import of production inputs, machineries and spare parts .

The problems of financing the working capital is a limiting factor for the success of the industrial sector. The rapid increase in the inflation rate has its negative impact on the cost of local finance, which reached 24% for the industrial sector in the banking institutions. This fact, coupled with the instability of the credit policies in the import sector, has negatively contributed to the financing situation of the industrial sector.

2-6-4 The Taxation:

Before the liberalization policies, which came into effect in the beginning of 1992, most of the local industries were enjoying concessions in the form of importing the production inputs at the official dollar price. However, after 1992 most of the local industries lost this concession and the imports prices increased dramatically. The concession of the imports' custom reduction was lifted and the following rates of the imports' customs were applied:

(i) Customs duties on imported inputs range between 5% and 30%.

(ii) Custom duties on ex-factory prices range between 15% and 70%.

Due to the negative impact of the application of these rates of custom duties and the decline of the purchasing power of consumers, a drop in the government revenues was observed.

2-6-5 The Inefficiencies of the Marketing System :

Due to the adoption of the liberalization policies, the local products have been subjected to a stiff competition from the imported substitutes. The local products were unable to compete with the imported ones due to the low quality of the former. This in addition to the fact that the prices of the local products have no considerable advantages over the prices of the imported products, especially in the light of the duality of taxation on local products which ultimately benefits the imported products.

Regarding the export sector, the exports of the country are facing difficulties in finding a place in the world market due to the following reasons:

(i) the inability to cope with the changing requirement of the international markets regarding prices and quality.

(ii) the lack of information about the international market.

(iii) the lack of research and development activities in order to promote the quality for international competition.

(iv) the lack of an effective and efficient system to promote the exportables in the international market.

2-6-6 Replacement Problems :

One of the financial problems of the industrial firms emanates from the fact that the depreciation provisions for the fixed assets is always underestimated due to the continuous devaluation of the local currency. As a result, the industrial firms, most of the times, find themselves unable to replace their fixed assets, especially the hardware. In fact, whenever firms distribute profits to their shareholders, most probable, they distribute part of their capital and thus firms are always subject to capital erosion.

2-6-7 Shortage of Skilled Labour :

The manufacturing sector in Sudan is experiencing a shortage of skilled labour force. This shortage may be attributed to the fact that most of the skilled labour and technicians migrated outside the Sudan searching for better working conditions. Even those who were not in a position to migrate have shifted to other activities where their opportunity cost is higher. The phenomenon may not be that problematic if there is a continuous supply of skilled labour to compensate for that loss in the manufacturing sector. Hence, the lack of regular supply sources of skilled labour is an alarming problem especially in the light of the government educational policies, which favour academic education at the expense of technical one.

2-6-8 The Scarcity of Some Production Inputs :

Inspite of the fact that Sudan is very rich with its natural resources, especially the agricultural products, it is found that some industrial firms failed to secure their inputs of raw materials. An example of that is the shortage of oil seeds,which compelled some oil mills to work with a very

low capacity. This phenomenon my be attributed to the failure of the agricultural policies adopted by the government of Sudan and the lack of some vital infra-structural facilities e.g. storage.

2-7 The Performance of The Manufacturing Sector :

In this section the performance of the manufacturing sector will be examined in terms of its contribution to the national income and the installed capacity utilization.

2-7-1 The Contribution of the Manufacturing Sector to the Gross Domestic Product (GDP) :

Sudan is primarily an agricultural country where , more than 80% of its population rely for their living in one way or another on agriculture and livestock raising . The average contribution of the agricultural sector to (G.D.P) during 1961-1974 was 43.6% (Abdel Salam 1977). However, during (1989-1994) , the average contribution of the agricultural sector to (G.D.P) fell to 34% being overwhelmed by the contribution of the services sector which amounted -on average- to 49%, whereas, the average contribution of the industrial sector registered 17% .

The following table displays the percentage contribution of the industrial sector to the (G.D.P) during the period 1980/81-1996.

Table (2-8): The Percentage Contribution of the Industrial Sector to the (G.D.P) During the Period 1980/81-1996.

Years	Relative Contribution (%)	Years	Relative Contribution (%)
1980/81	7.6	90/91	17.5
81/8 2	7.5	91/92	17.0
82/83	7.9	92/93	17.5
83/84	8.7	93/94	16.4
84/85	9.9	94/95	15.8
85/86	9.8	95	14.1
86/87	15.3	96	14.5
87/88	15.9	97	14
88/89	14.6		
89/90	15.4		

Source : Computed from data collected from the Ministry of Finance(1999), Annual Reports of Bank of Sudan and the Economic Survey 1993/94.

The relative contribution of the industrial sector to the (G.D.P) in the above table shows a steady increase from 1980/81 up to 1992/93. However, it since then started declinee. The contribution of the industrial sector to (G.D.P) has shown a remarkable improvement since 1980/81. Inspite of this fact, the industrial sector is providing the least contribution to the (G.D.P), outperformed by the contribution of the

agricultural sector and the services sector. This situation confirms the fact that industrialization in Sudan is still in its early stage of development.

2-7-2 Capacity Utilization of the Industrial sub- sectors :

This sub-section intends to investigate the operating capacities of the different sub-sectors in the industrial sector . Capacity utilization has been used as an indicator of the level of performance because effective capacity utilization is the first and fundamental requirement for satisfactory performance.

Table (2-9) shows that the textile industry is operating at ay low rate of capacity utilization (15.5 for weaving and 18.5 for spinning) . The core problems of the textile industry are linked to the inadequate supply of raw materials, difficult access to finance working capital, severe technical problems, obsolete machinery, lack of spare parts, frequent power cuts and above all policy constrains.

The sugar and milling industries are however, operating at an acceptable, if not a reasonable, utilization rates.The other sub-sectors are operating at utilization rates ranging from 30-50% except for the packing and packaging which is operating at a utilization rate of 20% only.

Table (2-9) : Capacity Utilization Ratios of The Different Sub-sectors of the Industrial Sector (1997).

Industrial sub-sectors	Utilization ratios
Sugar Industry	64%
Milling Industry	63%
Edible Oil industry	33%
Fruits & vegetables canning	30%
Spinning industry	18.3
Weaving industry	15.5
Cotton –based industries	33%
Leather industry	30%
Drugs industry	30%
Chemical industry	40%
Metallurgy related engineering industries	53%
Packing and packing industry	20%
Building materials industries	50%

Source : Computed from unpublished data collected from the Ministry of Industry (1997).

2-8 Conclusions

The emergence of the manufacturing sector dates back to the British colonial eradan, where the Gezira scheme and other cotton related industries are established in 1925. However, the origin of the modern manufacturing sector could be traced only to 1955/56. The government of Sudan has established a number of manufacturing firms during the seventies by the help of foreign finance. The private sector has contributed by establishing a number of manufacturing firms in different sub-sectors. However, some of the government policies have disincentive effect on the private sector and deterred it from playing a greater role in developing the industrial sector in Sudan.

The industrial objectives set by national government failed to identify specific priorities or set measurable targets for industrial growth. Likewise, the industrial policies failed to attract local and foreign capital.

The industrial sector in Sudan can be classified into seven major sub-sectors. The light industries dominate the industrial sector and they are directed to satisfy the needs of the local market. Most of the manufacturing firms in the Sudan are located in Khartoum State and the central states of the Sudan .

The manufacturing sector in the Sudan is confronted by a number of obstacles which negatively contributed towards its developmentsector. The investment climate, weak infra-structure, finance problems, marketing inefficiencies, shortages of skilled labour, taxes and replacement problems and scarcity of raw materials are the major problems facing the manufacturing sector .

The Contribution of the industrial sector to the (G.D.P) is always marginal, agriculture and services sectors are the major contributors to the (G.D.P). Under utilization of capacity is the major feature of the manufacturing sector in the Sudan. Most of the firms are operating at a capacity below 50% .

Chapter Three

Structure and Context: A Conceptual Frame work

3-1 Introduction:

The purpose of this chapter is to establish a conceptualization of the basic variables of the research. The chapter will address two basic issues; the structural dimensions of organizations and the contextual variables that are supposed to influence structure. The chapter will also attempt to define "organization" and other related concepts.

3-2 "Organization" Defined:

To define "organization" is an attempt to develop ways of understanding and reading organizations. A lot of contributions from organization theorists to define "organization" have been quoted in the literature. Different definitions of "organization" tend to introduce different ways of understanding organizations. Some definitions view "organizations" as social units, others view them as socio-technical systems and so on.

Our ability to achieve a comprehensive understanding of "organizations" depend on our ability to see how different aspects of "organization" may co-exist in complementary or even in a paradoxical way (Morgan 1988).

Organization theorists have distinguished between "formal organizations" and "informal organizations". For example Etzioni (1964) referred to "formal organizations" as "organizations", while he named

"social organization" as "social groupings". He defined "organization" as "social units" or (human groupings) deliberately constructed and reconstructed to seek specific goals". Etzioni has suggested that "formal organizations" are characterized by the division of labour, the presence of one or more power centres and the substitutions of personnel.

Buck (1967) who adopted and developed a decision-model for understanding organizations' behaviour defined "organizations" as an interaction between people and other resources in a strategy intended to attain specifiable goals". This definition assumes that there is always shortage and scarcity in the necessary resources that would ease the attainment of goals.

Blau (1968) defined "formal organization" as the existence of procedures for mobilizing and co-ordinating the efforts of various, usually, specialized sub-groups in pursuit of joint objectives". In his definition, Blau emphasized the formalization and specialization dimensions as the most vital characteristic of the formal organization.

Stodgill and Ralph (1971) defined "Organization" as "an interaction system that has become structured in terms of differentiated positions and roles". This definition stems from the viewpoint of the behaviorists' approach to understanding "organizations".

Thompson (1976) conceived " complex organization " as an open system, hence indeterminate and faced with uncertainty, but at the same time as subject to criteria of rationality and hence needing determinateness and certainty. In this conceptualization to complex organization, Thompson addressed the effect of the complex and uncertain environment upon organizations.

Taking a socio-technical approach, Zey-Ferrell (1979) defined "organization" as "goal-oriented collectives that consist of groups of individuals and, in turn, comprise social institutions". Thus, he assumes that "organizations" have relatively identifiable boundaries that are open to the environment, and they possess techniques, structures, processes and perform activities with varying degrees of effectiveness and efficiency.

Taking a political approach for understanding "organizations" Morgan (1988) believes that "organizations" are created for the interest of their creators. However, he unfolded that modern organizations can be viewed as instruments of exploitation and domination with variations in the mode of domination. Looking to them from this angle, the majority work for the interest of the minority.

3-3 Organizational Models:

As we have seen in the previous sub-section, the differences in definitions of "organization" developed by organization theorists emanate from the different perspectives and views they adopt to perceive "organizations". This means that organization theorists place different emphasis on various aspects of the organization. Accordingly, different models of "organization" have been suggested. These models are shaped by the perspectives that organization theorists take about "organizations". These perspectives are categorized on the basis of which aspect of "organizations" the theorist considers to be paramount. Zey-Ferrell (1979) distinguished seven organizational models. These models stem from either a functional perspective or a conflict perspective.

3-3-1 Structural Models:

The structural models of organization are of two types; bureaucratic models and non-bureaucratic models. The bureaucratic model, as advocated by Zey-Ferrell (1979) depends mainly on the assumptions of the classical management school and the Weberian School, while the non-bureaucratic model assumes that another type of rational control -professionalization- characterizes many organizations. However, the structural models, both bureaucratic and non-bureaucratic, use structural variables to explain organizational performance.

3-3-2 Goals Model:

This model is derived from the structural models, but the emphasis here is on the performance dimension of organization as opposed to the structural dimensions of the organization. This model was built on the assumption that organizations exist to achieve goals through developing rational procedures for the achievement of goals, and this achievement is assessed in terms of the effectiveness of goal attainment.

3-3-3 Technology Model:

The technological model is emphasized by the studies of Woodward (1965), Thompson (1967) and Perrow (1967). Those theorists see technology as a prime determinant of the organization structure. However, the technology-imperative rationale has been criticized by many organization theorists (Hickson et al 1969).

The sociotechnical model is a divergence from the technological model, it emphasizes both the technological aspect and the social-psychological aspect.

Katz and Kahn (1978) argued that the conceptualization of the scientists at the Tavistock Institute of the "organization" as a socio-technical system defines integration of social and technological factors as the core problem, not the determination of their priority. Thus, the advocates of the socio-technological system never claimed the superiority of one aspect over an other.

3-3-4 **Decision - making Model:**

Zey-Ferrel (1979) argues that the work of James March and Herbert Simon are essential to any discussion of the decision-making model. They assume that the individual is capable of being a decision-maker, however, he is not wholly rational because his alternative choices and their consequences are not well known to him. According to the decision-making model, organization action is assumed to be goal-oriented and adaptive. Unlike the structural models and the goals model discussed earlier, Zeg-Ferrell believes that the decision-making model emphasizes the decision-making process and quality of the resulting decision.

A more sophisticated relevant model is introduced by Morgan (1988) who he viewed "organizations" as brains. His metaphor draws attention to the importance of information processing, learning, and intelligence, and provides a framework of reference for understanding and assessing modern organization in these terms.

3-3-5 **Human Relations Models:**

The Human relations' approach to understanding "organizations" is a counter movement to the bureaucratic approach. In these models (human relations) individual motives, goals and aspirations have been emphasized.

Katz and Kahn (1978) believe that organizational success was explained in terms of individual motivation and interpersonal relationships, especially the relationship between the superior and subordinate.

Morgan (1988), in his opinion that "organizations" are cultures, adds additional significance to the human relations model. He believes that " organization" is now to reside in the ideas, value norms, rituals and beliefs that sustain organizations as socially constructed realities. The individual is the core of this cultural metaphor suggested by Morgan.

3-3-6 General Systems Model:

All the five organizational models discussed earlier are considered as closed-system models because they are concerned with the components within the "organization" as explanatory variables, where technology, structure, process, individual and group behaviour account for organizational effectiveness.

The open-system models are concerned with analyzing the relationships between the "organization" and its environment. Thus environmental variables explain organization behaviour. Morgan (1988) went further and conceptualized the "organization" as an "organism".

This metaphor focuses attention on understanding and managing organizational "needs" and environmental relationship. In explaining the importance of this organization metaphor, Morgan raises the question that whether "organizations" survive due to their ability to adapt to the changing environment or because the environment selects the fitting organization according to the evolution Theory.

3-3-7 Conflict Models:

The six "organizations" models discussed earlier are classified from a functional perspective. This perspective assumes that "organizations" are systems of interrelated parts. It concentrates on organization integration, which is accomplished through the assumption that common interests are guided by common organizational objectives (Zey-Ferrell 1979).

The conflict model of "organization" is derived from the conflict perspective to "organizations". Contrary to the Weberian model and the classical management school, conflict models see conflicts within "Organization" as a natural phenomenon which is unavoidable.

The conflict models assume that organizational goals are multiple and generally not well integrated; consequently, they are in conflict. Also Individual interests, group interests, management interests and owners interests in "organization" are always incongruent. Conflicts are expected to rise in case of limited resources in " organizations". The conflict models see that conflicts in "organization" may encourage innovation i.e. it views conflicts as a functional phenomenon. By Encouraging innovation, conflicts may foster the attainment of organizational goals.

3-4 Organization Structure: A conceptual Approach:

Pugh (1971) defines organization theory as "the study of the structure, functions and performance of organization and the behaviour of groups and individuals within them". Thus, the study of "organization structure" is a cornerstone in organization theory. March and Simon (1958) define structure as consisting "... simply of those aspects of the patterns of behaviour in the organization that are relatively stable and that change only slowly". March and Simon emphasize the "stable patterns of behaviour" aspect as a definition of structure.

Child (1972) defines structure as "the formal allocation of work roles and administrative mechanisms to control and interpret work activities including those which cross-organizational boundaries". From this definition one can see that structure involves division of work.

Thompson (1976) defines structure as"internal differentiation and Patterning of relations within organizations between human and non-human resources or facilities".The touches of the socio-technological system are apparent in this definition.

Jackson and Morgan (1978) modified a definition offered by "Child" that "organization structure" is defined as relatively enduring allocation of work roles and administrative mechanisms that creates a pattern of interrelated work activities and allows the organization to conduct, coordinate and control its work activities". This "pattern of interrelated work activities" is the result of the decision-making process regarding the allocation of work roles and administrative mechanisms.

Thus "organization structure" is the behavioural and physical manifestation of the decision-making process in organizations.

Fomburn (1986) advocates a distinct conceptualization to "organization structure". He suggests that "organization structure" is composed of three levels: (i) infra-structure, which defines the underlying map of interdependence that an organization faces and its struggle to engage in and maintain its activities over time.This infra-structure embodies the constraints of technology, competition and market context. (ii) Sociostructure, which encompasses both the administrative structure of exchange relationship. In this respect three dimensions of a work organization's sociostructure are distinguished; the division of labor, the formal control system designed to control social activities, and the emergent pattern of social relations. (iii) Super structure, which distinguishes the ideation side of the organization. Belonging to the super structure, then are the norms, values and the implicit ideologies of the organization members. Formburn believes that this conceptualization might be valuable because it recognizes that structure as a complex onstruct. In such conceptualization to "organization structure", it is evident that the traditional debate on the relationship between the structural and contextual variables turns to be a dialectic between the infrastructure on one hand and the sociostructure and superstructure on the other hand. Also this conceptualization assumes that there is an overlapping area between the contextual and structural variables.

A part from Fomburn conceptualization to "organization structure", there is a consensus among the theorists that "organization structure" is a set of pre-determined relationships among the different subunits. composing the organization. These pre-determined relationships are constructed in a manner to provide the necessary

support to the organization processes. Of course there might be variances between the predetermined set of relationships and the actual relationships among organization subunits.

3-5 The Structural Dimensions of Organizations:

Numerous "structural dimensions" can be identified from the conceptualization to "organization structure" developed by the organization theorists quoted in the previous sub-section. Triandis (1971) mentioned fifty six strucural variables, whereas Jackson and Morgan (1978)identified sixteen structural variables. Therefore, a lot of structural variables have been adopted by different organization theorists in their search of the relationship between the structure and its explanatory variables. However, only few numbers of structural variables have been the common factor between the huge number of studies conducted in this field. This research will consider five structural dimensions; specialization, centralization, configuration, standardization and formalization. These structural dimension have been widely used by organization researchers to contribute to the organization theory .

3-5-1 Specialization:

Fayol (1949) argued that "specialization" belongs to the natural order, it is observable in the animal world, where the more highly developed creatre, the more highly differentiated its organs; it is also observable in human societies where the more important the body corporate, the closer is the relationship between structure and function.

Fayol added that, as society grows, so new organs develop to replace the single one performing all functions in the primitive state. This argument implies that "specialization" is highly related to the developed systems whether biological or mechanical ones.

In biology the term "specialization" refers to the adaptation of the individual to the conditions of his existence, thus increasing his chancefor health and survival. In organization theory the term specialization"refers to the element of work specificity-making activities more specific.Thus, in biology the term "specialization" is used to denote "specialization of people", where in organization theory the term is used to denote "specialization of task"(Thompson 1961). The specialization of people can be viewed as a social process, while task specialization is an organizational process . Specialization in organizations is concerned with the extent to which jobs are divided into smaller ones. As stated by Gibson, Ivancevich and Donnelly (1982) the major decision in developing an organization structure is determining how much division of labour should exist. The objective of specialization in work is simply to produce more and better work with the same effort. Advocates of dividing work in smaller groups of tasks, usually attribute the advantage of " specialization" to the easiness to train replacement for terminated , transferred or absent employees and the high level of proficiency that can be gained by practicing a job of limited task.

Thompson (1961) classified " specialization " into two categories; "Functional specialization" and "roles specialization". Functional Specialization" denotes the extent to which official duties are divided between discrete, identifiable functional areas. "Role specialization" denotes the extent to which the official duties are divided within functional areas between discrete, identifiable positions. "Functional

specialization" considers the number of functions performed by the different occupational roles in the organization.

However, with the advancement of technology "functional pecialization" is expected to overwhelm role and personal specialization, because activities will depend on division of work rather than personal expertise.

The concept of "functional specialization" has been operationalized by identifying the number of functions performed by the organization."Role specializations" has been operationlized by counting the job titles and examining the distribution of job titles among the different categories of employees and also the distribution of employees a mong job titles(El-jaaly 1979) . However, job titles do not always indicate a differentiation in task or activities within an organization. Zey-Farrell (1979) support this argument by citing the example that the job title of the associate and full professor carry indication of a hierarchical rank or prestige, however, in most universities the activities and responsibilities of full and associate professor may be the same.

3-5-2 Centralization:

Pugh and Hickson (1976) define "centralization" as the extent to which the locus of authority to make decisions affecting the organization is confined to the higher levels of the hierarchy " . Organization authority is defined by Koontz and O'Donnell (1976) as " the degree of discretion conferred on people to make it possible for them to use their judgment". They suggested that the degree of "decentralization" in the organization is greater when : (i) the greater the decisions made at the lower levels of management ; (ii) the more important the decision made lower down the

management hierarchy ; (iii) the more functions affected by decisions made at lower levels ; (iv) the less checking required on the decision .

To Dale (1955) the term " decentralization" means the delegation of business decisions by the owners to their immediate representatives and then to others further down the management hierarchy. In defining who is the ultimate decision-makers in any organization , Zey-Ferrell (1979) argued that regardless of who makes the decision, If the decision can be changed at a higher level, the committee or department of origin is only advisory and does not have decision-making power in actuality, he added that the ultimate power rests with the actor who has the last say on a given issue.

However, there is still a difference between the routine checking on decision and the possible intervention by higher levels of management to change or alter the decision made for some reasons later . The basic question is whether or not approval by higher levels of management is needed to execute the decision.

"Decentralization" has to be distinguished from " participation in decision - making" because whether an employee participates formally or informally in the decision-making process or not shows only the style of management rather than considered as an indicator of delegation of authority to the lower echelon .

A question may be raised about the relationship between "centralization" as a dimension and other structural variables, this is regardless of the unidimentionality or multidimenionlity debate about organizations.

For example, Marshall Meyer (1968) who analyzed 254 city country and state departments of finance in US found that hierarchical differentiation was positively associated with decentralization of

decision-making while functional differentiation was found to be positively associated with centralization of decision-making. Meyer's findings were logical since the decision-maker has to be in touch with the location where the decision is made.

Triandis (1971) stated that "when there is high task structure and high member ability, decentralization is very effective". Professional organizations may be the place where decentralization may be effective. Thompson (1961) supports this argument by stating that " The number of occupational specialists is a measure of division of labour, and an increase in the number of occupational specialists leads to decentralization".

"Decentralization" and "autonomy" have been used as synonyms by some researchers, however autonomy refers to the complete independence of the organization to make decisions regarding its operations, while decentralization refers to the distribution of the decision- making authority within the organization.

3-3-4 **Configuration:**

"Configuration" is defined in terms of the broad aspect of the role structure in organizations. It is analogous to a very comprehensive organizational charts (starbuck 1965). "Configuration" includes two organizational variables; the administrative component and the vertical differentiation of organization. The administrative component is considered as an indicator for the width of the organization, while the vertical differentiation is an indicator for the height of the organization.

The two most researched measures of the administrative component are the administrative ratio and the span of control. Usually, the administrative ratio deals with the organization as the unit of

analysis, while the span of control utilizes a sub-unit of the organization a department or a group - as the unit of analysis.

3-5-3-1 The Administrative Component:

The concept of "administrative component" refers to the part of the organization charged with coordinating, facilitating, supporting, and supervising the activities of the organization (Zey- Ferrell 1979). Also the concept has been used as an indicator of two aspects of organizations; the closeness of supervision and the closeness of communication and coordination.

Blau (1974) describing the nature of the "administrative component" states that "organizations generally have an administrative machinery, a specialized administrative staff responsible for maintaining the organization as a going concern and for coordinating the activities of it members. In a large factory, for example, there is not only an industrial labour work force directly engaged in production, but also an administrative component composed of executes, supervisory, clerical, and other staff personnel ".

As can be understood from the previous definitions of the Administrative component; the concept is built around classifying all personnel in "organization" as either direct or indirect. The direct personnel are the line ones who are involved in the production process, while the indirect staff personnel are those who are not directly involved in the production process, but rather perform supporting activities. This conceptualization categorizes many, who are not truly administrators in the administrative component e.g. clerical and some supporting staff.

The concept of "administrative component" is important because it is thought that the smaller the number of human resources allocated to indirect or supportive activities relative to the amount allocated to direct production effort, the more efficient is the organization's conversion process (Jackson and Morgan 1978). Since the attention given to the concept of "administrative component" is justified by the economic rationale of the need for efficient use of resources, the administrative ratio should be measured by the non-work flow personnel relative to the total personnel of the organization. However, Pondy (1969) defines administrative intensity as "the number of mangers, professionals and clerical workers divided by the number of craftsmen, operatives and labourers employed by the organization", the same idea but slightly modified.

The "administrative component" concept is an attempt to classify the organization personnel into direct and indirect personnel rather than operative personnel" and "administrative personnel". The distinction might be easier in production firms rather than in services organizations.

Empirically, Jackson and Morgan (1978) reviewed several studies on the relationship between administrative component and some other structural variables. Their conclusion was that; there is no uniform agreement as to administrative component relationship with the other structural variables. This result is expected since they already found that the concept of "administrative component" has not been uniformly defined and measured by researchers. For example, some researchers excluded managers off the direct component and professional staff, others excluded only clerical groups. These varying operationalization of "administrative component" raise the doubt about the possibility of comparing the results of the different relevant studies. However, the

problem could be overcome by adopting different alternative measures of administrative component with the necessary disclosure.

3-5-3-2 **Span of Control:**

The span of control is a measure of the administrative component, but has been discussed in a separate section because it has a different operationalization. As previously stated the "span of control" utilizes a sub-unit of the organization (a department or a group) as the unit of analysis. Of course this fact does not mean that "span of control" should not be used when tackling organizations at macro-levels.

Ouchi and Dowling (1974) used the term "supervisory ratio" to express the amount of supervisory man power per unit of total manpower at the organization level. At the department level, Ouchi and Dowling used the term span of control as a measure of supervisory manpower. They regard the "Span of Control" as a measure of the limits of hierarchical authority exercised by a single manager.

Koontz (1966) outlined that inspite of Urwick's claim that " no supervisor can supervise directly the work of more than five, or, at the most six subordinates whose work interlock", the "span " may be wider where the work of subordinates is not closely interrelated and managerial coordination is not required, or where the requirements of leadership and morale do not require close and frequent face to face communication between the manger and his subordinates .

Other organization writers advocate a "span of control" ranging from three to seven or eight persons at the higher levels of organization and a span of control" of up to twenty or thirty persons at the lower echelon. However, empirical researches were not able to establish what a

"span" ought to be. The exact number of subordinates a manger can supervise effectively will depend on underlying factors, all of which affect the time requirement of managing. Those underlying factors are: training of subordinates, clarity of authority delegation, clarity of plans, prevailing control methods, and the quality of communication techniques (Koontz 1966). This suggests that high percentage of executives span may be widened by better training, better planning, clear delegation, better control system, using objective standards and in general, application of sound principles of management.

3-5-3-3 Vertical Differentiation:

A hierarchy, as Thompson (1961) states " is a system of roles - the roles of subordination and superordination - arranged in a chain so that role 1 is subordinate to role 2; and 2 is superordinate to 1 but subordinate to 3. The chain so continues until a role is reached that is subordinate to no other role, except perhaps to a group of people such as a board ofdirectors or an electronate. This means that roles, positions and functions are differentiated horizontally as well as vertically. For those concepts to be vertically differentiated they have to be evaluated in terms of some characteristics such as power or prestige (Zeg-Ferrell 1979).

In organizations, hierarchies are the natural consequence of authority delegation. Because the span of control of the top excutive is usually limited he resorts to authority delegation to ease the process of organization, this delegation results in the appearance of a new level of authority. Thus, there is an inverse relationship between vertical differentiation and the span of control. Accordingly, it is expected that, the more vertically differentiated the organization, the more is the need for effective communication and control procedure to control the

organization operation at the lower echelons. Loss of control is a major disadvantage of vertical differentiation. However, Zey-Ferrell (1979) believes that this factor is balanced in some organizations by automation.

"Proliferation of supervisory levels " is considered by Meyer (1968) as an indicator of hierarchy of authority. It is also a measure of function since administrators perform supervisory, coordination and communication functions, while the workers and professional deal with the work flow and clients of the organizations (Zey-Ferrell 1979). Pugh et al (1968) operationalize the concept of vertical differentiation in terms of the number of job positions between the chief executive and the employees working on the output.

3-5-4 **Standardization:**

"Standardization" has been defined by Pugh et al (1968) as "the extent to which activities are subject to standard procedures and rules" The rules and procedures that govern the internal functioning of the organization are either operative or regulative. Operative rules and procedures are adopted to govern the operation technology or the task of the organizations. However, in industrial organizations rules and procedures may be part of the job description or job manual because they are imperative to the production process (Zey-Ferrell 1979). Regulative rules and procedures are adopted to govern the internal functioning of the organization e.g. how evaluation and compensation of workers takes place.

Zey-Ferrell argued that it is very important to distinguish between operative rules and regulative rules in professionals' organizations. Professionals disregard operative standardization for the benefit of their

own professional codes (internalized rules and procedures), however, they favour regulative standardization to reduce the occurrence of arbitrary decisions by middle management and centralization of power in the hand of top executives and administrators.

Pugh et al (1963) noted that standardization "... includes statement of procedures, rules, roles ... and operation of procedures which deal with; (i) decision making (application of capital, employment, and so on) (ii) conveying of decisions and instructions (Plans, minutes, requisitions and so on). (iii) conveying of information including feed back". An organization that is characterized by the existence of those rules and procedures is considered as standardized no matter, whether rules and procedures are written down or not.

For Hall et al (1967) standardization must include: (i) roles (ii) authority (iii) communication (iv) norms and sanctions (v) procedures. For a standardized organization all those aspects must be clearly defined in the minds of the employees.

3-5-5 Formalization:

Pugh et al (1968) defined "formalization" as the extent to which procedures, rules, instructions, and communications are written down". Thus "formalization" is the extent to which "standards" are written down.

"Formalization was defined by Hage (1965) as the proportion of codified jobs and the range of variation that is tolerated within the rules. The less variation allowed, the more formalized the organization. Here, the measure of formalization was defined in terms of overall organizational rules and procedures, but only on those directly related to the employees' job autonomy (Zey-Ferrell 1979).

Gresov and Stephen (1993) defined "Formalization" as the " extent to which standard operating procedures and formal communication channels are used to regulate inter-unit relationship". This definition is confined only to inter-unit activities but neglects intra-unit activities.

Hage's (1965) definition of "formalization" may be considered more comprehensive because he included both the existence and enforcement of rules and procedures when he claimed that "formalization" is measured by the proportion of codified jobs and the range of variation that is tolerated within the rules defining the job.

Nevertheless, that professionals in professional organization require that rules and procedures related to work activities not to be formalized and left to their discretion, yet, they require that rules and procedures related to the internal functioning of the organization be formalized to protect them from arbitrary decisions of administrators (Zey-Ferrell 1979). This statement came in line with the findings of Hage and Aiken (1967) that positive correlation was found between decentralization and low formalization of work related activities in professional organizations.

3.6 Contextual Dimensions of Organizations:

Zey-Ferrell (1979) states that "contextual dimensions denote the internal environment (size and technology) in which structure develops. For him, size and technology are the only contextual dimensions that can explain any variation in organization structure. Other organization theorists believe that the structure of organization is closely related to the context within which it functions, and much of the variation in the organization structure might be explained by external factors. Many such

factors, including size, technology, organization charter, and interdependence with other organizations have been suggested as being of primary importance in influencing the structure and functioning of an organization (Pugh et al 1969).

The impact of the task environment as a contextual dimension on organization structure have been emphasized by Burn and Stalker (1961) and Lawrence and Lorsch (1967). Pugh et al (1969) have overlooked the impact of task environment on organization structure. Nevertheless, they adopted the concept of interdependence with other organizations as synonym with task environment.

3.6.1 Size:

Many organization theorists have perceived size as the most significant factor or variable in organizational analysis. A large number of researches have been conducted to investigate the impact of organization size upon its structure.

Eljaaly (1979) believes that a consensus regarding the conceptual definition of size is lacking. To prove this lack of consensus, he cited a number of examples of vast differences among types of organizations and the conceptual status of size i.e. either as a structural or contextual characteristic of an organization.

At the operationalization level, Jackson and Morgan (1979) believe that there is a remarkable agreement on the operationalization of the concept of size hence little attention was devoted to the definition of size in the various studies exploring the relationship between size and structure. He adds that most researches have operationally defined " size" as a number of full-time or full-time-equivalent members of organization. The other operationalization of "size" as full-time

equivalent members of organization may answer the question posed by some researchers about the operationalization of size when the part-time mployees or volunteers comprise a major part of an organization.

The question about how growth in size takes place have received more attention than the conceptual definition of "size". Katz and Kahn (1997) identified four kinds of growth: (i) intra-unit growth (ii) unit replication (iii) internal differentiation (iv) external amalgamation. To Katz and Kahn growth in size of an organization can take place due to one of the four mentioned types of growth. However, a question may be raised whether or not all these types of growth require re-structuring, of course assuming that size has an impact on structure of organization. It is suggested that "intra-unit growth" and "unit replication" growth may not require restructuring of organization, but the growth that takes place through "internal differentiation" and "external amalgamation" will require restructuring. This suggestion or proposal may not be realistic since growth of size through " unit replication" may require widening the span of control of first-line supervisors, and growth through "intra-unit growth" may require change in the administrative component of the organization.

Kimberly (1976) suggests four important aspects of organizational size, which have been derived from the various operational definitions that have appeared in the literature, these four aspects are (i) the physical capacity of an organization (ii) the personnel available to an organization (iii) organizational inputs or outputs (iv) the discretionary resources available to an organization.

3.6.1.1 The Physical Capacity of an Organization:

Kimberly (1976) argued that " this aspect of size takes into account the fact that at any particular point in time there are constrains imposed on most, if not all, organizations by their physical size". He suggested three common measures of this physical capacity aspect of organizational size, these are: (i) the number of beds in studies of hospital (ii) the number of cells in jail and (iii) the square footage available for different kinds of organizational activity.

Kimberly goes on to indicate that "although it is recognized that these measures may be strongly influenced by such variables as technology, they are conceptually independent and represent an important and distinct aspect of size". Eljaaly (1979) criticized Kimberly's proposed measures that they are confined to specific types of organizations, in addition, to the fact that these measures may not be suitable for third world countries where people used to share beds in hospitals or even bring their own beds to hospitals.

3.6.1.2 The Personnel Available to an Organization:

Kimberly (1976) argues that the number of personnel is a relevant measure of the size of organizations in the sense that it is applicable to all organizations. When compared to physical capacity, as a measure of size, Kimberly claimed that the "personnel available to an organization" is not the same thing as the physical capacity of the organization in which the work is carried out, and that while the two may be frequently related empirically, they are conceptually distinct.

Eljaaly (1979) argued that " the personnel available to organizations " has been the most commonly used measure of size, probably, due to the easy access to data relevant to its operationalization.

3-6-1-3 Organizational Inputs / Outputs:

Concerning the organizational inputs/outputs, Kimberly (1976) states that "it is important in so far as it reflects the amount of activity to which the core technology of the organization is exposed in a given period of time". He also perceived the volume of organizational inputs as "the volume of work faced by the organization in a given period of time". On the other hand, he perceived organizational output in terms of the level organizational achievement in a given period of time. As examples for organizational inputs Kimberly cited: number of clients seeking or accepted for services per unit time, number of students (educational organizations), and number of persons incarcerated (prisons). He used sales volume as a measure of organizational output.

Those different interpretations for organizational inputs/outputs are not expected to be suitable for all types of organizations, so it is not recommended that those measures be adopted in cross-sectional studies, where several organizations are usually involved.

3.6.1.4 Discretionary Resources Available to an Organization:

Kimberly (1976) claims that this aspect of size considers "the magnitude of the discretionary resources that are available at a given time. These resources have been measured both in terms of organizational wealth and net assets".

Eljaaly (1979) questioned the validity of using wealth as a measure of size. He also noticed that the use of net assets by Kimberly as a measure of size restrictsd his argument to business organizations.

Relatively high correlation is reported in a number of studies between the number of employees and various indictors of inputs or outputs on one hand and between the number of employees and "discretionary resources" as size indicators on the other hand.

Number of employees has been correlated with number of student (r^2 = 0.94, Hawley et al : 1965), pay roll (r^2.98, Eljally :1979), sales turnover (r^2= 0.76 Bates : 1965). Also number of employees has been correlated with net assets (r^2= 0.58, Bates: 1965), Pugh etal: 1969), total assets (r^2= 0.66 Bates : 1965) and net cash flow (r^2= 0.87,. Newbould and Wilson: 1977).

Although various operational definitions of size have been reported in the literature, most researchers have operationally defined "size" as the number of full time or full-time equivalent members of organizations. Operational definitions, other than that of employees, have raised various complications. For example, the organizational inputs /outputs as size indicator and discretionary resources available; normally net asset may be incompatible measures of organizational size, because the "efficiency in resource utilization" intervenes between the two aspects of measurement. Even the "number of employees" and "total or net assets" as size measures may be incompatible measures if organizations under question employ different ranges of capital-intensive or automated technologies.

3.6.2 Technology:

Perrow (1967) stated that " technology means the actions that an individual performs upon an object, with or without the aid of tools or material devices, in order to make some change in that object. The object or " raw material", may be a living being, human or otherwise, a symbol or an inanimate object". Perrow explained that "people" are raw materials in people - processing organizations; symbols are materials in banks and some research organizations; the "interaction of people" are raw materials to be manipulated by administrators in organization; boards of directors, committees and councils are usually involved with the changing or processing of symbols and human interactions, and so on.

Thompson (1967) defined "technology" as "those sets of man-machine activities which together produce a designed good or service". Similar to Thompson, Harvey (1968) defined "technology" as the mechanisms or processes by which an organization turns out its products or services." Pugh and Hickson (1976) defined "technology" as "the equipping and sequencing of activities in the work flow". By the "work flow", they meant the way of producing and distributing the output".

A more comprehensive definition of "technology" was introduced by Kast and Rosenzweig (1979) who stated that "technology" is the organization and application of knowledge for the achievement of practical purposes used in solving problems and obtaining desired outcomes". Kast and Rosenzweig have made a distinction between "hardware technology" and "software technology". Nevertheless researchers on organization technology emphasize "hardware technology" that is used in the transformation of inputs into outputs. Nevertheless the emphasis, here, is on the hardware aspect of technology,

yet non-mechanical technical systems are also considered (software aspect).

Goodman et al (1990) defines "technology" as "Knowledge of cause-effect relationships embedded in machines and methods". "knowledge of cause-effect relationship" involves "hardware" and "software" aspects of technology.

The introduction of the new information-processing technology in organizations (i.e. computerization) can be used to provide selective access to information. It can be used to provide those at the periphery or local levels of the organization with more comprehensive, immediate data relevant to their work, facilitating self-control rather than centralized control (Morgan 1988). Thus, designers of management information system can manipulate the distribution of power in organizations and consequently influence structure.

"Organization technology" is believed to influence "structure" because the technical nature and magnitude of operations being carried out by an organization will determine to a high degree the structure and departmentation designed for the operations. Perrow (1967) stated that the interest in "technology" as an independent variable stems from the recognition that the work processing of an organization provides foundation upon which social structure is built. He added that, because of this, "technology" should influence the nature of structure. Some of the pioneer researchers in the field of organization technology have developed different classifications, for the concept of "technology". Those classifications are based on different perspectives adopted by researchers. All the latter researches have utilized (or utilized with some modifications) the classifications of those pioneer researches in studying

organization technology. The review of literature reveal five major classifications of technology.

3.6.2.1 Woodward's Classification:

Woodwards (1965) classified technology according to the technical complexity. She stresses three major classes of technology in ascending order of complexity: (i) unit or small batch technologies in which the product is assembled one unit at a time or in very small lots according to customer classification (ii) large batch and mass production technologies which involve the production of higher volume of products than in the case of unit production. Here, the same product is produced for a large number of users.(iii) continuous process production systems in which highly standardized output is produced through a continuously linked set of transformations. According to Woodward's classification this is the most complex type of technology.

Based on her study of 100 firms in the South Essex region of England, Woodward claimed that each type of technology or production systems entails similar structural profiles i.e. firms with the same technology (production system) exhibit similar structures.

3.6.2.2 Classification of Technology According to the Scale of Specificity:

Contrary to Woodward (1965), Harvey (1968) reviewed her sequence of classification as a move towards technical simplicity rather than complexity.

He assumed that the frequent emergence of problems calling for innovation characterizes unit rather than process production. Thus,

Harvey grouped his cases along a continuum from technical diffusion to technical specificity as follow:

(i) a technically diffused firm implies a firm in which a number of technical processes yield a wide range of products. The more technically diffused the firm, the greater the degree of "made to orderness" in its products. This corresponds most closely to Woodward's distinction of unit production.

(ii) a technically specified firm, is a firm, where, the move towards the other edge of the continuum refers to as an increasing technical specificity, and closely related to Woodward's distinction of "process production".

(iii) a technically intermediate firm, is the one that falls in the mid-range of Harrey's continuum. This category is closely parallel to Woodward's distinction of "mass production".

3.6.2.3 The Aston's Classification of Technology

Hickson, Pugh, Diana and pheysey (1969) (hereafter referred to as the Aston Group), who carried out a research on stratified sample of diverse firms in the English Midland have proposed three classes of technology; operation technology, material technology and knowledge technology. These three types of technology can be explained as follows:

(i) "operation technology" has been defined as the equipping and sequencing of activities in the work flow. The work flow means the way of producing and distributing the output. Operation technology itself depends on a number of sub-concepts. Firstly; the equipping is defined in terms of the degree of automatcity of the

equipment i.e. the extent to which the device is capable of self-acting. Secondly; the sequence of operations is defined in terms of workflow rigidity i.e. the extent to which operations are linked in a series and raw material can be used for other products. Thirdly; the specificity of evaluation of operations i.e. whether exact standards or merely personal opinions are used in the evaluation of process of activities. Fourthly; the continuity of the unit throughput (work in process) in terms of job production, mass production and process production.

(ii) " material technology" is the characteristic of the raw material itself, which is characterized by Perrow (1967) by its perceived uniformity and stability.

(iii) "Knowledge technology" is the characteristic of the knowledge used in the work flow. This concept is also developed by Perrow, and this will be elaborated in the next sub-section.

3.6.2.4 Classification of Technology According To the Routineness Technology of Work:

Perrow (1967) was concerned with two aspects of technology that seem to be directly relevant to "organization structure ", these aspects are:

(i) the exceptional cases encountered in the work, that is the degree to which stimuli are perceived as familiar or non-familiar.

(ii) the nature of the search process that is undertaken by the individual when exceptions occur. In this connection, two types of search process can be distinguished; the first type is a search which can be conducted on a logical analytical basis i.e. the problem is

analyzable. The second type of search process occurs when a problem is so vague and poorly conceptualized as to make it virtually non-analyzable. In this respect no formal search is undertaken, but instead one draws up on the residue of analyzable experience or institution, or relies upon chance and guess work (e.g. nuclear fuels , psychiatric case work). Here a scale from analyzable to non-analyzable problems can be conceived.

Perrow (1967) suggested that the characteristic of the raw material is likely to determine what kind of technology will be used. He added that, to understand the nature of the material means to be able to control it better in transformations.

3.6.2.5 Classification of Technology According to The Scale of Independence:

Thompson (1967) argued that it is necessary to design complex organizations to operate technologies which can not be operated by singular efforts. He developed a model that limits a few widely used technologies which are in common use. He goes on to idetifying three such technologies as; long-linked, mediating and intensive.

(i) "Long-linked technologies" are characterized by a serial form of interdependence between sub-units. In this case, the work is thought to flow sequentially from one unit to the next one. Any interruption in the sequence of work or any type of non-standard behaviour will be disruptive, and perhaps the subunits must perform additional work to compensate for the problem. "Long-linked technology" corresponds to mas production assembly lines and most continuous process technologies.

(ii) "mediating technologies" are perceived by Thompson as provide a linking function between relatively autonomous users. In this case interdependence is thought of as being of pooled nature, and resources are pooled in a way beneficial to all users e.g. commercial banks, insurance companies ...etc.

(iii) "intensive technologies" are designed to apply to the subject a combination of knowledge, skills and techniques that are uniquely appropriate for the problem at hand. The subject of the "intensive technology" is mostly a challenging problem. Thompson cited examples of "intensive technology" such as the research and development of a new aircraft or treating a patient in an emergency room in a hospital .

To sum up, all the technological classification reviewed in this sub-section are not conceptually distinct. In fact a lot of overlap can be observed. For example, the Aston classification of technology as "operation technology" overlaps with Woodward's classification. Also, Perrow's classification interferes with the Aston's classification of "material technology" and "knowledge technology". However, these different classifications of technology can be viewed as different ways of viewing and understanding the concept of technology.

3.6.3 Task Environment:

The "task environment" of "organization" has been considered by many researchers as the major determinant of organizational structure (Burn and Stalker 1961 , lawrence and Lorsh 1967 and Pennings 1975) .

Glueck (1980) states that "the environment includes factors outside the firm which can lead too opportunities or threats to the firm.T

there are many factors at work in the environment, the most important ones are economic, governmental and legal, market and competition, supplier and technological, geographic and social. Glueck has defined the environment in terms of the general environmental factors that might influence the activities of any organization, however, some researchers emphasized discussing the "task environment" of the organization assuming that every organization is influenced by specific group of environmental factors (task environment) rather than all the environmental factors. For example, Dill (1958) defined "task environment" in terms of those parts of the environment which are "relevant or potentially relevant to goal setting and goal attainment". Thus he excluded all the other environmental factors which are not relevant or potentially relevant to goal setting or goal attainment from "task environment". Dill found the task environment of two Norwegian firms to be composed of four major sectors :

(i) customers (both distributors and users) .

(ii) suppliers of materials, labour, capital equipment and work space.

(iii) competitors for both markets and resources, and;

(iv) regulatory groups, including governmental agencies, unions and information associations .

The "technological environment " which refers to the knowledge about technical processes and machine design existing outside the organization itself, have been considered by Katz and Kahn (1979) as an important aspect of "task environment". Jackson and Morgan (1978) also considered the number of production lines of a firm and labour stability as important aspects of "task environment" of an organization.

The " task environment" of an organization has been characterized by March and Simon (1958) as hostile or benign. Dill (1958) characterized "task environment" as homogeneous or heterogeneous, stable or rapidly shifting, and unified or segmented. Other researchers have characterized "task environment" as certain or uncertain, complex or simple. Thompson (1967) hold the opinion that "all organizations face task environments which are located simultaneously somewhere on the homogenous-heterogeneous continuum and stable-shifting continuum". Still a certain -uncertain continuum can be added to Thompson' proposal. By uncertainty is meant the difference between information required to do or perform a task and the information already possessed, however, uncertainty increases with heterogeneity i.e. the greater the diversity of inputs and out puts of an organization the greater the information needed for better performance .

Morgan (1988) argues that " changes in the environment are viewed as presenting challenges to which the organization must respond'. He believes that whether adaptation, as viewed by contingency theorists, or selection as viewed by population ecologists, are the primary factors influencing organization survival it remains that the major problems facing modern organizations stem from changes in the environment .

Katz and Khan (1979) believe that the response of the organizations to the threats from the external environment may take place through:

(i) changing the internal structure of the organization e.g. establish research and development department or an industrial relation department in the case there is high unionization among the working employees.

(ii) developing some activities to control the external forces, hence it creates powerful dynamics for organizational growth e.g. increasing the level of expenditure on promotion may be an indicator of turbulent and uncertain environment.

(iii) interacting with the political sector to assure legitimacy for themselves and to protect themselves against unfavorable legislation or to gain economic advantage e.g. in Sudan organization may interact with the political sector by appointing members from the governing group in their board of directors or advisory committees.

Katz and Khan (1979) proposal of the three strategies for responding to threats from the external environment implies that organizations have open options to respond to environmental dynamics, thus organizations operating in the same turbulent environment may respond in different manners, hence, they may not necessarily show similar organizational structures.

3.6.4 Ownership and Control:

As far as ownership and control are concerned, the research is interested in the impact of the various modes of ownership and control upon organizations' structure. Here three modes are identified; public ownership, private ownership where management is separated from ownership and private ownership where the owners are the mangers. Here, the public enterprise represents the public mode of ownership and control. The public enterprise as defined by Fernandes and Sichel (1981) has the following characteristics:

(i) owned by public authority including the central, regional or local authorities to the extent of 50% or more from the total shares,

(ii) it operates under the control of the owning party, this control includes the right to appoint the top management and the decisions regarding the top policies of the enterprise,

(iii) it is established to achieve public goals that have multiple dimensions,

(iv) it is subject to public accountability, and

(v) It has commercial nature of activities which are contemplated to achieve a pre-determined rate of return on the investment.

In case of private enterprises where management is separated from ownership, the capital ownership may be dispersed in the hands of few shareholders or numerous ones, nevertheless the control of the business ultimately rests on few hands. Mills (1956) argued that "the dispersion of capital ownership makes possible the concentration of economic power in fewer hands, because of the inability of the mass shareholders to act resulting in a concentration of authority". Thus the validity of the legal distinction between public companies and private ones is questionable with regard to purpose of the research. This conclusion was supported by Hamza (1997) who indicated that "the narrow structure of companies ownership as manifested in the high concentration, narrow distribution and low diversification of shareholders, makes these public companies very similar to "individual firms" ... though legally they are public companies".

The private enterprises where the owners are the managers have been considered as a separate and important mode of ownership because they usually attach negative preference to administrative staff, thus

sacrificing some profitability in return for avoiding dilution of control (Pugh et al 1969).

Hamza (1997) states that "number of writers observed that most enterprises in developing countries are either family-owned or state-owned. However, he believes that in Sudan the ownership may ascribe to factors other than state or family base; such as religious, ethnic...etc. Due to the fact that ownership can not be ascribed to factors others than the dispersion of capital among the owning group, any religious or ethnic agenda might be tackled in the frame of the organization charter.

3.6.5 Charter:

Pugh et al (1969) quote Parsons (1965) and Selznick (1949) as defining the charter of an organization in terms of its social functions, goals, ideology, and value systems, in influencing structure and functions. The charter of an organization deals with general purpose rather than its specific objectives. To make the charter comparable to other contextual factors, the Aston Group (1969) developed seven ordered category scales. These scales include; multiplicity of output, type of out put, whether output is consumer or producer product, customer orientation of outputs, self-image of the organization, policy on multiple output and client selection. These scales were designed to measure two aspects; the operating variability and operating diversity of the organization. The operating variability is concerned with the standardization of output of the enterprise, where the operating diversity is concerned with multiplicity of output, policy on whether to expand the kinds of outputs, client selection and self-image.

As mentioned earlier, in case the organization is adopting religious or ethnic orientations this can be tacked with the self-image scale. It is assumed that these different scales of measuring organization charter influence organization structural variables on individual bases rather than collective bases, i.e. each individual scale may influence a specific structural variable.

3.6.6 Location:

It is believed that, the geographical, cultural and community setting can influence the organization markedly (Blau and Scott, 1962). Most of the researches conducted on the relationship between contextual variables and structural dimensions tend to control for these effects in a gross way.Always all the organizations located in the samples of the researches were located in the same large industrial conurbation, and the community and its influence on the organizations located there were taken as given (Aston Group 1969).

Mostly, the overwhelming majority of the manufacturing enterprises are located in urban settings, specially in the developing countries, therefore, any attempt to study the impact of location -based on this classification- upon organization structure may be meaningless.

The Aston Group (1969) suggested one aspect of location, which can discriminate between organizations in any sample of study. This aspect is the number of operating sites. The expansion of the production process or any of the functional activities of an organization may entail restructuring of the organization structure. The number of operating sites is expected to correlate with some specific structural variables rather than a number of structural variables.

3.6.7 Origin, History and Dependence:

Origin, history and dependence are contextual variables, which are believed to influence organization structure. An organization may be established as a one-man business and develops over time, or it may be established as a branch of an already existing organization. Organizations that are personally founded and expanded from within are expected to be relatively centralized (Koontz and O'Donnel 1976). Pugh et al (1969) operationlized three aspects of the concept of origin and history; (i) impersonality of origin which distinguishes between entrepreneurial organizations, personally founded, and bureaucratic ones founded by an existing organization, (ii) age of the organization and (iii) the historical changes that occurred to the organization, in its location, product or service range or in the pattern of ownership.

Kreacie and Marsh (1985) indicate that public enterprises are much dependent on their origin, if they came into existence during colonial times, the organization structure of the enterprise may still resemble the original organization structure. Also, if the organization structure is inherited from private owners -through nationalization for example, the already existing structure is adjusted to the legally prescribed public enterprise organizational structure in the particular environment.

Weinshall (1977) defines dependence as the degree to which an organization is tied to others in its environment. To the Aston Group (1969), the dependence of organization reflects its relationships with other organizations in its social environment, such as suppliers, customers, competitors, labour unions, management organizations and political and social organizations. So they classified dependence as

dependence on parent organizations and dependence on other organizations. For the purpose of this research dependence on other organizations is considered as part of the task environment of the organization.

3.7 Conclusions:

This chapter attempted to define the concept of "organization" and the different organization models developed by organizations theorists. Some selected structural dimensions of "organizations" have been reviewed. These dimensions have been chosen because they are widely used by organization researchers. These structural variables are; pecialization, centralization, configuration, standardization and formalization.

A critical review of the contextual dimensions of "organization" has been attempted. The review included both the concepts and their operationalization. In this respect, size, technology, task environment, ownership and control, charter, location, history, origin and dependence were reviewed.

The review of the literature on the contextual dimensions revealed that their operationalization poses some complications to researchers. For example, the various operational definitions of size may be incompatible while the operationalization of technology has shown some overlapping and interference between the different classifications of technology.

Chapter Four

Organization Structure and Context: A critical Review of Some Selected Methodological-Empirical Evidences.

4-1 Introduction:

This Chapter is an attempt to review critically some selected studies conducted on the relationship between organization structure and the contextual factors that are supposed to determine structure. No claim is made that these selected studies represent all the important studies conducted in this area, however, they cover most of the pioneering studies, on one hand, and present these studies with clear evidences concerning this relationship on the other hand.

4-2 Size-Structure Relationship: Empirical Evidence:

Size, as one of the contextual variables, is claimed to be the most important determinant of organizational structure. This statement was drawn from the results of works of a number of organization theorists. The following studies provide some of these evidences:

4-2-1 The Aston's Group Study:

Hickson et al (1969) conducted a study with the objective of testing the broad hypothesis that "technology" and "structure" are strongly related, utilizing data from 46 diverse organizations in

Birmingham, England. The size of the sample of the organizations surveyed ranged between 241 employees in an insurance company to a vehicle manufacturing concern with 25,052 employees.

The Aston's classification of "technology" and the measures they developed for the operations technology were discussed in section (3.6.2.3). Hickson et al adopted a number of structural dimensions for testing the "technological imperative" hypothesis. These dimensions are: (i) the structuring of activities which, refers to the degree of formal regulation of the intended activities of the employees, (ii) concentration of authority, which is the degree to which authority for decisions rest in controlling units outside the organization and is centralized at the higher hierarchical levels, and (iii) line of control of workflow which, refers to control of operations on the throughput being exercised directly by line managers against impersonal control through records and procedures by staff departments.

The relationship of operations technology to structure has been tested by using correlation techniques between workflow integration, size and the selected structural variables. Measures have been developed for the structural dimensions.

The study revealed that there is a moderate correlation between "technology" and "structure" i.e. there is a relationship between workflow integration and the selected structural dimensions. However, this relationship is overwhelmed by the correlation with size.

The researchers found that operations technology as defined here has accounted for but small proportion of the total variance in structural features. So in this sample, the broad "technological imperative" hypothesis that operations technology is of primary importance to structure is not supported, although some configuration variables

(subordinate-supervisor ratio) were found to have correlation with workflow integration, and with size and other contextual variables. All these are simple job-count variables (by job-count variable is meant the proportion of personnel in the employment side of personnel work, and in buying, stock control, and stock keeping).

When the researchers confined their sample to 31 manufacturing organizations using Woodward's classification of "technology" they arrived at the same findings of their first test.

The Aston group findings rejected Woodward's hypothesis that technology is a prime determinant of structure, however, they believed that technology influences structure in organizations in which the work flow operations represent the bulk of the organization activities.

4-2-2 Inkson and Others' Study:

Inkson et al (1970) conducted a study to test the reliability and validity of short forms for the measurement of four previously established dimensions of organizations employed by the Aston study (1969). These dimensions include two contextual dimensions; technology and dependence, and two structural variables; structuring of activities and concentration of authority based on information obtained from the chief executives. A replication study was carried out using abbreviated measures on a sample of 40 organizations in the English Midlands. The aim of that study was to develop a short form of the schedule of organizational information to represent accurately the major dimensions of context and structure established.

The findings of Inkson and his associates support the relationships previously found between context and structure in the Aston group's

research. The researchers, here, employed the same methodology used by the Aston Group, with some modifications. Structuring of activities was found to be primarily related to organization size and to lesser extent to technology; concentration of authority was found to be related to dependence.

4-2-3 Blau and Schoenherr's Study:

Blau et al associates (1971) at the University of Chicago tried to understand why organizations developed a number of structural characteristics and how these attributes are related to one another. Blau and Schoenherr included in their study all the employment security agencies in the United States. They interviewed agency directors, the heads of two major divisions and personnel directors. They also used questionnaires and records to obtain information. The information was mostly factual data, and from it they were able to construct measures of a number of structural variables. In total they measured eighty-five variables.

The researchers found that a large a number of the organizational dimensions measured was related to organizational size. They concluded that size is the most important condition affecting the structure of organizations. They believe that the effect of size is overwhelming, affecting such major variables as decentralization. This study revealed the importance of size as the central, if not the only, variable in understanding structure.

4-2-4 Child and Mansfield's Study:

Child and Mansfield (1972) studied the relationship between "technology", "size" and "structure" adopting the Aston's classification of "technology" in addition to Woodward's conceptualization of "technology". The two researchers found that the work flow integration is weakly associated with specialization and standardization, especially when the effect of size was controlled. The relationship between size and these structural variables was found to be stronger. The relationship between "technology" and "structure" was found to be even weaker in the industrial firms, whereas it was found to be stronger between size and structure.

When the researchers used Woodward's classification of "technology", they arrived at the same findings of the Aston group. Nevertheless, the pattern of relationship between "technology" and the structural variables was found to be different. Child and Mansfield concluded that all the results support the hypothesis that "size" is a prime determinant of "structure" compared to " technology".

Child (1973) attempted to examine size as predictor of organization structure with data from a British sample of business organizations supplemented by findings from British labour unions, engineering firms, and the Aston sample of varied work organizations. He adopted the Aston's methodology for investigating the relationship between context and structure. He found that the broad lines of formal organization structure are predictable with high degree of confidence from knowledge of organization size, but he suggested that other contextual variables must be taken into account. Child distinguished

complexity from other aspects of structure and he found that complexity has a more direct relationship with formalization than does size. He added that size, however, remains the major predictor of decentralization.

4-2-5 Khandwalla's Study:

Khandwalla (1974) tried to investigate the relationship between mass-output oriented "technology" and the organizational variables; vertical integration, decentralization and the use of sophisticated control methods. The concept of mass-output oriented technology is derived from Woodward's (1965) scale of technological complexity.

Using product moment correlation, between the above-mentioned variables in addition to "size" of the firm, the results were consistent with those of the Aston group and child and Mansfield replication of the Aston study (1972), firm "size" was fairly strongly related to dimensions of "organization structure". Khandwalla stated that the correlation of firm "size" with vertical integration, decentralization and control were all found positive and significant at one percent level. After controlling for size, the study did not reveal any significant relationship between "technology" and dimensions of "organization structure".

4-2-6 Blau and Others' Study:

Blau, et al (1976) tried to examine the relationship between plant technology and four dimensions of internal structure by using data from 110 manufacturing concerns in New jersey, United States of America. The four dimensions are differentiation, the size of various personnel

components, supervisory spans of control and decentralization of decision- making authority.

The two main independent variables employed by the researchers were production technology (measured by the degree of mechanization of equipment) and automation of functions through computers. Measures have been developed for the four structural variables, similar to those used by the other studies surveyed in this research.

Blau and his associates analyzed the data by using some selected measures of association between the measure of "technology", "size" and measures of "organization structure". The analysis verified the general findings of the Aston group and rejected the "technological imperative" hypothesis claimed by Woodward (1965).

4-2-7 El - jaaly's Study:

El-jaaly (1979) attempted to explore the relationship between five of the most widely discussed organizational variables on a cross-cultural basis. These variables are: size of organizations, structural differentiation, the administrative component, attitudes of employees, and behaviour of employees. The empirical findings on the relationship between these variables in the European and North American milieu were tested in an African context; the Sudan Railways corporation (SRC) was the organization ivestigated by the study.

The number of employees and the total wages and salaries have been used as measures of size of different directorates of the SRC. A questionnaire was designed to provide data for measuring the other organizational variables.

Concerning the relationship between size and the structural variables, the research found that: (i) among the indicators of the directorates general division of labour, size is significantly correlated with the number of sub-sections ($r = 0.809$, $P < 0.05$). As far as the indicators of the specific division of labour are concerned, size is positively and significantly correlated with the number of job titles ($r = 0.93$, $P < 0.01$). The researcher has also found that the size of the directorates is correlated more significantly with the administrative function.

However, no generalization can be made concerning the results of this research, because SRC was a service rendering organization besides the fact that the study is not cross-sectional one.

4-3 Technology-Structure Relationship: Empirical Evidences:

Technology, as one of the most important contextual variables, has received wide attention from organizations theorists. Many studies have been conducted on technology-structure relationship. Some of these studies advocate the "technological imperative rationale" i.e. technology is a prime determinant of structure.

This sub-section will attempt to review some of the studies advocating the technological imperative.

4-3-1 Woodward's Study:

Woodward (1965) and her associates have conducted a wide study that covered the operations of 100 manufacturing firms gathered in the South Essex region of England. The size of the firms studied ranged from

11 to approximately 40,000 employees. The firms have been classified according to their performance as "below average", "average" and "above average". Also the firms have been classified according to a scale of technical complexity (see section 3.6.2.1) that reflects the production system of each firm. Woodward reached a number of findings regarding the relationship between the technical systems and some organizational aspects. The followings are some of her findings:

(i) "specialization" as a structural variable has received the attention of Woodward. She concluded that, the accepted opinion that "specialization" inside the management field is a direct result of growth was not confirmed by the research findings. She found that a line-staff type of organization was found in eighteen firms employing less than 250 people. "Specialization" between the functions of management was found more frequently in large batch and mass production than in unit or process production. Few specialists were used in unit production firms; managers responsible for production are expected to have technical skills, more often based on length of experience on "know-how" than on scientific knowledge. In process production firms; line-staff patterns were not working in practice, and firms tend to do without specialists and incorporate scientific and technical knowledge in the direct executive hierarchy.

(ii) regarding delegation of authority: the researchers found that there was a tendency for organic system to predominate in the production systems at the extreme of the technical scale, while mechanistic systems predominate in the middle ranges. They also noticed that clear-cut definition of duties

and responsibilities was characteristic of firms in the middle ranges, while flexible organizations with a high degree of delegation both of authority and responsibility for decision-making was characteristic of firms at the extreme. These were less "organization conscious" at the extremes; it was the firms in the middle ranges, which found it easier to produce organization charts. It was also found that unit and process production firms tend to employ larger number of skilled workers than their mass production counterparts.

(iii) Woodward's "span of Control" data are arranged into categories ; "span of Control" for executives and "span of control" for supervisors. Woodward found that the median "span of control" for executives increases from four for unit technology, to seven for mass technology, and to ten for continuos process technology. This suggests that the "organization structure" becomes flatter with the more advanced forms of technology. Concerning the "span of control" of supervisors, it represents one point of similarity between the extremes in the scale. If the median "span of control" for supervisors is plotted across all three levels of technology, it would be interesting to note that in firms which were viewed as high performers by Woodward tended to cluster at the median "span of control" for all firms. Woodward concluded that the smaller span for unit and process industries indicates that the work force has been divided into smaller primary work groups. She contends that this arrangement permits supervisors (in unit and process

firms) to achieve better personal relationships and use less formality, which tends to improve industrial relations.

4-3-2 Harvey's Study:

Harvey (1968) conducted a study on 43 industrial organizations to point out the relationship between organization's technology and aspects of its internal structures including : the number of specialized sub-units, the number of levels of authority, the ratio of mangers and supervisors to total personnel, and the degree of program specification within the organization. Harvey has adopted the classification of technology shown in section (3.6.2.2).

Measures have been developed to both "technology" and the structural variables. In case of "technology" the continuum from "technical diffuseness" to "technical specificity" has been measured by obtaining information about; (i) the number of product changes during the last ten years (ii) the average of the number of different kinds of products offered during the last ten years. It was found that the sample ranged from one product change in ten years to 145 product changes in ten years. Corresponding ranges of product changes have been given to three classes of technology in the scale of "technical specificity". Concerning the aspects of internal structure, subunit specialization was measured by examining the basic specialization established within the organization, such as production, research and development, and accounting. Measuring the other variables is straightforward except for program specialization in organization, which will not be emphasized in this review.

The hypothesis that Harvey has tested is that, as "technical specificity" increases, the following organizational characteristics also increase: the number of specialized sub-units, the number of levels of authority, the ratio of managers to total personnel, and the amount of program specification. The analysis of all these organizational characteristics shows tendency to increase with "technical specificity".

Harvey attempted to discover if the effects on "organizational structure" could be attributed to variables other than "technology", such as size, location...etc. He arrived to the same findings of Woodward that there was no apparent relationship between size and "organizational structure" or organization technology and size.

4-3-2 Hage and Aiken's Study:

Hage and Aiken (1969) carried out a research investigating the relationship between organizational technology (specially the degree of routineness of work) and the structure and goals of health and welfare organizations. The researchers have mentioned the difficulty to find a measurable dimension for describing the workflow in the organizations. The two researchers Woodward's classification of "technology" as clearly not applicable to people-processing organization.

The researchers referred to Perrow (1967) who classified "technology" according to the routineness of work. However, they admitted that the routineness of work does not cover all the aspects of the concept of "technology", but nevertheless, this dimension of "technology" can be applied to people-processing, industrial and other kind of organizations.

In their investigation, Hage and Aiken collected data from sixteen health and welfare organizations that vary in size. Each organization is divided into levels and departments, and then job occupants were randomly selected within these categories. Measures for "organization structure" and "routiness"were developed by computing means for social position (levels and departments) and by asking several questions about the routineness of work respectively.

The findings of the research can be stated as follows:

(i) organizations with routine work are more likely to be characterized by centralization of organizational power,

(ii) organizations with routine work are more likely to have greater formalization of organizational role,

(iii) there is no relationship between the degree of routiness of work and organizational stratification (social distance between levels of hierarchy or chain of command), and

(vi) organizations with routine work are likely to have staff with less professional training .

The researchers concluded that no relationship was found between size of organization and the routineness of work process. This finding indicates that relationship between the rountineness of work and other structural properties are evidently not a function of size of the organization. Routineness of "technology" should be treated as an input that can affect the social structure of an organization independently of organization size.

4-3-4 Zwerman's Study:

Zwerman (1970) replicated Woodward's study on 55 firms. He adopted Woodward's classification of technology. His findings were similar to Woodwards' with some exceptions. In contradiction to Woodward's findings Zwerman found that "span of control" of executives is influenced by size (number of employees). The authority levels were also associated with size. In addition to this, Zwerman did not find any association between "technology" and first-line supervisors as found by Woodward.

Zwerman indicated that in firms where management was separated from ownership, there were more authority levels, wider span of control at higher management levels, and lower cost of labour.One of the Zwerman's findings was that "technology" is associated with the ratio of non-administrative supervisors to administrative supervisors.

4-3-5 Comstock and Scott's Study:

Comstock and Scott (1977) attempted to test the argument that " technology" should be thought of as representing the work of each level of organization, as well as, different subunits in an organization. The researchers used the following concepts to represent "technology". However, these concepts are not far from what have been introduced by Perrow (1967):

(i) Technological predictability which is the degree to which raw materials and transformation process are well understood so that they present few unexpected contingencies for qualified performers.

(ii) Task predictability, which referred to the extent to which the raw materials and task activities associated with performance of a particular job were well understood and non-problematic for individual in that position.

(iii) Workflow predictability refers to the extent to which raw materials and transformation process associated with the combination of tasks carried-out by an organizational subunits are well understood and non-problematic for the individual in that unit.

The researchers have tested the effects of individual task and subunit workflow technologies on staff characteristic, and subunit structure in 142 patient care-wards in a stratified random sample of sixteen hospitals. The data rather clearly support the conclusion that, as one moves from task to workflow, the effects of technological predictability shift from individual job qualification and specialization to systems of subunit coordination and control. The effects of "technology" were compared to those of subunit size and it was concluded that while size continued to have independent effects, it was a less powerful predictor of subunits structure than "technology".

This conclusion suggests that "technology" should be the most powerful predictor of structural characteristics at the lower levels of staff and subunit structure. In this study, the technological imperative is supported at the individual and subunits levels in organizations.

4-4 Task Environment-Structure Relationship: Empirical Findings:

The relationship between the task environment of organization and their internal structure has been a subject of concern to many organization theorists. However, unlike size and technology, task environment has not been claimed as a prime determinant of structure. Nevertheless, the researchers on task environment-structure relationship have emphasized the importance of considering environment when planning organizations. This section is an attempt to review some of the most important and pioneering studies made on the relationship between task environment and organization structure.

4-4-1 Burns and Stalker's Study:

Burns and Stalker (1961) have carried out a study on organization-environment relationship. The sample of the study was twenty British electronic firms. The "rate of change" in technology and market has been the concern of the researchers as a dimension of the environment. The researchers have suggested two types of organizations: mechanistic and organic organizations. This categorization was a function of the relationship between the organization and its environment. The emphasis here is on the environment as a determinant of the internal structures of organizations.

The researchers found that mechanistic organization are characterized by: centralization of authority and control, primary downward communication, and high degree of task specialization. While the organic organizations are characterized by: greater decentralization of

authority and control, more horizontal communication, and higher degree of task interdependence. Thus, mechanistic organizations are seen as flexible and adaptive.

No arguments were made by the researchers other than that one system is more effective than the other but they claimed that the effectiveness of one system over the other is contingent upon the task environment of the organizations under question. The researchers found that the mechanistic system is more effective where the relevant environment is more stable and predictable i.e. the market and technological conditions remain stable or unchanged over time. In this case effectiveness can be achieved by routinizing tasks and centralizing decisions. On the other hand, the organic system was found to be more effective where the environment is turbulent and the organization has to change directions to adapt to its environment. In this case effectiveness can not be achieved through routinizing task and centralizing decisions, but instead it can be achieved through decentralization of decision-making and relaxing rules and procedures to allow for more sense of adaptability. This is because the dynamic environment produces uncertainty in the decision-makers' minds.

The concept of mechanistic-organic organizations suggests in theory how an organization is supposed to respond to the conditions of its environment. However, the evaluation of the state of the organization environment depends mainly upon the perception of its management with the demerit of the element of subjectivity. Despite this, the model seems to have the merit of providing general guides for organizational design situations.

4-4-2 Lawrence and Lorsch's Study:

Lawrence and Lorsch (1967) have made an attempt to study the structural dimensions that correspond to given environmental dimensions in effective organizations. In their attempt, the researchers explored six organizations in the plastic industry having varying degrees of success. Objective and subjective measures of performance have been developed. The researchers categorized their six organizations into three scales of performance levels (high, medium and low performance levels). Lawrence and Lorsch constructed a score of uncertainty for measuring the effect of the environment. The score is consisting of: (i) clarity of information, (ii) uncertainty of cause-effect relations, and (iii) time span of definitive feedback. Scientific knowledge was found to be the most uncertain, followed by market knowledge, and that techno-economic knowledge was most certain.

The researchers explored two other industries to facilitate comparison. These industries were found to have less dynamic and diverse environment than the plastic industry. These industries were the container industry and the food industry.

The researchers studied the effect of the environment on two structural characteristics of organizations: differentiation and integration. By differentiation the researchers mean the degree of specialization of labour and the extent to which managers in different departments differ in attitude and behavioural orientation. Integration referred to the nature and quality of interdepartmental relations as well as the processes by which such relations were achieved.

Concerning the relationship between environment and the structure, the researchers found that organizations operating in more

complex and dynamic environment, such as the plastic industry tended to show greater degree of differentiation between functional departments than did those firms operating in less turbulent environment such as the container industry.

The food industry firms, which operated in a moderately dynamic environment, exhibited a moderate degree of differentiation. That is to say, the greater the instability of environment the more psychological distance was created between departments in effective organizations.

Different environments call for different methods of integration. A formal integrating department was needed to integrate the activities in firms operating in dynamic environment. The integrating mechanism in firms operating in moderately dynamic environment was found to be individual integrators, whereas in a more stable environment, firms used direct managerial contacts through the chain of command to maintain integration.

Lawrence and Lorsch findings were similar to those reported by Burns and Stalker (1961) in that environment does play an important role in the relationship between structuring activities and organizational effectiveness (Zey-Ferrell 1979).

Lawrence and Lorsch have been criticized for their failure to precisely identify the linkage through which environment is able to affect the organization (Hall 1968). Duncan (1972) criticized Lawrence and Lorsch study on the basis of its approach to uncertainty, claiming that their definition is ambiguous, which limited the effectiveness of the operational measures used. The study can also be criticized on the basis of relying on attitudinal measures to operationalize the different dimensions of external environment. How individuals perceive the

environment can have a dramatic effect on how they and their organizations decide to respond (Gerloff 1985).

4-4-3 Osborn and Hunt's Study:

Osborn and Hunt (1974) investigated the effects of environmental complexity on organizational effectiveness in twenty-six small, rigidly structured social service organizations in a midwestern state in America. The data have been collected through mail questionnaires administered to the chief executive of each organization. Environmental complexity was defined in terms of: (i) the amount of risk involved in organization-environment relations. Here, risk has been defined in terms of change that may occur in the organization environment for growth and survival. The level of dependence is expected to increase with the increase in the (ii) level of sophistication in the environment (iii) the nature of inter-organization relationship is measured in terms of the ability of the organization to develop favourable exchange relations with its environment.

The results of the study found that the degree of risk presented in the external environment is unrelated to effectiveness. However, both dependency and inter-organization interaction were found to have positive, significant relationship to measures of effectiveness. Inter-organizational interaction was found to be the most closely associated with effectiveness.

The results of this study are not supportive to the findings of Lawrence and Lorsch and Burns and Stalker. One of the methodological shortcomings of this study is that it assumed that the degree of

homogeneity in task environment is an adequate measure of environmental risk.

4-4-4 Pennings' Study:

Pennings (1975) attempted to examine whether there are structural variations between organizations that are attributable to differences in aspects of their environment. The study hypothesized that the greater the environmental uncertainty; that is instability, resourcefulness, demand volatility, competitiveness and complexity, the greater the amount of informal communication, participativeness, frequency of meetings, specialization, and power equalization. The data of the research were collected from forty widely dispersed branch offices of a large United States brokerage organization. Pennings used subjective and objective measures to explore the degree of association between organizational structure and environmental dimensions. The goodness of fit between the structural and environmental variables was then analyzed as to their ability to explain organizational effectiveness. The researcher found that the structural contingency model was not generally supported by his analysis of the relationship between the environmental variables and the structural variables mentioned above. Resourcefulness and complexity were the only environmental variables related to the structural variables.

Pennings concluded that his study tried to determine factors that explain why organizations differ structurally and how they vary with respect to their effectiveness, but the study has not been successful in understanding variance in these parameters. Thus, Pennings like, Osborn and Hunt did not find support for the structural-contingency model.

4-4-5 Bourgeois and his Associates' Study:

Bourgeois et al (1978) conducted a series of three experiments to test the validity of the structure-contingency model advocated by Burns and Stalker (1961), and Lawrence and Lorsch (1967). Bourgeois and his associates tested the prediction that managers will choose the organic structure when confronted by an unstable situation. The sample of the experiment was composed of college students and some off-campus evening (MBA) students who were practicing managers.

According to the researchers' findings, individuals confronted by unstable or turbulent external environment tend to favour more mechanistic management systems. When individuals were confronted by a more stable environment they were most likely to select the organic management systems. The results of the experiments suggest that managers and organization designers might favour organization structures which are contrary to situational contingencies and needs. The results also suggest that people respond to uncertainty and change by tighter control, which limits the autonomy of individuals.

The fact that the sample of the experiment is composed of college students negatively influences the validity of research findings although the sample contains some practicing managers.

4-5 Ownership and Control - Structure Relationship: Empirical Evidences:

The focus of the research on the determinants of organizational structure has been on the impact of technology, size, and environment on the structure of organization. Little attention has been paid to the other

determinants of structure. The lack of attention may be explained by the absorbing debate that is still going-on about the explanatory value of size and technology in understanding organizational structures (Kimberly 1976 and March and Mannari 1981). This section is a survey of some few evidences about ownership and control-structure relationship.

4-5-1 The Aston Group's Study:

In their study discussed in section (2-4-1), the Aston Group (1969) claimed that the differences in structure between a department of the government and a private business will be due to some extent to the different ownership and control patterns. The concept of public accountability and the relationship of the ownership to the management of the organization were investigated. Public accountability was measured by the extent to which the organization was subject to public scrutiny in the conduct of its affairs.

No relationship was found between public accountability and structuring of administrative and workflow activities ($r = -0.10$). On the other hand, there was a positive relationship between public accountability and concentration of authority ($r=0.63$), standardization of procedures for selection and advancement ($r = 0.56$), and line control of workflow ($r= 0.47$). These all point to centralized but line-controlled government workflow organizations.

Concerning the relationship of ownership to management, a negative relationship was found between public accountability and concentration of ownership with control ($r=-0.51$); the more publicly accountable the organization, the less concentrated it was. A negative relationship was found between concentration of ownership and control

with concentration of authority (r=-0.29). This result might suggest that concentration of ownership is associated with dispersion of authority. This result is not expected by the researchers. When they excluded the government organizations from the sample, the correlation disappeared (r= 0.08). It was a striking result in view of the correlation found with other contextual variables.

4-5-2 Pondey's Study:

Pondey (1969) constructed a model assuming that administrative intensity is set so as to maximize profit, or more generally, to maximize the dominant managers' utility function. The model was tested against data from a sample of 45 manufacturing industries. One of the finding, was that administrative intensity (measured in terms of the number of managers, professionals, and clerical workers divided by the number of craftsmen, operatives, and labourers employed by the organization) was found to increase with functional complexity and the separation of ownership and management. Higher administrative intensity is associated with wider span of control at higher levels and more hierarchical levels.

4-5-3 Zwerman's Study:

In this study, discussed in section (4-3-4), Zwerman (1970) found that in firms where management was separated from ownership, there were more authority levels, wider span of control at higher management levels, and lower cost of labour. It seems that Zwerman's results are consistent with those of Pondey's (1969).

4-5-4 Geeraerts's Study:

Geeraerts (1984) conducted a study to investigate the relationship between size and organizational structure in which "status of the management" has been taken into account, to try to determine what the nature is of the effect, if any, of that variable on the relationship between size and structure.

The sample of organizations involved consisted of 142 Dutch small manufacturing businesses. The measures of the Aston Group for measuring the structural variables have been employed. The status of the firm's manager was measured by the proportion of shares held by the manager. The data has been treated by correlation and regression analysis.

The research found that, on average, firms of a given size will be more horizontally differentiated, more formalized, and will have higher internal specialization when they are controlled by professional managers than will be the case when they are controlled by owners. It is also found that there was an existence of interaction effect between size and status of the management i.e. the relationship, itself, between size and decentralization is influenced by status of the management. The researcher made some reservations about the result of the study in case of not controlling for the effect of the variable "status of the management", the matter that will yield unpredictable inter-sample differences in the result.

4-6 Charter-Structure Relationship: Empirical Evidences:

Charter is considered as one of the contextual dimensions of organization. A number of researchers have discussed the effects of the goals of an organization on its structure, but there has been almost no detailed empirical work on the actual relationship between goals and structure (The Aston Group 1969).

The study by the group on the context of organization structure, relates scales of organization charter to structure. Operating variability (conceptualized as being concerned with manufacturing non-standard producer goods as against providing standard consumer goods was shown to be strongly associated with line-control of work flow ($r = -0.57$). The researchers say that the more the organization is concerned with manufacturing non-standard producer goods, the more it relies upon impersonal control of work flow; the more it is providing a standard consumer service, the more it uses line control of its work flow through the supervisory hierarchy. Organizations showing operating diversity (emphasized multiplicity of outputs, policy on whether to expand the range of kind of output, client selection and self-image) however, tended to be more structured in activities ($r = 0.26$) and more dispersed in authority ($r = 0.30$). No claims were made by the researchers that t charter has an overwhelming impact on organization structure.

4-7 Location-Structure Relationship: Empirical Evidences:

Location, like charter, is considered as one of the contextual dimensions of an organization. The literature reveals no empirical detailed work on the relationship between location of an organization and

its structure. The Aston Group (1969) found a negative correlation (r = -0.58) between the number of operating sites and workflow integration scale of technology. Also a positive correlation was reported between number of operating sites and public accountability (r = 0.34). The researchers went on to say that, this pattern of inter-relationship among the contextual variables led to the expectation of a relationship between number of operating sites and the structural dimensions. The researchers added that, the correlation of the number of operating sites with structuring of activity (r = -0.26), concentration of authority (r = 0.39) and line control of work flow (r = 0.39) confirms the relationships with charter and technology, and suggests a charter-technology-location nexus of interrelated contextual variables having a combined effect on structure.

4-8 Origin, History and Dependence-Structure Relationships: Empirical Evidences:

Origin, age, history, and dependence were visualized by the Aston Group (1969) as part of the organization context that influence structure. However, Greiner (1979) noticed from a number of studies that the same organization practices are not maintained throughout a long time span, and he inferred that the impact of organization age on the behavioural aspects overwhelms the impact of age on the structural aspects.

The Aston Group hypothesized that impersonally founded organizations might be expected to have a higher level of structuring of activities, whereas personally founded organizations would have higher degree of centralization of authority. Their findings showed that no

relationship exists between impersonality of origin and structuring of activities (r= -0.04) but a strong relationship between impersonality of origin and centralization of authority (r = 0.64). The researchers explained that this is due to the fact that state-owned, and therefore impersonally founded organizations tend to be highly centralized. Thus, this fact contributed to the noticeable relationship (r = 0.36) between impersonality of origin and line control of workflow.

Concerning the age of the organization, it was found that no relationship exists between age and structuring of activities (r = 0.09) or line control of workflow (r = 0.02). Age was related to concentration of authority, which means that older organizations have a tendency to be more decentralized and to have more autonomy.

With respect to historical changes, and as it was expected, there was strong correlation with age (r = 0.51), older organizations tend to have experienced more types of changes. There was also a strong relationship, perhaps mediated by age, between historical changes and concentration of authority (r = 0.45). It was suggested that such changes are being associated with dispersion of authority.

4-9 Conclusions:

It seems that the debate on the relationship between context and structure will continue for years to come. Inspite of the tremendous research conducted in this area, little agreement was reported about the results and the nature of the relationship between contextual and structural dimensions.

Woodward (1965) and her advocates (Harvey 1968, Hage and Aiken 1968, Zwermman 1970, Comstock and Scott 1977) believed that

technology is a prime determinant of organizational structure, whereas, the Aston Group (1969) and their advocate (Inkson et al 1970, Blau and Schoenherr 1971, Child and Mansfield 1972, Child 1973, Khandwalla 1974, and Blau et al 1976) believed that size is a prime determinant of structure .

Although the Aston Group (1969) tried to reconcile their research results with that of Woodwards' (1965) by showing that similar conclusions have been reached when they considered only organizations in which the bulk of their activities are centred around the production activities, but the Aston Group and their advocates denied the technological imperative rationale and indicated that technology has no major impact on structure. The disagreement among researchers concerning the relationship between structure and context may be attributed to the following factors:

(i) Although the overwhelming majority of organization researchers have treated size as conceptually distinct from structure, yet 80% of the studies reviewed by Kimberly (1976) operationalized size in terms of the number of employees in the organization. Kimberly raised the question whether this measure of size can be used for all types of organizations. In spite of the fact that other operationalizations for sizes have been developed, most researchers have employed the number of employees as size indicator. The number of employees as a measure of size may be misleading in the case of rapid automation and technological advancement in industry, where industry tended to be capital-intensive.

(ii) Different operationalizations have been introduced for technology; operation technology, routineness of work ...etc. These operationalizations do not necessarily result in similar measures. For example, Hage and Aiken (1969) criticized Woodward (1965)

classification of technology as not applicable to people-processing organizations. This raises the question about the applicability of all technology classifications to all types of organizations. This disagreement about conclusions on technology-structure relationship is expected.

(iii) All the Aston Group advocates have used the Aston Group measures for structural variables, which is not the case for their opponents. So different measures are not expected to arrive at similar conclusions, as it is difficult to compare studies employing different measurement instruments according to (Pennings 1975).

(iv) The sampling and level of analysis may be another disagreement factor. However, the Aston Group have employed manufacturing firms in their study similar to Woodward (1965), but still the representation of certain industries employing certain types of production systems was missed in the Aston Group sample. Many of the studies, which claimed that size is the major determinant of the structure, have employed in their samples only service organizations. For example, Blau and Schoenherr (1971) have included security agencies in their sample, and Hage and Aiken (1969) have included in their sample health and welfare organizations only. Some of the researchers who provided evidences on the technological imperative have done this at the individual and sub-unit levels.

(v) The interference and interdependence between the contextual factors themselves may be another complicating factor which contributes to the disagreement and contradicting findings between researchers regarding the relationship between context and structure. Certain types of technologies may be operated only within specific size, a matter that assumes interdependence between technology and size. Size

and location may be related if location is operationalized in terms of the number of operating sites. Most probable, state owned manufacturing firms are usually large in size compared to private firms.

Environment, though, has been conceptualized distinctly from contextual variables, yet in this research it is considered as one of the contextual dimensions of organizations. The findings of Burn and Stalker (1961) and Lawrence and Lorsch (1967) -in their structure-contingency model- play an important role in the relationship between structuring of activities and organization effectiveness (Zey-Ferrell 1979). However, Lawrence and Lorsch have been criticized for the limitation in operationalizing the concept of uncertainty and for reliance upon subjective measures. It seems that it is difficult to develop pure global measures for environmental stability, certainty, and simplicity. Obsborn and Hunt (1974) and Pennings (1975) did not find support to the structure-contingency model, but still the model remains as a useful guide for organizational design.

Little attention has been paid to the relationship between structure and the other dimensions of organizations (e.g. charter, location, origin, ...etc). Even for those researchers who tackled this aspect, no claims have been made that those contextual variables are important or decisive factors in organizations structuring. The few evidences reported revealed remarkable relationships between those contextual factors and some of the structural variables.

Chapter Five

Research Methodology and Design

5-1 Introduction:

This chapter discusses the methods and procedures used to operationalize the conceptualization of the research variables discussed in the theoretical framework of the research. The operationalization of the research concepts is derived mainly from the works of the Aston Group (1969), in addition to some measures developed by researchers. The operationalization of these concepts is not expected to reveal exactly the concepts of the research, a short coming one has to live and deal with if we want to escape dealing with the study of organization theory purely at the theoretical level (Ali 1988).

5-2 Research Design:

The research design is derived from "positivism" as an appropriate philosophical design. There are a number of implications for such tradition; (i) independence of the researcher (ii) objectivity in selecting the study (iii) identification of causal explanations of regularities in organization behavior (iv) operationalization of concepts (v) reduction of problems into simple elements (vi) generalization from sufficient sample size (vii) comparisons of variables across samples and, (vii) testing research hypothesis by deducing observations (Easterby-Smith et al 1991).

In this study cross-sectional research strategy is adopted in which thirty manufacturing firms are investigated to test the research

hypotheses. In this research, the study and analysis of structure-context relationship is based on organizations by type rather than generalizing. This approach is supported by Thompson (1973) who argued that organizational members tend to develop and elaborate formal structural frameworks in wayes that are "symbolically appropriate" to their complex values. He elaborated by saying that "the Episcopal structure of the Roman church, or the corporate structure of a local authority, or the radical faculty structure of a school, have much to do with the values underpinned by interpretive frames of organizational members". The research design has incorporated only one type of organization, which is the manufacturing firms, believing that the similarity of the values of the organizational members will help in better understanding the relationship between structure and context in organizations.

5-3 Methodology:

This sub-section includes; the sampling plan, determination of the sources of data, the measurement of the analytical variables of the research and the statistical models used in analyzing the data of the research.

5-3-1 The Sample:

The objective of sampling is to estimate population values from information contained in a sample (Guy etal 1987). This research is adopting non-probability sampling because the population and the sampling frame can not be well defined. No information about the manufacturing firms and their contextual dimensions are available to enable the researcher to use probability sampling.

According to purposive or judgmental samples, a researcher selects a subgroup that on the basis of available information, can be judged to be representative of the total population (Guy et al 1987). However, variability and sampling errors can not be controlled, hence, such samples require strong assumptions or considerable knowledge of the population (Miller 1975).

This research adopts the purposive sample to represent the manufacturing firms operating in Sudan because there is no clear defined organizational universe. Thirty manufacturing firms have been selected in the sample to represent the population of the manufacturing sector in Sudan. The sample has been selected in a manner to include manufacturing firms with varying size, adopting different types of technologies, operating in different task environments and so on.

Two different approaches for sampling have been suggested by Kimberly (1976) from the viewpoint of research strategy:

(i) Intratypical sampling, samples of only one type of organization (e.g. manufacturing firms) to be used for analysis, and the justification is that replication of the findings from one type in another helps to build a general theory of organization.

(ii) Intertypical sampling -using different types of organizations- which is much less frequently used by organizations' researchers, is justified on the ground that a general theory of organization ought to enable one to derive a hypothesis which can be tested on a heterogeneous sample of organizations.

Kimberly's idea is that at the most general level, a distinction should be made between manufacturing and services organizations and that this distinction may help to reduce the level of ambiguity in empirical studies of organization context and structure. However, the two approaches of sampling suggested by Kimberly are not contradicting,

since inratypical sampling studies may be considered as the starting point in building an organization theory.

5-3-2 Source of Data:

The institutional approach has been adopted to collect most of the data required to conduct the research. This approach has the advantage of providing information that is not biased by the interviewee's perspective in that it is based on objective variables. The attitudinal approach -on the contrary- relies on the opinions of individuals within the organization to measure the analytical variables under questions (Pugh et al 1968). Almost all the data, which has been collected for the purpose of this research, is objective data. Interviews with the general managers and other organization executives have been the source of the research data from the selected sample of organizations.

The researcher noticed that some -if not most- mangers are not generous enough in providing information for the researcher unless they are approached by an influential party. This may be due to the fact that either they are too busy or do not appreciate the role of scientific research. Interviews lasted from one to one and half-hour and were conducted in Arabic.

5-3-3 The Measurement of the Analytical Variables:

The "organization" is the unit of analysis in this study where the interrelated contextual, environmental and structural dimensions are analyzed. The research attempts to relate the structural variables of organization to the contextual dimensions of organization, hence measurement should be established for both groups of variables.

Most of the data were collected on the basis of the Aston Group instrument on structural and contextual dimensions by way of in-depth face-to-face interviews with organization executives. Despite some criticisms (Starbuck 1981), the Aston measures were used because they are the best instrument currently available for measuring organizational structure and context, and because its widespread use and acceptance allows meaningful comparison across studies and accumulation of findings (Gilbert and Philip 1994). The measurement of the task environment of the organization is developed by the researcher through operationalizing some of the relevant environment concepts reported in the literature review.

5-3-3-1 The Measurements of the Structural Dimensions:

The following approach is adopted to measure the selected structural dimensions in this research. This approach for measuring those variables is borrowed from the Aston measures.

(a) Specialization:

For measuring functional specialization in organizations, the Aston Group listed sixteen activities (See Appendix A-2-4) that are supposed to be present in all work organizations. These functions exclude the workflow activities of organizations, and so are not concerned with operatives in manufacturing. It can be seen whether an activity is specialized in an organization; that is performed by someone with that function and no other, who is not the line chain of command. Only functions that are carried out by full-time specialists from the organization itself is included in this scale. Distinction has been made

between whether the function carried out by an individual(s) and an independent department. Although this distinction might reflect the scale of operations of the firm only, yet it might also stress the keeness of organization to have a separate department to perform the function under question. The most functionally specialized organization can not exceed 16 scores. The justification why role specialization has not been adopted here rests on the difficulty of obtaining obtain the relevant information.

(b) Centralization:

A List of twenty-five recurrent decisions was prepared covering a wide range of organizational activities (see Appendix A-2-5). This list of decisions was adopted from the list prepared by the Aston Group. For each organization, the lowest level in the hierarchy with the formal authority to make each decision was determined. This identifies the level in the hierarchy where executive action could be authorized, even if the decision remained subject to a routine confirmation later by a chairman or a committee. But action may be taken regarding the decision before the routine confirmation. In (Appendix A-2-2) six organizational levels were identified starting from "above the chief executive" down to the "operator" level. If the decision is taken at "above the chief executive" level, the organization will score five regarding this decision. If the decision is made at "whole organization" level, the organization will score four regarding this decision and so on until the "operator" level, which will be given zero. Theoretically, the maximum scores an organization can make is 125 scores, a state where an organization is relatively most centralized, a case which is impossible practically.

By adopting this measure, comparisons can be made among a number of different organizations with respect to their levels of

centralization in decision making. The greater the scores of the organization, the more centralized the decision making in that organization.

(c) Configuration:

"Configuration", as the shape of the role structure, has been measured by the Aston Group using a number of organizational characteristics. The researcher borrowed the "span of control" and "the number of employees who are directly responsible for output" as measures of configuration.

The vertical span of control or the number of hierarchical levels is measured by a count of the number of job positions between the chief executive and the employees directly working on output. The lateral span of control includes the chief executive's span of control and the supervisor's span of control. The total number of those employees who are directly responsible for the output -including the management- is compared with the number of those employees engaged in other supporting activities.

(d) Standardization:

As "standardization" is related to the existence of standard procedures and rules in an organization, The Aston Group identified a number of procedures that might exist in every organization covering a wide area of functions; inspection, operational control, financial control, communication, people recruiting and sales. These indicators of standardization have been adopted in this research, but in an abbreviated manner. The score is obtained by a count of the number of such

procedures available to an organization from those given in (Appendix A-2-10). No assumption is made as to the use of procedures. The greater the number of scores, the more standardized the organization. The maximum score an organization can obtain is sixty.

(e) Formalization:

For the Aston Group, "formalization" is closely related to decentralization. A document -as they defined it- is at least a single sheet of paper; therefore, several copies of the same sheet of paper may each score as a separate document if used for separate purposes.

The Aston Group made some distinctions within the overall scale, which was split into three subscales concerned with formalization of role definition, information passing, and recording of role performance. The documents grouped together to constitute items on the subscale of formalization of role definition were all those designed to prescribe behaviour; written terms of reference, job description, and manuals of procedures (Appendix A-2-11).

5-3-3-2 The Operationalization of the Contextual Dimensions:

The operationalization and measurement of the contextual dimensions of organization has been developed as follows:

(a) Size

As mentioned in section (3-6-1), different size indicators have been suggested by organization researchers, especially the Aston Group. The area occupied by an organization, the total number of employees, annual

sales volume and total resources available for an organization all have been used to operationalize and measure organization size. Concerning the sample of the research, it was found too difficult to get accurate information about these indicators except the number of employees. Most of the respondents were not sure about the area of their organization. Some executives were reluctant to give information about their firm's annual sales volume while others are also reluctant to give an up-to date figure of the total value of the assets of the organization. Although these size indicators have been used in the analysis, yet the number of employees as size indicator is the most reliable measure. The part-time employees, or casual labour, have also been taken care of and converted into full-time labour equivalent. This has been done by multiplying the number of the casual or part-time labour by the number of their working days per year divided by 365 days.

In spite of the limitations of using the number of employees as measure of size (Kimberly 1976, Mohamed 1996), this research has adopted the number of employees as a measure of size because almost all the industrial enterprises in Sudan are not fully automated.

The logarithm transformation on number of employees as size indicator has been used to create a more linear relationship. For example, the effect of adding one employee to a small enterprise is greater than adding one employee to a large enterprise (Child 1973). Because the total number of employees in raw form was not assumed to be the optimal indicator of size, the research has converted the raw form of number of employees into logarithmic form.

(b) Technology

The Amber and Amber (1962)'s scale and Woodward (1962)'s classification of technology have been adopted by the researcher to

operationalize the concept of technology. This scale is an estimate of the bulk equipment used by an organization in its workflow activities. This scale ranges from an organization that uses hand tools and manual machines -the simplest form of automaticity mode- to an organization using computer control; automatic cognition which is the most sophisticated mode of technology. The organization using hand tools and manual machines in the bulk of workflow activity scores zero, while the maximum score (five) is given to fully-computerized production system (see Appendix A-1-7).

The mass-output oriented scale of technology is basically Woodward (1965)'s classification of technology modified by Khandwala (1974). The scale identified five levels of production systems starting with "unit technology" which scores zero and ending with "continuos process technology" which scores four. The score of the technology in an organization is equivalent to the score representing the technology pre-dominant in the production system (see Appendix A-1-7)

(c) Task Environment:

The concept of "task environment" is operationalized in nine items along a favourable-unfavourable continuum. Likert scale (1967) is used to subdivide each item into five sub-items or alternatives. These nine items include information about (i) the supply of raw materials, spare parts and labour (ii) degree of unionization. (iii) rate of technological change. (iv) competition (v) number of production lines and (vi) customers of the product. The organization that scores high on this scale will be considered as having unfavourable task environment; whereas the organization that

scores low will be considered as having a favourable task environment (See Appendix A-1-8).

(d) Ownership and Control:

Because of the fact that the legal distinction between state companies and private ones is invalid with regard to the purposes of this research, three modes of ownership and control have been identified; public enterprise, private companies managed by professionals and private companies managed by their owners. Another fact that supports this classification –in addition to the arguments presented in section (3-6--4) is that it is very rare to find a manufacturing firm in a developing country -specially in Sudan- that takes the form of a public company (Hamaza 1997).

In Appendix (A-1-6), three different scores have been assigned to the three modes of ownership and control. Scores (1,2,3) may act as nominal scales to differentiate between the three modes of ownership and control. Also the scores can act as ordinal scales in the sense that the greater the score of the organization the fewer the hands that control it. Because the public enterprise is owned by the state its control is expected to rest in many hands and vice-versa with respect to the private enterprises managed by their owners.

(e) Charter:

For measuring the organization charter, the research adopted the Aston Group (1967) instrument for operationalizing the concept of charter (see section 3-6-5). Three indicators are adopted to measure organization charter: type of output, client selection, and multiplicity of

output. The type of output is either consumer or producer. Sometimes, the output may be a consumer and a producer output at the same time, in such a case the output will be specified according to the segment that consumes the major quantity of that output. Client selection indicates whether the organization sells to the large public or deals with selected clients. Multiplicity of output counts the number of products that the organization produces (see Appendix A-1-3).

The higher the scores of an organization the lower the standardization of the product and the higher the trend to diversify and vice-versa.

(f) Location:

A scale is developed to measure whether the organization is located in an urban and populated area or rural area with low population. Three indicators are used: the distance from the capital, whether the organization is located in urban or rural area; and the density of population (see Appendix A-1-4). Although a similar approach for operationalizing the concept of location has been criticized in section (3-6-6), yet it remains the only possible option because the Aston Group's instrument to measure location (number of operating sites) can not be applied in this research due to the fact that almost all the manufacturing firms selected in the sample have only one operating site.

(g) Origin, History and Dependence:

The date of establishment, whether the organization is founded by a person or an existing organization, and the status of the organization are the measures adopted by the research to determine the origin and level of dependence of organizations. The status of the organization may be: a

principal unit, a subsidiary, head branches, or branch. The scores of the status of the organization and how the organization is founded constitute the measure of organization dependence. The higher the scores of an organization, the higher its dependence (See Appendix A-1-2).

5-3-3 Statistical Analysis:

Various statistical techniques are employed to analyze the data of the research. Correlation analysis is used to investigate the impact of the contextual dimensions under study upon the selected structural variables. The greater the coefficient of correlation (whether positive or negative) between any pair of contextual and structural variables, the greater the impact of that contextual variable upon that structural variable.

The product moment correlation analysis among the structural variables investigates the extent to which Sudanese manufacturing firms are multi-dimensional or uni-dimensional. The latter analysis is also used to investigate whether or not there is interdependence among the contextual dimensions under question.

The multivariate analysis is usually used to test the significance of the difference between more than two nominal variables, which contain more than two ordinal or interval variables. This analysis is employed to test the significance of the difference among more than two structural profiles within each contextual dimension. Each contextual dimension will be classified into more than one category. For example, "size" is classified into three categories: large size, medium size and small size organizations. These three categories of size will constitute the nominal variables. The ordinal and/or interval variables will be represented by the structural variables. The greater the coefficient of the test, the greater the

impact of the contextual dimension upon structure. Thus, the contextual dimensions can be ordered according to their strength of impact upon the structure of the selected sample of organization. Hence, a generalization can be made about the relative importance of the contextual dimensions in the manufacturing sector in the Sudan.

(5-4) Research Limitation:

One of the research limitations emanates from the assumptions or implication of the "positivism" paradigm as an appropriate philosophical design for this research (See section 5-2). It is too difficult to assume; the independence of the researcher, perfect operationalization of concepts and the use of perfectly sufficient sample size. In line with this, Dewar and Hage (1978) have pointed to the difficulty with studying only levels (at single point of time) stating that it collapses the history of an organization into a single snap-shot. Of course this has been the problem of nation-state studies, where a large number of variables tend to be highly interrelated, e.g. technology and size.

Another limitation is that the researcher was not able to adopt "probability sample" for data collection because of the fact that the population and the sample frame of the data can not be well defined. This has led the researcher to adopt "non-probability sample" with all its drawbacks.

(5-5) Research Hypothesis:

(a) The primary hypothesis of this research relates to the primary objective of the research, which is to identify the relative importance of the contextual dimensions in determining the internal structure of the manufacturing firms in the Sudan. The null hypothesis is that the means of the structural scores across the three categories of the contextual dimension are equal. This can be achieved by using Multiple Analysis of Variance (MANOVA) hypothesis testing formula (Hair et al 1992).

$$H_0: \begin{matrix} U_{11} \\ U_{21} \\ \vdots \\ U_{p1} \end{matrix} = \begin{matrix} U_{12} \\ U_{22} \\ \vdots \\ U_{p2} \end{matrix} = \ldots\ldots\ldots = \begin{matrix} U_{1k} \\ U_{2k} \\ \vdots \\ U_{pk} \end{matrix}$$

Null hypothesis (H_0) = all the group means vectors are equal, that is they come from the same population.

Where P represents the means of the structural variable and K represents the category of the contextual dimension. The contextual dimension which scores the least significance level will be the most important determinant of organizational structure.

(b) The second hypothesis relates to the relationship between the contextual variables and the individual structural variables.

The followings are the research hypotheses in this respect:

(i) Centralization is highly influenced by the mode of ownership and control relative to size.

(ii)Specialization is highly influenced by ownership and control relative to environment.

(iii) Configuration is highly influenced by size relative to technology.

(iv) Standardization and formalization are highly influenced by ownership and control relative to size.

Acceptance or rejection of the above mentioned hypotheses can be done through testing the significance of the difference between the means of the structural variable under question in relation to the contextual dimension along its three categories.

This can be achieved by using the Analysis of Variance (ANOVA) hypothesis testing formula. (Hair etal 1992)

$$H_0: u_1 = u_2 = \ldots U_K$$

Null hypothesis H_0 = all the groups means are equal, that is, they come from the same population. Where k represents the different categories of the contextual dimensions under question. The structural variable which scores the least significance level is the most influenced by that contextual dimension.

(c) The last hypothesis is that the relationship between context and structure shows different patterns across different cultural environments irrespective of the similarity or dissimilarity of the societal levels of industrialization.

Chapter Six

The Relationship between Structure and Context: Empirical Findings and Analysis

6-1 Introduction:

This chapter is devoted to the discussion of the empirical findings drawn from the data collected via the sample survey. The relationship among the contextual dimensions, on one hand and that among the structural variables of the selected sample of organizations on the other hand is the subject of discussion. Also this chapter investigates the relationship between the contextual dimensions and the structural variables of the selected sample of organizations.

The analysis of variance techniques (ANOVA) and the multiple analysis of variance (MANOVA) are applied to test the significance of the relationship between the contextual dimensions and the individual structural variables at one level and between the contextual dimensions and the structural variables collectively.

This chapter also gives a brief account of the literature that compares the results of this study and those of the other similar studies conducted in the Western milieu. Across-cultural comparison is also made to substantiate the argument on whether organizations are "universally constructed" or "culture bound".

6-2 Interdependence of the Contextual Dimensions:

The research model has been constructed around the assumption that the contextual dimensions are the determinant (independent variables) of the structural dimensions of organizations. If this assumption is to be held

true, there should be no, or at least negligible, interdependence among the contextual dimensions of the selected sample of organizations. Some researchers have thought that the possibility of overlap between technology and size will jeopardize the findings concerning debate on the "technological imperative rationale" on one hand and "size imperative rationale" on the other hand.

Table (6-1) shows the intercorrelation of the contextual dimensions under study. The correlation between dependence and ownership and control shows that there is a strong significant relationship between them (-. 653). The direction of the relationship is negative. This means that the least dependent organizations are those whose ownership and control rest in few hands (private enterprises which are managed by their owners). This can be justified by the fact that almost all the organizations that are managed by their owners are principal units. Of course by dependence here, we denote dependence on parent organization. The relationship between location and dependence is similar to that between ownership and control and dependence, showing a correlation coefficient of (-.539). This can be explained by the fact that most of the organizations included in the selected sample from the rural areas are public enterprises that exhibit higher levels of dependence. The intercorrelation reveals a strong negative and significant relationship between location and the number of employees in logarithmic term (-. 695). This type of relationship is expected since the sample of the organizations located outside Khartoum include the largest organizations in the sample. This statement might put the sampling techniques adopted in this research under question, but the fact is that most, if not all, the industrial enterprises located in the rural part of the Sudan are public enterprises with labour intensive technologies.

Table (6-1): Intercorrelation of Contextual Dimensions.

	Age	Dep.	Charter	Location	Ownership &control	No. Of Employees (log.)	Size of investment	Automatically mode	Mass –out put	Task environment
Age	1.000	-.054	.001	-.295	-.156	.256	.042	-.149	.306	.266
Dependence		1.000	-.029	-.539(**)	-.653(**)	.286	-.014	-187	.283	.055
Charter			1.000	.053	-.079	.065	.040	-.126	-.226	-.129
Location				1.000	.413(*)	-.695(**)	-.430(*)	-.153	-.472(**)	-.343
Ownership control					1.000	-.301	.046	-.103	-.090	.086
No. of Employees (log.)						1.000	.593(**)	.175	.526(**)	-.267
Size of investment							1.000	.301	.192	.084
Automaticity mode								1.000	1.000	.060
Mass–output										1.000
Task environment										

(**) Correlation is significant at 0.01 level (2-tailed).

(*) Correlation is significant at 0.05 level (2-tailed).

Source: Empirically Collected Data

The relationship between the number of employees (in logarithmic term) and the size of investment is not as strong as one expects (.593), although it is significant at 0.01 level. However, this could be attributed to the fact that the size of investment for some of the organizations selected in the sample is recorded at historical values that will never reflect the real economic value of these enterprises. Owing to this fact, the research has adopted only the number of employees as a measure of size.

There is a moderately, positive and significant relationship between the number of employees (in logarithmic terms) and the mass-out put oriented scale of technology (.526) which suggests that mass-output oriented technologies use relatively larger number of employees.

It could be concluded that there is some sort of interdependence between dependence and ownership and control as contextual dimensions and also between location and size, but the latter relationship could be attributed to the sampling process.

6-3 Interdependence of the Structural Variables:

The interdependence of the structural variables of organization has been a subject of debate for long time. Different organization theorists have viewed organizations either uni-dimensionally or multi-dimensionally. When an organization is perceived as unidimensional, all its structural elements (e.g. centralization, standardization, formalization ...etc) tend to vary in the same direction under a given set of conditions. The unidimensionality has been claimed firstly, by Weber and confirmed by some others e.g. Richard Hall (1963). On the other hand the multidimensionality approach has been confirmed by the Aston Group (1969) and Child (1972).

Table (6-2): Intercorrelation of the Structural Variables

	No. of job titles	Functional Specialization	Centerali-zation	Autonomy	Executive Span of control	Supervisor span of control	Vertical span	Administrative component	Standardization	Formaliza-tion
No. of job titles	1.000	.780(**)	-.105	-.215	.163	.554(**)	.374	-.140	.559(**)	.680(**)
Functional Specialization		1.000	.005	-.369(*)	.093	.453(*)	.508(**)	-.215	.565(**)	.691(**)
Centralization			1.000	-.611(**)	.058	.008	-.391(*)	-.050	-.135	-.109
Autonomy				1.000	-.001	-.171	-.265	.327	-.169	-.282
Executive Span of control					1.000	.066	-.107	.107	-260	.307
Supervisor .span of control						1.000	-.012	.108	.092	.120
Vertical span							1.000	-.242	.521(**)	.512(**)
Administrative component								1.000	-.094	-.245
Standardization									1.000	698(**)
Formalization										1.000

(**) Correlation is significant at the 0.01 level (2-tailed)

(*) correlation is significant at the 0.05 level (2- tailed)

Source: Empirically Collected Data

Table (6-2) displays the intercorrelation of the structural variables of the selected sample of manufacturing organizations.

The number of job titles prevailing in an organization and its functional specialization have been considered as alternative measures for the degree of specialization.

The relationship between the two measures is found relatively high and significant (.78). So either the number of job titles or number of functional specialization, can be used as a measure of specialization in an organization.

The number of job titles shows relatively strong and significant relationship with standardization and formalization (.559) and (.680) respectively. It also shows a relatively strong positive and significant relationship with the supervisors span of control. The functional specialization has similar relationship with those variables. But functional specialization has a moderate, positive and significant relationship with the vertical span (.508), unlike its relationship with the number of job titles, which is (.375).

Functional specialization has a weak, negative, but significant relationship with autonomy (-. 369). These results suggest that highly specialized organizations tend to be highly standardized and highly formalized, but have moderate span of control of supervisors. The significant negative, but moderate or even low correlation between functional specialization and autonomy suggests that the functionally specialized organizations tend to have less autonomy; however, it seems difficult to interpret this result.

Blau (1970) and Pugh et al (1968) found a negative correlation between concentration of authority and standardization of organizational activities. In this study, a negative, but weak and insignificant correlation is found between concentration of authority and standardization (-. 135) and (-. 169) respectively. Blau (1970) suggests that centralization and standardization of organizational activities are alternative methods of control, thus he conceptualized organization as multidimensional.

Although centralization and autonomy are alternative measures of the concentration of authority in organization, the statistics show that there is a negative, but strong and significant relationship between the two variables. This negative relationship may be explained by the proposition that organizations with less autonomy (there is a limit to the number and kind of decisions to be made within the organization) tend to centralize the authority of decision making and confine it to the top-level management.

Centralization of decision making has a negative, moderate, but significant relationship with the vertical span (-. 391), which suggests that organizations having longer vertical span tend to decentralize authority of decision making. This finding is logical since in organizations with long vertical span, the top management will find themselves away from the place of the bulk of the organization operations, so they tend to delegate more authority to the middle level managers. The vertical span has a relatively strong, positive and significant relationship with standardization and formalization, (.521) and (.512) respectively. This means that organizations with longer vertical span tend to be more standardized and formalized. This tendency may be attributed to the willingness of the organization to compensate for the loss of control as a result of lesser centralization. This result confirms the findings of Blau

(1970) that concentration of authority and standardization are alternative methods of control; thus supporting the multidimensional approach.

The most powerful relationship among the structural variables was found between standardization and formalization (-.698). This high, positive and significant relationship shows that highly standardized organizations are highly formalized. The same degree of correlation is always observed between standardization and formalization on one hand, and, the other individual structural variables on the other hand. Formalization may be regarded as a tool for implementing the high number of standards, which the organization applies to its activities. Thus formalization and standardization may be regarded as two aspects of one organizational characteristic.

Neither the administrative component nor the executive span of control has shown any significant or even moderate relationship with any of the rest of the structural variables.

The relationship among the structural variables can be summarized as follows; (I) the more specialized organizations tend to be more formalized, more standardized, have wider-span of control of supervisors and have longer vertical span, (ii) the more centralized organizations tend to have less autonomy and less vertical span, (iii) organizations with long vertical span tend to be more formalized and more standardized, (iv) the more standardized organizations tend to be more formalized. Thus, organizations tend to be multi-dimensional rather than uni-dimensional.

6-4 The Relationship between the Contextual Dimensions and the Structural Variables:

Table (6-3) displays the correlation between the contextual dimensions and the structural variables of the selected sample of organizations. The following sections will be devoted to the discussion of this relationship in details.

6-4-1 The Relationship Between Size and the Structural Variables:

In contrast to the view of some structurtalists -who view size as a structural characteristic- size in this study has been viewed as one of the several dimensions of an organization's context. This view is supported by the Aston Group (1969) and Child (1972).

When treated conceptually distinct from structure, size could be assigned an important causal role. The number of employees has been considered as a measure of size because no accurate information was available about other measures mentioned in the theoretical part of this research. Although information about the size of the investment -as a measure of size- has been availed, yet the lack of up-to-date market valuation of some of the manufacturing firms in the sample prohibited the adoption of this measure.

6-4-1-1 The Sample

The selected sample of organizations amounts to thirty manufacturing firms. The size of the individual organization ranges between 30 and 11000 employees.

Table (6-3): The Correlation between the Contextual and the Structural Variables

	Age	Dependence	Charter	Location	Ownership & control	No. of Employees (log.)	Size of investment	Automaticity mode	Mass – out put	Task environment
No. of job titles	.146	.272	-.148	-.615(**)	-.248	.836(**)	.712(**)	.216	.404(**)	.055
Functional Specialization	.072	.280	.077	-.595(**)	-.343	.766(**)	.481(**)	.385(*)	.378(*)	.055
Centeralization	-.207	.400(*)	-.063	-.157	-.314	-.060	-.118	.432(*)	.025	.135
Autonomy	-.041	-.647(**)	.073	.677(**)	.626(**)	-.392(*)	-.042	-.184	-.292	-.237
Executive Span of control	-.017	.118	.291	.046	-.645	.260	.220	.191	-.057	-.185
Supervisor span of control	.092	-.009	-.048	-.350	-.108	.559(**)	.712(**)	.325	.131	-.192
Vertical span	.383(*)	.306	.003	-.527(**)	-.379(*)	.452(*)	.038	-.174	.472(**)	.048
Administrative component	.145	-.295	-.092	.267	.268	-.251	.120	.098	-.282	-.338
Standardization	.298	.174	-.047	-.440(*)	-.247	.606(**)	.366(*)	.025	.501(**)	-.215
Formalization	.105	.265	-.022	-.428(*)	-.387(*)	.661(**)	.397(*)	.177	.449(*)	.031

(**) Correlation is significant at the 0.01 level (2-tailed)

(*) Correlation is significant at the 0.05 level (2-tailed)

Source: Empirically Collected Data

Table (6-4): Size Distribution of Organizations

No. of Employees	No. of Firms
30-100	6
101-300	13
301-500	2
501-700	3
701-900	-
901-1100	-
1101-1300	1
1301-1500	-
1501-1700	2
1701-1900	1
1901>	2
	30

Source: Empirically Collected Data

The sample has been categorized into three distinct classes according to size. These three classes are; small size, medium and large size firms. Of course, this classification has been done on relative rather than absolute basis. This classification is deemed important for the purpose of studying the impact of different sizes of organizations on structure.

Table (6-5): Number of Employees in Each Class of Size.

Class of Size	Range of employees	N. of Firms
Small	30-1801	10
Medium	206-368	10
Large	475-8000	10
Total		30

Source: Empirically Collected Data

6-4-1-2 Single Correlation between Size and the Structural Variables:

The single correlation between size and elements of structure is shown in Table (6-3). There is a high, positive and significant correlation between size and both number of job titles and functional specialization (.836) and (.766) respectively. However, the correlation coefficient between size and the number of job titles is greater. This relationship represents the strongest among those between size and all other structural dimensions. No other contextual dimension has shown such high correlation with either the number of job titles or functional pecialization. This means that size is the most important determinant of specialization in organization, specially, manufacturing ones in the Sudan.

Both standardization and formalization are highly influenced by size, since the correlation between size and standardization and formalization is (.606) and (.661) respectively. This means that large organizations tend to be highly standardized and formalized. The similarity between the coefficient of correlation of standardization and

formalization -in quantity and direction- suggests that these two structural dimensions are not distinct, but rather two aspects of the same structural characteristic. The high positive intercorrelation between standardization and formalization (.698) confirms this finding. Size also has got a strong positive and significant correlation with the supervisor span of control (.559), and even higher (.712) if the size of investment is being considered. No other element of context has shown such a strong relationship with the supervisors' span of control. This contrasts the claims of some researchers that technology has some bearing on the supervisors' span of control. This result may suggest that size is the most important determinant of the supervisors' span of control in manufacturing firms in the Sudan.

There is a moderately positive and significant relationship between size and vertical span of organizations (.452). This indicates that size is not a decisive element in structuring the vertical span of firms, but it has some bearing on.

There is negative, weak but significant correlation between size and autonomy (-. 392), which may indicate that large organizations tend to be less autonomous i.e. Boards of Directors tend to reserve the right to take some of the decisions regarding the operations of the firms. The researchers' observation that small firms have almost inactive board of directors, as most decisions are made within the organizations, may explain this.

Weak, insignificant correlation has come up between size and executive's span of control and administrative component (.260) and (-. 251) respectively. No correlation is found between size and centralization (-. 060). This result may suggest that size has no bearing on executives

span of control, administrative component and centralization of decision making. However, the last two structural elements were claimed by some researchers to have some relationship with size.

From the above account, it seems that size is an important element of context. It is a strong determinant of organization's specialization if measured by the number of job titles or functional specialization. Size is also a significant and strong contextual element in determining the standardization and formalization of manufacturing firms in Sudan. The supervisor's span of control is another structural element that is highly influenced by size. Size has moderate impact on the autonomy and vertical span of organizations, but no bearing on executive's span of control, administrative component and centralization.

6-4-1-2 **Size and Structure: Analysis of Variance.**

The research is interested in the impact of the sub-scales of size on the behaviour of the individual structural variables. The analysis of variance (ANOVA) is used to test the significance of the difference of the means of the individual structural variables with respect to the three sub-scales of size. Looking at table (6-6) both measures of specialization; number of job titles and functional specialization are found to be most sensitive to the change of size along the three sub-scales. The significance level is minimal (.00). This result suggests that size has an absolute influence upon specialization in manufacturing enterprises in the Sudan. Formalization comes in the next to specialization, and is also showing great dependence on the differential or sub-scales of size with significance (.002). Size has also significant influence upon standardization, vertical span of organization and supervisor's span of control with levels of significance equal to (.005), (.008) and (.021)

respectively. The supervisor's span of control (as a dependent variable) has the least response to change in organization size among these variables.

Table (6-6): Analysis of Variance Coefficients

Dependent Variables	(F)	Sig. N=30
No of job titles	10.898	.000
Specialization	13.318	.000
Centralization	.478	.625
Autonomy	1.765	.190
Executive span	1.680	.205
Supervisor Span	4.443	.021
Vertical Span	5.802	.008
Admin. Component	2.220	.128
Standardization	6.512	.005
Formalization	7.984	.002

Source: Empirically Collected Data

Other variables; centralization, autonomy, executive span and administrative component have shown no significant relationship with the three sub-scales size. All of these variables have significance level more than (.05).

From the above analysis, it could be inferred that some elements of the structure of organization behave differently with respect to difference

in organization size while others do not. These structural elements which respond to change or difference in size are; specialization, formalization, standardization, vertical span and the supervisor's span of control. This result is more or less consistent with the results of the correlation between the contextual dimensions and the structural variables.

6-4-1-4 Size and Structure: multiple Comparisons Tests:

In the previous sub-section we have seen that all the structural variables that have significance level greater than (.05) are not influenced by the change in the three sub-scales of size. However, the other structural variables having significance level less than or equal to (.05) are believed to respond remarkably to whatever change or difference in organizational size. For the structural elements that have significance with size, a question may arise as to what sub-scale of size might this significance be attributed? Could it be attributed to all three sub-scales with each other or only to some?

Specialization, in terms of the number of job titles and functional specialization has shown high significance level (.000). However, this significant difference is attributable to the significant difference in the means of the relatively large size and small size organizations, and to a lesser extent can be attributed to the significant difference in the means of the relatively large size and medium size firms (.017). There is no

Table (6-7): The Significance Level of the Sub-scales of Size with the Structural Variables.

Dependent Variables	Significant Level N = 30					
	Small Size		Medium Size		Large Size	
	Medium	Large	Small	Large	Small	Medium
No. of job titles	.347	.000	.347	.017	.000	.017
Functional Specialization	.059	.000	.059	.044	.000	.044
Centralization	1.000	.710	1.000	.694	.710	.694
Autonomy	.614	.191	.614	.683	.191	.683
Executive Span	.217	.496	.217	.836	.496	.836
Supervisor span	974	.941	.974	.065	.041	.065
Vertical span	.307	.008	.307	.205	.008	.205
Administrative component	.914	.305	.914	.155	.305	.155
Standardization	.102	.005	.102	.420	.005	.420
Formalization	.023	.003	.023	.703	.003	.703

Source: Empirically Collected Data

Significant difference in the means (of specialization scores) of the relatively medium and small size organizations. Therefore, the impact of size on specialization is attributed to the difference between the relatively large size organizations on one hand and the relatively small and medium size organizations on the other hand.

The significance of size to the supervisor's span of control can be attributed to the difference between large size and small size organizations only where significance level Is (.04). That is to say, there is no significant difference between the supervisor's span of control in medium size and large size firms, any variation in the supervisor's span of control between the two sub-scales may be attributed to other factors. The vertical span is also influenced by the difference between small size and large size organizations only (.008).

The significant influence of size upon formalization and standardization is attributed to the difference between the small size and large size organizations. However, for formalization the difference between small size and medium size organization is also significant (.023).

The above discussion reveals that the significant impact of size on the structural variables should not be attributed to the difference in means of the scores of the structural variables with respect to the three sub-scales of size all together. But it could be attributed to the difference between two sub-scales only e.g. either between small size and large size or between medium size and large size only.

6-4-2 The Relationship between Technology and The Structural Variables:

The concept of technology is operationalized by the automaticity mode, which is a measure developed by Amber and Amber (1962) and by the mass-output oriented technology scale, which is developed by Khandwala (1974). The latter is merely an adaptation of Woodward's (1965) classification of technology. The hardware technology could be operationalized by these two scales. Although the software aspect of technology may be viewed as part of the tools of the organizational processes that may influence structure, only the hardware technology is within the scope of this study.

6-4-2-1 The Sample:

Table (6-8) displays the distribution of the selected sample of organizations according to their automaticity mode. The sample does not include the of the most primitive mode of technology, which is hand tools and manual machines which are no longer used in the modern manufacturing sector in the Sudan. The sample also does not cover the sophisticated modes of technology, i.e the self-measuring and computer control ones. These modes have not been introduced in the manufacturing sector in the Sudan. Earlier, in chapter two, we mentioned that the Sudan is a non-industrialized country and that its modern manufacturing sector is dominated by light industries. The sample is giving a reasonable representation to the dominant modes of technology available in the manufacturing sector.

Table (6-8): The Distribution of Organizations According to Automaticity Mode of Technology.

Automaticity	No. of firms
A) Hand tools and manual machines	0
b) Powered machines and tools	13
c) Single-cycle Automatics &self feeding machines	10
d) Automatic: repeats cycle	7
e) self-measuring and adjusting: feedback	0
f) computer control: automatic cognition	0
Total	30

Source: Empirically Collected Data

Table (6-9) displays the selected size of manufacturing firms according to their mass-output oriented scale of technology. No consideration was given to the even representation of the five mass-output oriented modes of technology in the sample.

The assembly-line technology has a weak presence in the manufacturing sector in the Sudan. Ii has thus been merged with the large batch technology in one group i.e. large batch and mass technology. There is only one manufacturing firm in the sample that adopts assembly line technology.

Table (6-9): The Distribution of Firms According to mass-output Oriented Scale of Technology.

Mass-oriented output mode	No. of firms
a) Unit technology	3
b) Small batch technology	3
d) large batch technology	11
d) Assembly line technology	1
e) continuous process technology	12
Total	30

Source: Empirically Collected Data

The continuous process technology is represented in various industries e.g. sugar, cement, spinning etc... Although some of these industries do not behave in the exact manner of the typical continuous process technology firms, their structures should exhibit the inherited demand of such technology. For the purpose of analysis, those modes of technology have been categorized into three classes; unit and small batch technology, large batch and mass technology and continuous process technology. This classification is in line with Woodward's.

6-4-2-2 Single Correlation between Technology and the Structural Variables:

The single correlation between technology and the structural variables is shown in table (6-3). Both measures of technology;

automaticity mode and mass-output oriented scale are adopted so as to make it possible to compare our results with the various studies.

The automaticity mode has shown a significant, but less than moderate correlation with functional specialization and centralization (.375) and (.432) respectively. In spite of the strong correlation between the number of job titles and functional specialization, the former has weak and insignificant relationship with the automaticity mode. The value of the correlation coefficient of these variables suggests that nothing can be inferred with regard to type of relationship between those variables, but only that this type of relationship is positive. The mass-output mode has shown a significant, positive and less moderate correlation with the number of job titles (.404), and functional specialization (.376), but it has no relationship with centralization.

The automaticity mode has no significant relationship with any of the other structural variables, but the mass-output oriented mode has something to do with the vertical span, standardization and formalization. The relationship between mass-output oriented mode and vertical span is significant, but less than moderate (.472). Both standardization and formalization correlate moderately with the mass-output mode, however, the correlation with standardization (.501) is higher than that with formalization (.449).

From the above, one can say that automaticity mode has significant, but less than moderate relationship with functional specialization and centralization, while mass-output oriented mode has similar relationship with number of job titles, functional specialization, vertical span and formalization. But mass-output mode has moderate, significant relationship with standardization. Standardization is the only

structural element that has moderate relationship with technology in the category of mass-output oriented mode.

6-4-2-3 Technology and Structure: Analysis of Variance:

The analysis of variance technique is used to investigate the behaviour of the individual structural variables in response to the differences in the means of the individual structural variables with respect to three sub-scales of technology; unit and small batch technology, large batch and mass technology and continuous process technology. The adoption of the automaticity mode of technology in this analysis is overlooked due to the relatively weak correlation of this mode with the structural variables.

Table (6-10) shows that only vertical span, standardization and formalization respond significantly to the different scales of the mass-output oriented technology. Vertical span is the most influenced structural variable in case of changing the production systems of the firms, and the significance level is equal to (.018). Standardization and formalization are also showing remarkable dependence on the mass-output oriented technology with respect to the three different sub-scales. The significance level is (.021) for standardization and (.024) for formalizations.

The rest of the structural variables under consideration have shown significant differences in their means with respect to the three modes of technology. This means that technology, classified according to mass-output oriented mode, has significant impact on vertical span of organization, standardization of procedure and formalization of role definition of organizations. These structural variables have also shown significant relationship with size. Since size and mass-output oriented

Table (6-10): The Analysis of Variance test coefficients:

Dependent variables	(F)	Sig. N=30
No. of job titles	3.121	.060
Specialization	3.205	.056
Centralization	.490	.618
Autonomy	2.547	.097
Executive's span	.639	.536
Supervisor's span	.479	.624
Vertical span	4.679	.018
Admin. Component	1.126	.339
Standardization	4.181	.021
Formalization	4.282	.024

Source: Empirically Collected Data.

technology have moderate interdependence this might raise a question whether this significance in the relationship may be attributed partially to size or mass-output oriented mode of technology.

6-4-2-4 Technology and Structure: Multiple Comparisons tests:

Using the multiple comparisons test (MCT), the researcher is interested to know whether the significance difference in the means of vertical span, formalization and standardization may be attributed to the three sub-scales of mass-output technology or just to any two of them.

The significance in the difference of the means of vertical span with respect to technology is due to the difference between the means with respect to unit and small batch technology on one hand and the continuous process technology on the other . Neither the difference between unit/small batch technology and large/ mass technology nor the difference between large/mass technology and continuous process technology have significant influence on the length of vertical span of organizations. The impact of sub-scales of technology upon formalization is similar to the impact on vertical span, the only difference is that vertical span is more sensitive than formalization with significance level equal to (.019) and (.034) respectively. The overwhelming impact due to the difference between unit /small batch and continuous process technology may be attributed to the possible interference between large/mass technology and continuous process technology. However, standardization is showing a different pattern, it is sensitive to the difference among the three sub-scales where the significance level due to the difference between unit/small batch and continuous process technology is (.034) and that due to the difference between large batch/mass and continuous process technology is (.031). Whether the technology is unit/small batch or large batch/mass this has no significant influence upon standardization.

Table (6-11): The Significance Levels of Sub-scales of Technology with Respect to Structural Variables.

Dependent variables	Significance Level				N=30	
	Unit /small batch		Large batch & mass		Continuous process	
	Large &mass	Continuous	Unit-small	continuous	Unit small	Large & mass
No. of job titles	.491	0.68	.491	.338	.068	.338
Functional specialization	1.000	.188	1.000	.087	.188	.087
Centralization	.677	.965	.677	.751	.965	.751
Autonomy	.975	.328	.975	.120	.328	.120
Executive Span	.629	.977	.629	.656	.977	.656
Supervisor span	.724	.641	.724	.985	.641	.985
Vertical Span	.252	.019	.252	.284	.019	.284
Admin. Component	.699	.345	.699	.741	.345	.741
Standardization	.915	.038	.915	.031	.038	.031
Formalization	.526	.034	.526	.158	.034	.158

Source: Empirically Collected Data

6-4-3 The Relationship Between Ownership and Control and The Structural Variables:

Ownership and control have been operationalized in terms of; public ownership, private ownership where management is separated from ownership (the firm is managed by professional managers) and private ownership and control where the firm is managed by its owners. This contextual dimension can be viewed as a continuum with public ownership at its beginning and private ownership where ownership and management are not separated at its end. Thus, this continuum displays the gradual increase of ownership and control when we move from left to right. The mode of private ownership and control where, firms are managed by professionals is located at the middle of this continuum. Ownership and control increase where the control of the firm's operation rests in fewer hands. Ordinal scales are used to measure this contextual dimension.

6-4-3-1 The Sample:

The selection of the sample size is done in a manner to ensure an even representation of the three modes of ownership and control. This is because the hypothesis of the research emphasizes the role of ownership and control in organizations structuring in Sudan. However, this approach has not disturbed the fair representation of the other contextual dimension in the selected sample. The sample includes 10 manufacturing enterprises in each mode of ownership and control.

6-4-3-2 The Single Correlation between Ownership and Control and The Structural Variables:

Table (6-3) shows the correlation between ownership and control and the elements of structure of organizations. Ownership and control is showing a strong, positive and significant correlation with autonomy (.626). This result suggests that when ownership and control move from one end of the continuum towards the other end, firms tend to be more autonomous i.e. public ownership shows the least autonomy, where privately owned firms managed by their owners show the maximum autonomy. This may be explained by the fact that the board of directors of the private firms managed by its owners are less active since most of the decisions usually made by the board are delegated to the general managers of the firms. The general manager is always the most powerful member in the board of directors.

Ownership and control have significant but less than moderate correlation with vertical span and formalization (.379) and (.389) respectively, but the direction of the relationship is negative, this means that publicly owned firms tend to have longer vertical span and greater formalization. This time standardization is not showing a similar correlation with ownership and control as formalization. The correlation between ownership and control and standardization is weak and insignificant but negative (- .247).

Therefore, ownership and control is highly correlated with autonomy, less moderately with vertical span and formalization, but shows weak and insignificant relationship with the other structural variables.

6-4-3-3 Ownership and Control and Structure: Analysis of Variance:

Here, the focus of the research is to investigate the influence of the three modes of ownership and control on the behaviour of the individual structural variables. The analysis of variance is used for that purpose.

Table (6-12) shows that there is a significant difference in the means of specialization between the three sub-scales of ownership and control. Functional specialization is showing a level of (.024), where the number of job titles is showing a level of (.033). As its correlation with ownership and control, autonomy is showing the highest significant difference in its means between the three modes of ownership and control (.001). Standardization and formalization are also highly influenced by ownership and control in terms of its three modes. The levels of significance for standardization and formalization are (.003) and (.006) respectively.

Therefore, ownership and control, in its three modes; public ownership, private ownership with professional management and private ownership where managers are the owners imposes significant influence upon organizations scores with respect to specialization, autonomy, standardization and formalization.

6-4-3-4 Ownership and Control and Structure: Multiple Comparisons Test:

In Table (6-12) we have seen that specialization, autonomy, standardization and formalization are significantly influenced by the sub-scales of ownership and control because they show high significance level{less than (0.05)}.

Table (6-12): Analysis of Variance Coefficients.

Dependent Variance	(F)	Sig.
No. of Job Titles	3.895	.033
Functional specialization	4.293	.024
Centralization	2.018	.153
Autonomy	10.126	.001
Executive's span	1.530	.235
Supervisor's span	.579	.567
Vertical span	2.544	.097
Admin. Component	1.231	.308
Standardization	7.140	.003
Formalization	6.281	.006

Source: Empirically Collected Data

Table (6-13) shows that the significant impact of the modes of ownership and control upon specialization is stemming from the difference in the means of the latter with respect to private-managed by professionals firms versus private-managed by owners firms (.033). This means that whether the firm is publicly owned or private-managed-by-professional both has no significant influence upon specialization both in terms of functional specialization and number of job titles. In other words, being a public enterprise has no bearing on

Table (6-13): The Significance Levels of Modes of Ownership and Control with Respect to Structural Variables.

Dependent Variables	Significance Level			N= 30		
	Public		Private/Professional		Private/owners	
	Private/Pro.	Private/Own.	Public	Private/Own.	Public	Private/ Prof.
No. of jobs titles	.425	.325	.425	.032	.358	.033
Functional Specialization	.732	.143	.732	.029	.143	.029
Centralization	.244	.233	.244	1.000	.233	1.000
Autonomy	.011	.001	.011	.599	.001	.299
Executive's Span	.367	.418	.367	.277	.418	.277
Supervisor's Span	.568	.850	.568	.881	.850	.881
Vertical Span	.893	.119	.893	.265	.119	.265
Admin. Component	.477	.360	.477	.976	.360	.976
Standardization	.113	.300	.113	.003	.300	.003
Formalization	.604	.069	.604	.007	.069	.007

Source: Empirically Collected Data

the level of specialization in it. Autonomy is significantly influenced by the nexus of public ownership and private ownership (Whether managed by professionals or owners) This means, there is no difference between private firms managed by professionals and those managed by their owners with respect to autonomy. Both formalization and standardization are influenced by the nexus private with professional managers ownership versus private with owners/managers mode. Whether the ownership is public or private has no significant impact upon these two structural variables. In contrast to autonomy, there is no difference between publicly owned firms and privately owned ones with respect to standardization and formalization.

Thus, the impact of ownership and control upon specialization, autonomy, formalization and standardization is not showing the same pattern, however, there is similarity in its impact on specialization, formalization and standardization.

6-4-4 The Relationship between Task Environment and The structural Variables:

The task environment, as a concept, has been operationalized by using Likert's (1967) scale to obtain interval scores for every organization in the sample concerning a number of environmental factors that affect the operations of the individual organization distinctively. These environmental factors include; (i) supply of raw materials, spare parts and labour (ii) turn-over of employees (iii) unionization of the labour force (iv) rate of technological change in the industry (v) market structure (vi) number of production lines, and (vii) the extent to which the output of the organization is used by the large public.

6-4-4-1 The Sample

No prior consideration was given to ensuring that different organizations with different task environment be included in the selected sample. But the sample includes various types of industries, if not all, in the manufacturing sector in the Sudan. Each industry is expected to have its own problems relating to its task environment. For example, the textile industry exhibits high levels of labour turnover in Sudan, whereas the pharamathetical industry does not face such a problem.

Table (6-14) shows the distribution of firms selected in the sample according to their scores on task environment measure. The maximum score that a firm can get is 45. It was found that no firm has scored less than 11. The percentage of firms scoring between 11 and 20 is 60%. Only 30% of the sample scored between 21 and 30. The rest of firms in the sample (10%) scored more than 31. The maximum score a firm has got is 34 and the minimum is 12. Firms with relatively high scores were viewed to have unfavorable task environment, where firms having relatively low scores are viewed to have relatively favourable task environment. Of Of course some firms could be classified as having moderate favourability.

6-4-4-2 Single Correlation between Task Environment and The Structural Variables:

The scores of the structural variables and that of task environment of firms selected in the sample have been correlated with each other. Table (6-3) shows the result of this correlation. Task environment has shown no relation at all with specialization, vertical span and formalization, with correlation coefficient (.055), (.043) and (.031) respectively. It has also shown insignificant, weak and negative

Table (6-14): The Distribution of Firms According to Their Task Environment Score.

Range of Task environment Scores	No. of firms
1-10	0
11-20	18
21-30	9
31>	3
Total	30

Source: Empirically Collected Data

correlation with the rest of the structural variables, except for centralization which found insignificant and weak, but positive.

It seems that task environment- as far as this operationalization is concerned- has no apparent influence upon the structure of the manufacturing firms in the Sudan.

6-4-4-3 Task Environment and Structure: Analysis of Variance:

The Analysis of variance technique confirms the previous result. Table (6-15) shows that not even a single structural variable has shown significant difference in its means with respect to the three sub –scales of task environment. That is to say, whether the task environment is favourable, unfavourable or moderately favourable has no influence upon the structure of manufacturing firms in the Sudan.

Table (6-15): The Analysis of Variance Coefficient.

Dependent Variables	(F)	Sig.
No. of jobs titles	.044	.957
Functional Specialization	.105	.900
Centralization	.377	.690
Autonomy	1.059	.361
Executive's Span	.094	.911
Supervisor's Span	1.441	.254
Vertical Span	.227	.798
Admin. Component	1.386	.267
Standardization	1.126	.339
Formalization	.044	.957

Source: Empirically Collected Data

6-4-5 The Relationship Between location and The Structural Variables:

Unlike earlier researchs, especially the Aston Group (1969) who operationalized the location in terms of the number of operating sites, this study has suggested the adoption of rural-urban nexus as an operationalization to this concept. The Aston Group's Operstionalization is not used in this research because it is found that most, if not all, manufacturing firms in the Sudan are principal units or have no branches

to represent different operating sites. The study has used different indicators to represent different levels of location; whether the firm is located in the capital, urban or rural area, and density of population. The highest score in location can be obtained by firms operating in the capital, which is the most urban populated area.

6-4-5-1 The Sample:

It seems that the urban organizations in the sample are over-represented since 83% of sample is located in the capital. However, this representation is fair compared with the national distribution of the manufacturing firms in the Sudan, as indicated in Chapter two 80% or more of the number of manufacturing firms are clustered around the capital. It is known that most of the manufacturing firms classified with the modern sector in rural Sudan are publicly owned and relatively large in size. Most of those firms are established within the framework of developmental plans. This characteristic creates a real problem to the sampling process since some sort of independence between location on one hand and ownership and size on the other hand will appear and distort the implications.

6-4-5-2 Single Correlation between Location and The Structural Variables:

Table (6-3) displays the results of correlation between location and the structural variables. Location has shown high, positive and significant correlation with specialization; number of job titles (.615) and functional specialization (.595). Since location and size are highly interdependent, with correlation coefficient equal to (.693), this high association between location and specialization may be attributed to the effect of size. There is

no theoretical evidence to support such high correlation between location and specialization.

Location also shows high positive and significant correlation with autonomy (.677). This result suggests that firms located in the urban populated area (the capital) are more autonomous than their counterparts in the rural areas. This result is expected since autonomy has shown high correlation with ownership and control, and private firms whether managed by professionals or by their owners tend to be more autonomous. The fact is that 4 firms of those selected in the rural area are public enterprises, so it is not surprising to find high correlation between location and autonomy.

The moderate correlation between location and vertical span, standardization and formalization may also be attributed to the impact of size. All the above-mentioned considerations suggests that location, as a contextual dimension that may affect organization structure, could not be objectively investigated in the context of Sudan, especially in this study, unless the high interdependence between location and size is minimized. This minimization could be done through more careful selection of the rural sample by including small size and private manufacturing firms as possible.

6-4-6 The Relationship between History, Dependence and the Structural Variables:

The history of the organization has been operationalized by its age. Other operationalizations that were used by some researchers are complicated and time consuming, thus, they were avoided in this study. This in addition to the fact that the impact of history on organization structure is not emphasized in the literature. The dependence of the

organization is operationalized by the identity of the founder and whether the organization is a principal unit, a subsidiary, a head branch or a branch. The most independent organization is that founded by a person and is a principal unit, and the most dependent is that founded by an existing organization and is a branch.

6-4-6-1 The Sample:

Table (6-16) shows the distribution of the firms selected in the sample according to their Age. The distribution shows that firms with varying ages have been fairly represented in the sample. The lowest age in the in the sample is 3 years and the hightest one is 41 years.

Table (6-16): The Distribution of Firms According to Age.

Age range	No. of Firms
1-10	10
11-20	4
21-30	9
31-40	6
41-50	1
Total	30

Source: Empirically Collected Data

Table (6-17) shows the distribution of the sample of firms according to their scores of dependence. Firms with low dependence have been over-represented in the sample. This may be attributed to the built-in

bias in the population of the manufacturing firms as most of them are principal units or/and subsidiary with legal identity.

Table (6-17): The Distribution of Firms Accords to Their Dependence.

Dependence Scores	No. of firms
0	12
1	11
2	4
3	1
4	2
Total	30

Source: Empirically Collected Data

6-4-6-2 Single Correlation Between Dependence/Age and The structural Variables:

The results of the correlation between age and the structural elements and that between dependence and structural elements are shown in Table (6-3). Age has shown significant, positive, but less moderate correlation with vertical span (.383). This suggests that elder organizations tend to have relatively longer vertical span. This may be explained by the fact that some organizations grow by the passage of time, and that size relates moderately to vertical span. Age shows no significant or moderate relationship with any of the other elements of structure.

There is a strong, negative and significant correlation between dependence and autonomy. This means that the less dependent organizations are the most autonomous. Again the high intercorrelation between ownership and control and dependence (-. 658) has distorted the picture. That is because, the high correlation between ownership/control and autonomy suggests that private firms, especially those managed by their owners are the most autonomous ones, and at the same time they are the most independent. This suggests that ownership and control on one hand and dependence -as operationalized here- on the other hand are two aspects of one organizational characteristic. However, dependence has not shown any strong or significant correlation with any of the other structural variables.

6-4-7 The Relationship between Charter and the Structural Variables:

The concept of charter has been operationalized in this research in terms of characteristics of the output of the organization. The question is whether the organization is providing a standardized output or non-standardized one. This will be judged according to: type of output, client selection and multiplicity of output.

6-4-7-1 The Sample:

Table (6-18) displays the distribution of firms according to their scores with respect to standardization of out put. Organizations with relatively low scores tend to produce standardized output and vice-versa. The minimum score of standardization is zero and the maximum one is 7.

Table (6-18): The Distribution of Firms According to their Scores of Standardization.

Standardization Scores	No. of Firms
0-2	9
3-5	13
6-8	3
Total	30

Source: Empirically Collected Data

6-4-7-2 Single Correlation between Charter and the Structural Variables:

The correlation between charter and the structural variables is shown in Table (6-3). It is obvious that charter has no significant or moderate relationship with any structural variable. The lowest correlation coefficients in this correlation matrix are between charter and the structural variables. This to say that whether the organization is producing standard or non-standard output has nothing to do with the organization structure.

6-5 The Relative Importance of Size, Technology and Ownership and Control to Structure:

Table (6-19) provides a summary of significance of size, technology and ownership and control with respect to the structural

variables. Size has shown remarkable significance to the number of job titles (.000), functional specialization (.000), supervisor's span of control (.021), vertical span (.008), standardization (.005) and formalization (.002). Also ownership and control have shown remarkable significance to the number of job titles (.033), functional specialization (.024), autonomy (.001), standardization (.003) and formalization (.006). Technology has shown significance to three variables only; vertical span (.018), standardization (.021) and formalization (.024). However, if the significance level used -which is (0.05)- is raised to 0.06 for example, technology will show significance to the number of job titles (.060) and functional specialization (.056). The significance levels scored by the individual structural elements tell nothing about the relative importance of size, technology and ownership and control with respect to the determination of the structures of manufacturing firms in the Sudan.

Multiple Analysis of Variance (MANOVA) presents the researcher with four criteria with which to assess multivariate differences across groups. The four most popular are: Roy's largest root, Wilk's Lambda, Hotelling's Trace and Pillai's Criterion (Hair 1992). The Most basic distinction among the measures is their assessment of differences across dimensions of the dependent variables. These tests or criteria are utilized in this study to find out the relative importance of size, technology and ownership and control to structural variables, which are the dependent ones. The result of each test will give the significance level, as an outcome, for assessing the difference across the structural variables for the sub-scales of the contextual dimensions. The contextual dimension is deemed important for structure if the corresponding significance level is < 0.05. The contextual dimension that shows the minimum significance

level across all the tests will be the most important one for the determination of structure.

Table (6-19): The Significance of Size, Technology and Ownership and Control with Respect to the Structural Variables

Structural Variables	Significance Level N= 30		
	Size	Technology	Ownership Control
No. of jobs titles	.000	.060	.033
Functional Specialization	.000	.056	.024
Centralization	.623	.613	.153
Autonomy	.190	.097	.001
Executive's span of control	.205	.536	.235
Supervisor span of control	.021	.624	.567
Vertical span	.008	.018	.097
Adminstrative component	.128	.339	.308
Standardization	.005	.021	.003
Formalization	.002	.024	.006

Source: Empirically Collected Data

The (F) values and the significance levels and the corresponding multivariate tests are shown in Table (6-20). It is clear that the difference between the structural variables with respect to modes of mass-output oriented technology is insignificant within all the four types of tests. Both size and ownership and control with their sub-scales are deemed significant to structure according to the four criteria. But size is considered as superior to ownership and control with reference to the three latter tests or criteria; Wilk's Lambda, Hotelling's Trace and Roy's largest root. It is believed that the measure to use is the most immune to violation of the assumptions underlying (MANOVA). There is some agreement that both Pillai's Criterion or Wilk's Lambda best meets this need, although in most situations all the measures indicate the same conclusion (Hair 1992). However, in this study Pillai's Criterion has shown slight deviation, where its result is not in-line with the results of the other tests, but taking into consideration the conclusion of the majority gives the priority to size in relation to its significance to structure.

From the above discussion, one can conclude that size is the most significant contextual dimension that influence organization structure in manufacturing in the Sudan, followed by ownership and control, whereas, the other contextual dimensions -including technology- have not shown any significance to the overall structure.

Table (6-20): Multivariate Tests Results.

Context	Tests	F	Sig.
Size (Log. Number of Employees)	Pillai's Trace	1.895	.044
	Wilk's Lambda	2.162	.021
	Hotelling's Trace	2.425	.011
	Roy's largest root	4.648	.002
Ownership and Control	Pillai's Trace	2.085	.028
	Wilk's Lambda	2.072	.028
	Hotelling's Trace	2.050	.032
	Roy's largest root	3.220	.014
Mass-out put oriented technology	Pillai's Trace	1.391	.187
	Wilk's Lambda	1.346	.214
	Hotelling's Trace	1.298	.246
	Roy's largest root	1.896	.110

Source: Empirically Collected Data

6-6 The Relationship between Context and Structure: A comparative Perspective.

This section will adopt a comparative perspective with regard to the relationship between context and structure in organizations. In the previous sub-section, the relationship between context and structure has

been specified by applying different statistical techniques. This sub-section gives a brief account of the comparison between the findings and results of this study and some of the relevant ones conducted in the Western milieu. This comparative perspective is expected to shed some light on the issue of "the universality" of the organization theory, the problem which has not received the appropriate attention in the literature at the theoretical-empirical levels.

6-6-1 **Comparison with Woodward's Study:**

Woodward (1965) developed a structural-contingency model of organizations with technology as the determinant variable. She claimed that mass production organizations are more structured, formalized and bureaucratized, while the successful unit or batch and continuos process technologies are less structured, formalized and bureaucratic. Our study found that technology exerts significant influence on organizational structure with respect to vertical span, standardization and formalization. This study has adopted a different methodology to investigate the problem. Regardless of the fact that the mass-output oriented scale is an adaptation to Woodward's classification, yet, the two scales exhibit different operationalization. This is because Woodward's classification is based on the technical complexity while the mass-output scale is based on the intensity of output. Woodward (1958) found that technology is dominant predictor of structure e.g. specialization, delegation of authority, span of control. Our study found that technology can be viewed as predictor of vertical span, formalization and standardization, however, size is found to have a superior influence compared to technology.

Although Woodward has not found such a relationship between size and structure in her study, she has reached some evidence of such

relationship when each of the production groups was considered separately. She explained this by indicating that in large-batch and mass production groups the number of levels of authority and the span of control of both the chief executive and the first line supervisor both tend to increase with size. One shortcoming of Woodward's study is that she hasn't investigated the impact of size with a similar perspective as she did with the technological systems. She only looked at the impact of size in each group of production system and admitted the impact of size on structure in each group having similar production system. This inferrence of mutual impact of technology and size was supposed to be sorted out by using a more rigorous methodology.

6-6-2 Comparisons with the Aston Group and their Advocates' Studies:

In this section a comparison will be made between the results of our study and the results of the studies conducted by the Aston Group and their advocates. Emphasis will be placed on to the studies covering manufacturing organizations only and adopting similar methodology so as to have a proper base for comparison and reach more conclusive results. In this respect the comparison will include the Aston Group study -covering manufacturing firms only- and the national study by Child and Mansfield (1972).

Table (6-21): Single Correlation of Structural Variables with Size (log. Number of employees)

Structural variables	Aston Study N=31	National Study N=40	This Study N=30
Functional Specialization	.75	.65	.766
Role Specialization	.83	.90	.836
Standardization	.65	.76	.606
Documentation	.67	.69	.661
Centralization	-.47	-.74	-.060
Vertical Span	.77	.63	.452

Source: A adopted from, Child (1973): Predicting and Understanding Organization Structure " in Administrative Science Quarterly, 18, no: 170

Table (6-21) shows the product-moment correlation between some selected structural variables and size (log. number of employees). For the purpose of comparison; the number of job titles has been used as a synonym for role specialization and formalization as a synonym for documentation. They are almost similar measures. It is obvious that the correlation coefficient for each individual structural variable is similar with respect to the three studies except for centralization and, to some extent, for vertical span. The correlation results of our study -except for centralization and vertical span- are closer to the results of the Aston study, if not the same, relative to that of the national study. Centralization is negatively correlated with size in the Aston study (-. 47) and the

national study (-. 74), where it shows no relationship with size in this study. In the British organizations, larger ones tend to be more decentralized, whereas in Sudan, the tendency to decentralize is the same among all organizations with different sizes. The relationship between vertical span and size is stronger in the British studies, whereas it is moderate in the Sudanese manufacturing firms.

6-6-3 Context and Structure: Cross-Cultural Comparison:

The inconsistent results of the correlation of size with centralization and that with the other structural variables in the three studies discussed in the previous sub-section suggests that, attention should be given to the effect of the cultural constrain on the decision relating to structuring of organizations. For this purpose, the results of our study is compared with the results of the study conducted by Hickson, Hinings, McMillan and Schwitter (1974). In their study data is analyzed on seventy manufacturing organizations in America, Britain and Canada. American and British data are taken from Inkson et al (1970) supplemented with more complete information made available by the authors. Canadian data was collected by Mc Millan et al (1973). The American sample includes twenty-one-manufacturing organizations ranging in size from 250 to 25,000 employees. The British sample includes twenty-one firms ranging in size from 260 to 18,000 employees. The Canadian sample ranges in size between 215 to 1500 employees including twenty-four organizations. The Aston measures have been adopted to measure both contextual and structural dimensions. The selected contextual dimension includes; size of organization, technology and dependence. The selected structural variables include: functional specialization, formalization of role-definition, and autonomy.

Table (6-22): Single Correlation of Size, Dependence and Technology with Structural Variables in Four Countries Separately.

Contextual Dimensions	**Formalization**	**Functional Specialization**	**Autonomy**
Size of organization			
United States	.48**	.82*	.37**
Britain	.45**	.79*	.01**
Canada	.49**	.49*	-.38**
Sudan	.66**	.77*	-.39*
Dependence			
United States	.11	.00	-.54*
Britain	.57*	.02	-.60*
Canada	.31	.14	-.42**
Sudan	.27	.29	-.65**
Technology: Automaticity Mode			
United States	.24	.42**	.27
Britain	.16	.13	-.31
Canada	.06	.13	-.17
Sudan	.18	.39*	-.18

* Correlation in significant at 0.01 levels.

** Correlation is significant at 0.05 levels.

Source: Adopted from: David J. Hickson et al (1974): The Culture-free Context of Organizations Structure: A Tri-National Comparison" in Theodore 0. Weinshell (ed.), Culture and Management (1st Edition, England, Penguin Books Ltd. 1977)

The correlation between scores on the contextual and structural variables is shown separately for the four countries in table (6-22). The organizations in the four countries are similar in formalization, functional specialization and autonomy. However, the pattern of relationship between size and autonomy seems to be a bit different for the four countries. There is some pattern in of the direction and magnitude of the relationships especially those between size and formalization and specialization and those between dependence and autonomy. However, Sudan seems to be higher in formalization and autonomy. Sudan is similar to Britain with respect to the relationship between: size and functional specialization, dependence and autonomy, and technology and formalization. Sudan is also similar to Canada with respect to the relationship between: size and autonomy, dependence and formalization and technology and autonomy. Whereas, Sudan resembles the United States only in the relationship between technology and autonomy and functional specialization. The greater similarity between Sudan and Britain may be attributed to the British heritage in Sudan and the close ties between the two countries after Sudan independence.

The significant relationship between size and the structuring of activities [i.e. functional specialization and formalization] in the four countries suggests that this ingredient is functional to the "universality of organizations". The relationship between dependence and autonomy also is another important ingredient.

Hickson et at (1974) were not able to assume culture-free context of organization structure because they believe that their research was based on data from three Anglo-Saxon societies only and they need other evidences from a much wider spectrum of societies in which levels of industrialization are varied. Our study adds another evidence from the

Sudan, which is having a different cultural environment and experiencing lower level of societal industrialization. Inspite of these differences, the findings are similar to the former study, and this could be considered as an additional evidence of the "Universality of Organization Theory". A question may arise: whether it is appropriate to compare the results of this study and Hickson (1974)'s study because the data of Hickson study was collected earlier than 1974. The answer is that even if we assume that Sudan now is at similar industrialization level to the three Anglo-Saxon societies at that time, still the difference of "cultures" is the most vital for a universal theory of organization.

Chapter Seven

Summary, Conclusions and Suggestions

7-1 Introduction:

This chapter aims firstly, to summarize the previous chapters of the study, secondly, to present conclusions of the theoretical framework as well as the empirical part of the study. Finally, the study will provide some implications and suggestions for future research related to the subject of the research.

7-2 Summary of the Study:

The importance of this research emanates from the on-going debate among organization scholars on the relationship between structure and context in organizations. However, the emphasis of most researchers has been on the manufacturing organizations. If concrete results have been reached on the relationship between structure and context in manufacturing, then the debate could be extended to the other taxonomy of organizations, which is a logical approach to building a more rigorous "organization theory" with respect to structure-context alignment.

The main objective of this study is to find out or specify the relative importance of the different contextual dimensions in determining structure of the manufacturing firms in the Sudan. Other issues, like the relationship between the contextual dimensions and the individual structural variables as well as the interdependence among the contextual dimensions and that among the structural variables, have been tackled.

Another important objective of this study is to find out what is "universal" among organizations with respect to the relationship between structure and context. An attempt to answer such a question has been made by comparing the results of this study with other similar studies conducted in the Western milieu.

The purpose of the second chapter of this study was to familiarize the reader with the societal level of industrialization in Sudan. The evolution, structure and performance of the manufacturing sector have been presented. It has been stated that the modern manufacturing sector in Sudan has a recent origin. It dates back to the early days of the independence of the country. The manufacturing sector in Sudan has been classified into seven major sub-sectors, dominated by light industries directed to satisfy the need of the local market. Most of the manufacturing firms are located in Khartoum and the central states of the Sudan. The manufacturing sector is faced with various problems: the weak infrastructure, inappropriate investment climate, finance problems, shortage of skilled labour, discouraging tax policies...etc. All these problems have contributed to raising the complexity of the environment of the industries operating in the manufacturing sector. It was also found that the contribution of the manufacturing sector to the gross domestic product is always marginal, whereas agriculture and services sectors are the major contributors. The result of these problems is that most of the manufacturing firms in Sudan are characterized by under-utilization of capacity.

Chapter three is an attempt to present an intensive literature review to define the basic variables or concepts of the study; context and structure as well as the other relevant concepts. A critical review of the contextual dimensions of organizations has been attempted; these dimensions are: size, technology, ownership and control, task environment, charter,

location, history and dependence. The operationalizatrion of these dimensions has also been reviewed. The selected structural variables in this study are specialization, centralization, configuration, standardization and formalization. These structural variables have been widely used by organization researchers in their studies, which makes comparisons easier. The review of the literature on the contextual dimensions revealed that their different operationalization poses some problems to the researchers.

Chapter four presents a critical review of some selected studies conducted on the relationship between structure and context. No claim has been made that these selected studies cover all the research concerning this issue, nevertheless, they cover most of the prominent works in this subject. In spite of the many researches conducted in this area, little agreement was reported about the results and the nature of the relationship between context and structure.

Whereas Woodward (1965) and her advocates believe that technology is a prime determinant of organizational structure, the Aston Group (1969) and their advocates claim that size is a prime determinant of structure. However, the Aston Group have tried to reconcile their findings with Woodward's but they denied the technological imperative rationale and stated that technology has no major impact on structure. The disagreement among researchers with respect to the relationship between structure and context may be attributed to the followings: (i) "size" has been operationalized by most researchers in terms of the number of employees, this might raise the question whether this measure of size can be used for all types of organizations, especially in the light of the emergence of the rapid automation and the technological advancement, where manpower tends to be replaced by machine, (ii) different operationalizations have been introduced for "technology", hence they

may not result in the same measures. This raises the question about the applicability of all technology measures to all types of organizations, (iii) different researchers have utilized different measures for the structural variables, hence different operationalizations are not expected to arrive at similar conclusions and it is meaningless to compare the uncomparables, (iv) the variation of the sample selection and level of analysis may be another disagreement factor, (v) the interdependence of the contextual dimensions may a be complicating factor, because this will make it difficult to separate the effect of various contextual dimensions, (vi) the difficulty of developing pure global measures for environmental stability, certainty and simplicity.

In chapter five, the study states the research methodology and design. The method of organizational analysis used is the "comparative method" which gained popularity in organizational analysis due to the increased knowledge of the advanced statistical techniques and the aid of computers. The research has adopted the Aston Group's measures for measuring the organizational variables. The Aston measures are widely used by researchers, however, this research attempted to develop appropriate measures for the task environment and location. The multivariate analysis, especially the multiple analysis of variance (MANOVA) and the analysis of variance (ANOVA), have been utilized to test the research hypotheses. This in addition to utilizing single correlation analysis to test the hypotheses regarding the interdependence of the organizational variables. In this chapter, the research limitations and hypotheses have also been highlighted.

Chapter six, which is the core of the study, presents the empirical findings and analysis of the collected data utilizing the statistical methods

outlined previously. The analysis of the data revealed the existence of some sort of interdependence between ownership and control, on one hand, and dependence on the other hand. Also, there is interdependence between location and size. This interdependence complicates the results concerning the relationship between structure and context. However, the interdependence between size and location is expected, as most of the manufacturing firms located in the rural areas in the Sudan are relatively large in size. With respect to the relationship among the structural variables, it was found that: (i) more specialized organizations tend to be more formalized, more standardized, have wider span of control of supervisors and have longer vertical span, (ii) more centralized organizations tend to have less autonomy and shorter vertical span, (iii) organizations with long vertical span tend to be more formalized and more standardized, (iv) more standardized organizations tend to be more formalized.

Concerning the relationship between size and the structural elements, it is found that there is strong, significant and positive correlation between size and the followings: specialization, standardization, formalization and the supervisor span of control, whereas size has shown moderate correlation with autonomy and vertical span. Size has no bearing on executive span of control, administrative component and centralization. The analysis of variance has confirmed these results. The multiple comparisons tests have shown that the impact of size on specialization is attributed to the difference in the means of specialization scores between the relatively large size firms on one hand and the relatively small and medium size firms on the other hand. The significance of size to the supervisor span of control is attributed to the difference in the means of the scores of the latter between the relatively large and the relatively small organizations, and so does the vertical span.

The significant influence of size upon formalization and standardization is attributed to the difference in the means of ormalization and standardization scores between the relatively small and the relatively large organizations. However, the difference between small size and medium size organizations is significant, for formalization only.

The single correlation analysis revealed that technology is having significant relation with some structural variables. Automaticity mode has significant, but less than moderate relationship with functional specialization and centralization, while mass-output oriented technology has similar relationship with the number of job titles, functional specialization, vertical span and formalization. But mass-output mode has moderate relationship with standardization. The analysis of variance revealed that only vertical span, standardization and formalization respond significantly to the different scales of mass-output oriented technology. The significance of the difference in the means of vertical span scores is due to that between unit/small batch technology and continuos process one. The impact of the sub-scales of technology upon formalization is similar to that with vertical span, whereas standardization is sensitive to the difference among the three sub-scales of technology.

The high positive and significant correlation between ownership and control and autonomy suggests that the fewer the controlling hands, the more is the autonomy of the organization. Ownership and control have less than moderate correlation with vertical span and formalization, but shows weak and insignificant relationship with the other structural variables. The analysis of variance found that ownership and control –in terms of its three sub-scales; public ownership, private ownership with professional managers and private ownership where managers are the owners- impose significant influence upon organization scores with respect to specialization, autonomy, standardization and formalization.

Furthermore, the multiple comparisons tests show that the significant impact of the modes of ownership and control upon specialization emanates from the difference between the means of the latter scores with respect to private-managed-by-professionals-organizations versus private-managed-by-owners-organizations. There is no significant difference between the publicly owned organizations and either of the two other modes with respect to specialization. Autonomy is significantly influenced by the nexus of public ownership and private ownership (whether managed by Professionals or by owners). Both formalization and standardization are significantly influenced by the nexus private with professional management ownership versus private managed-by-owners mode of ownership.

Task environment -as operationalized in this study- has shown no relation at all with specialization, vertical span, and formalization. It has also shown insignificant, weak and negative correlation with the rest of the structural variables. The analysis of variance has confirmed this result.

The high interdependence between location and size in this selected sample of organizations made it impossible for the researcher to make any inferences about the relationship between location and structure. Dependence -as a contextual dimension- has shown a strong, negative and significant correlation with autonomy. Again this significant correlation may be attributed to the impact of ownership and control, since there is high interdependence between dependence and the latter, or ownership and control and dependence may be two aspects of one organizational characteristic. Charter, as a contextual variable has not shown any significant or strong correlation with any structural variable.

The multiple analysis of variance (MANOVA) has been utilized to investigate the relative importance of size, technology and ownership and

control to organization structuring in the manufacturing sector in the Sudan. Using four criteria, three of them have ranked size as the vital determinant of structure followed by ownership and control. The other contextual dimensions -including technology- have not shown any significance to the overall structure.

Comparisons of the results of this research with other similar researches have been made. In contrast to Woodward (1965)'s study which found that technology is the dominant predictor of structure e.g. specialization, delegation of authority and span of control, this study found that technology can be viewed as predictor of vertical span, formalization and standardization. In spite of this, size is found to have an overwhelming influence upon structure compared to technology, and technology has no overall influence upon structure.

Compared to the Aston Group and the National Study, the results of this study have shown high degree of consistency with the results of the formers. The correlation coefficients were found to be similar across all the structural variables -except for centralization- in the three studies. To test the universality of the type of relationship between context and structure, the results of this study have been compared with one of the results of the study conducted by Hickson et al (1974) using data from America, Canada, and Britain. The organizations in the four countries are found to be similar in formalization, functional specialization and autonomy. The direction and magnitude of relationships of the structural variables in the four countries are found to be consistent. In spite of the differences between Sudan and these three countries, similar results have been obtained with respect to the relationship between structure and context.

Regarding the research hypothesis which states the relative importance of the contextual variables in determining the structure of the

Sudanese manufacturing firms, the null hypothesis that ownership and control and size have significance to the overall structure is rejected, while the null hypothesis that technology has no significance to the overall structure is accepted. However, size is found to be the most important determinant of organization structure.

With regard to the hypothesis that relates to the relationship between the individual structural variable and the contextual variables, centralization has no relevance to neither the mode of ownership and control nor size, thus the null hypothesis is accepted. Specialization is found to be highly influenced by size and not by ownership and control nor environment, thus the null hypothesis is also rejected. The null hypothesis is also rejected that configuration is found to be highly influenced by size. Standardization and formalization are found to be highly influenced by size rather than ownership and control, the null hypothesis is thus rejected.

Similarity in the relationship between structure and context between Sudan and some Western countries has been reported in the study.

7-3 Research Conclusions:

This sub-section concludes the discussion that in the previous chapters of this study on the relation between context and structure in general and specifically in the manufacturing sector in the Sudan.

7-3-1 Size and Structure:

Since organizational size is found -by most researchers- to be the most influential contextual dimension to structure, the concept has

received a lot of attention. The operationalization of size as the number of employees available in the organization has been a popular measure. Although "resources available to an organization" is also a reasonable measure, yet it has been overlooked by most of the researchers. The reason for that may be the difficulty involved in estimating the real value of the total resources available to an organization. The rapid pace of automation in the manufacturing sector forced the researcher to pay the "size of investment" more attention. However, the two measures of size may be used as alternatives if only the correlation between the two measures is high enough. In most of the studies -including this one- size has been treated as a contextual dimension so as to assign it an overwhelming important causal role. Size should be treated as a contextual dimension as long as the change in size takes place independent of the change in other contextual dimensions e.g. size may be treated as a structural dimension if change in size takes place as a consequence of a technological change. The question which has been posed by Kimberly (1976) whether size, operationalized in terms of the number of employees, is appropriate for all types of organizations still needs an in-depth investigation.

The similarity between the results of this study and that of the Aston Group (1969) with respect to the impact of size on structure, may classify this study as going in line with the Aston Group

7-3-2 Ownership / Control and Structure:

No such a strong influence of ownership and control upon structure –as in this study- has been reported in any research conducted in the Western countries. Nevertheless, the Aston Group (1969) found positive

relationship between public accountability and concentration of authority (r=0.63) and standardization (0.56). Also Grearaets (1984) found that on average, firms of a given size will be horizontally differentiated, more formalized, and will have higher internal specialization when they are controlled by professional managers than the case when they are controlled by the owners. Although concentration of authority has nothing to do with the mode of ownership and control, yet Gearaets (1984) findings are similar to that of this study.

The single correlation analysis failed to reflect the impact of ownership and control upon structure. However, this has been reflected very clearly in the analysis of variance, which is a more powerful tool than the correlation analysis. The reason of inconsistency between the results of the two methods may be due to the ordinal measure used to operationalize the concept. The opearionalization used is most appropriate for the analysis of variance rather than the correlation analysis.

7-3-3 Technology and Structure:

Although the results of the study did not assign a significant impact of technology on structure, yet it has been found to influence a few structural variables. Approximately, this has been the case in the findings of most of the researchers in this field. Woodward (1965) and her advocates, and other researchers like Thompson (1967) and Perrow (1967) have developed theoretical models showing the connection between technology and structure. In spite of the logic involved in these theoretical models, the empirical evidence -till now- is not substantial. Since the organizational structure is the physical manifestation of the decision-making process, the perception of the decision-maker may be an

intervening factor in setting structure with respect to its relation with technology.

The most striking finding is the similarity between the results of this study and that of Hickson et al (1974) regarding the relationship between technology and structure. Technology is expected to have less important role in structuring an organization in a country like Sudan where the level of societal industrialization is relatively very low. In the highly industrialized countries technology is expected to play greater role in organization structure, however, the findings of the research have not proven that.

7-3-4 Task Environment and Structure:

Although Burns and Stalker (1961), Lawrence and Lorsch (1967) have pointed-out the important role of task environment in structuring organizations the findings of this research failed to establish any connection between task environment and the organizational structure. Unlike, Burns and Stalker and Lawrence and Lorsch, Osborn and Hunt (1974) and Pennings (1975) did not find any support to the structure-contingency model of the formers. The findings of this research are in-line with the findings of Osborn and Hunt and Pennings.

Khatz and Kahn (1979) proposed three different strategies for responding to the threat of the external environment. This implies that organizations have open options, to respond to environmental dynamics. Thus organizations operating in the same turbulent environment may respond to change in different manners, hence they may not necessarily show similar structures. This argument denies the structure-contingency model of the influence of environment upon organization structures. Also the proposal of Khatz and Kahn implies that a more sophisticated

methodology should be utilized to investigate the impact of the task environment on structure. Unlike the measures of the other contextual dimension which are more or less global, the measures utilized to operationalize the task environment are, to some extent, subjective. It seems that it is difficult to develop pure global measures for environmental stability, certainty and simplicity. The perception of the decision-maker may be a decisive moderator of the impact of task environment on structure.

7-3-5 Structure and Context: A Contingency Model:

The analysis of the research findings has shown that "size" is the most important contextual dimension in determining the overall structures of the manufacturing firms in Sudan. Ownership and control come in the second place. Whereas, technology, operationlized in terms of mass-output orientation, is found to have significant impact upon some of the structural variables, namely; vertical span, standardization and formalization. The moderate correlation between size and mass-output oriented scale of technology points to some sort of interdependence between the two contextual dimensions.

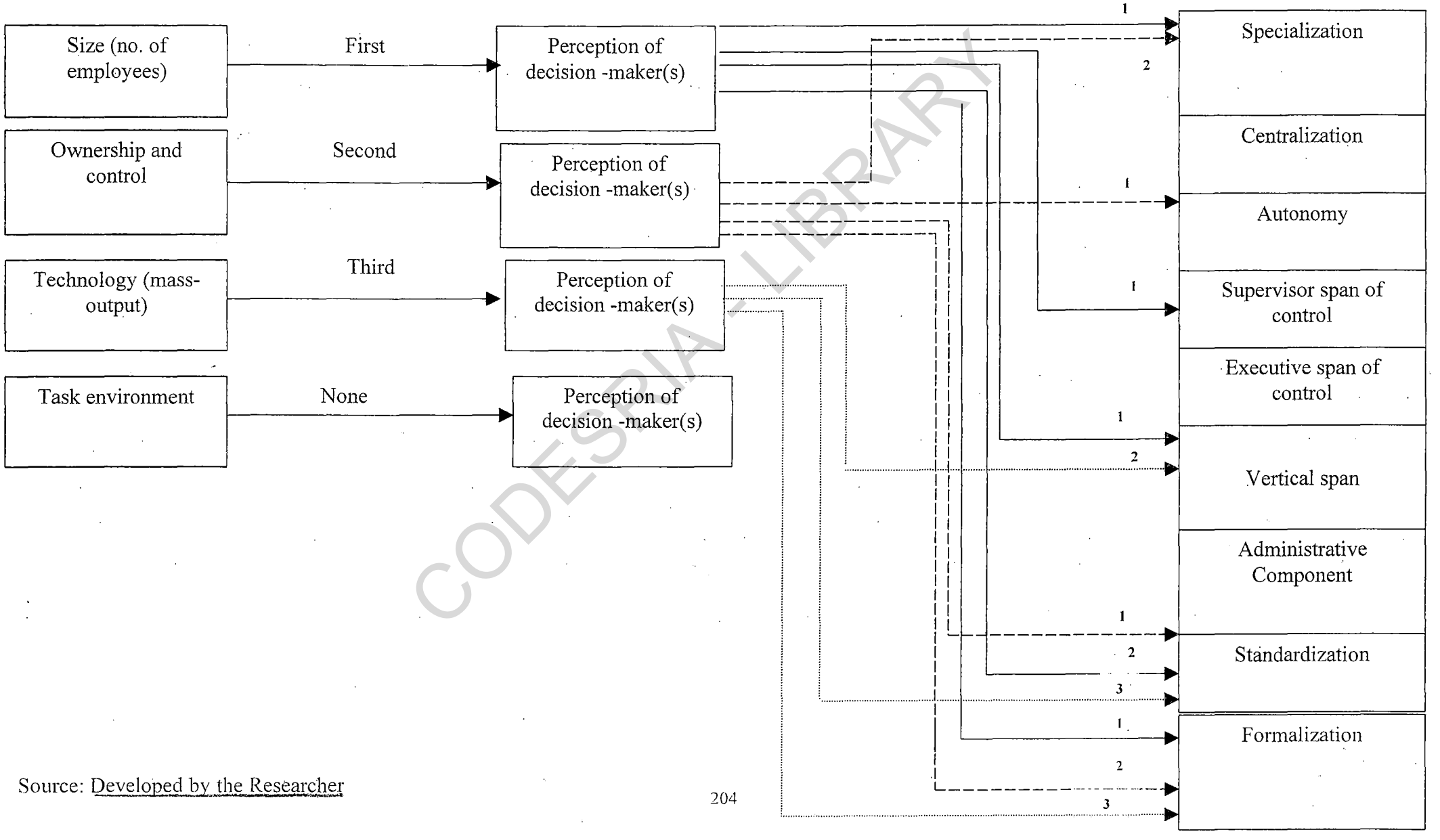
This study has shown that variations in organization structure can be explained by variations in such contextual dimensions as size, ownership and control, and to some extent technology. Thus, the study suggests a structure-contingency model in studying organizational structure. The structure-contingency model has been criticized by Bobbitt and Ford (1980) in that the majority of researches using this model have been static, cross-sectional, and bivariate. They added that the analytical framework of current structure-contingency models need to be expanded to include the decision-maker choice as a determinant of structure.

However, Bobbitt and Ford failed to distinguish between contextual pressures which have an effect upon structuring because of the way they are perceived and those factors that have an impact in spite of perception (Ranson, Hinings and Greenwood 1980). Thus, the perception of the decision-maker is not a decisive factor in structuring organization, but it is rather a moderating one.

Figure (7-1) exhibits a structure-contingency model with respect to the relationship between structure and context in manufacturing in Sudan. The model shows the impact of the perception of the decision-maker as a moderating factor rather than a determining factor. The model exhibits the order of the contextual factors with respect to their relative importance and significance to the overall structure, as well as, the order of the impacts of the individual contextual factors upon the individual structural variables.

The knowledge of the scores of an organization on the contextual dimensions that show high correlation with structure makes it possible to predict within relatively close limit its structural profile. In this respect a multiple regression model can be utilized to estimate the values of each structural variable given the values of the contextual dimensions, which are the independent variables. Of course this can be done only if all the assumptions of the multiple regression model are satisfied (Anderson, Sweeney and Williams 1996).

Figure (7-1): The Contextual Pressures and their Importance on Overall and Individual Structural Elements Considered by the Perception of the Decision Maker(s)



Source: Developed by the Researcher

The multiple regression model can be shown as follows:

$Y = Bo + B_1X_1 + B_2X_2 + B_3X_3 + E$

Where:

Y	=	the structural variable
X_1	=	size of the organization (no. of employees)
X_2	=	Ownership and control
X_3	=	Technology
B_0	=	B1, B2, B3 are the parameters
E	=	a random variable.

The other contextual dimensions, which have no apparent relevance to structure, can also be included in the model.

7-3-6 The Universality of Context-Relevancy to Structure:

The similarity of the results of this study and the results of some studies conducted earlier in the Western countries suggests that the impact of culture on organizational structures is not as strong as it is perceived by many researchers. The relationship between size and structure, ownership/ control and structure, and technology and structure ascertained in this study is similar to that proven in the West except for the relationship between context and centralization, context and administrative component. These dissimilarities suggest that culture has its role in organizational structure, however, the similarities outweigh th the differences. The similarities between the results of this study and those of the Western studies may be attributed to the impact of transfer of technology, training and education of Sudanese decision-makers in the Western countries, which will help minimizing the impact of culture upon management practices. However, this issue needs deeper investigation. It

is also suggested that centralization of decision and autonomy are the two structural variables, which are highly influenced by culture.

7-4 Suggestions:

The study suggests the followings:

(i) In order to develop an empirically derived organization theory, we must firstly develop a science of taxonomy enabling us to classify organizations as members of homogeneous groups. This in spite of the argument of some researchers that to develop an organization theory in a full sense, theories must apply to all organizations equally. This argument does not contradict the effort to study homogeneous groups of organizations first to establish, empirically derived relationships, and thereafter, relationships in terms of differences and similarities can be established among the different homogeneous sub-groups. Of course, excessive care in formulating and comparing the comparables might become a barrier to developing a sound organization theory. So organizations have to be classified into homogenous group e.g. according to the input-output process. Organizations may be processing the followings; materials, information, people, money... etc.

(i) This study is a cross-sectional one intended to establish a framework for operating defined concepts and their pattern of relationships rather than the causal effects. In order to investigate those casual effects, longitudinal studies should be conducted for that purpose. Organizations that experience change of ownership or size or/and technology should be the targets of such studies so as to understand the casual effects and the process.

(ii) No systematic effort was exerted by researchers to investigate the relationship between structure and performance, with the exception of Woodward (1965) and Lawrence and Lorsch (1977). This study has tried to shed light upon such relationship. However, it has been faced with the difficulty of collecting necessary data for measuring performance of the manufacturing firms in the Sudan, keeping in mind the complexity of measuring the effectiveness of organizations. Studies have to be conducted to see whether or not successful organizations exhibit similar structures with respect to specific context.

(iv) The debate on the "universality" and "culture-bound" organization theory necessitates conducting and comparing studies in the field of structure-context alignment. These studies should be conducted in different cultural environments of different levels of societal industrialization. Universal measures should be agreed upon for the purpose of measuring structural and contextual variables. The Aston measures could be the foundation for such work. These measures have to be simplified as possible, although excessive simplicity may jeopardize the validity of the measure.

Appendix (A)

(A-1): The Contextual Dimensions

(1) Name of the Organization

(2) Origin History and Dependence of the organization (high scores = dependence, low scores = independence).

(i) The legal framework.

(ii) Date of the establishment.

(iii) The organization was founded by:	Scores
a) A person or persons	0
b) An existing organization	1

(iv) The status of the organization

a) Principal unit	0
b) Subsidiary (with legal identify)	1
c) Head branch (with headquarters on the same place)	2
d) Branch	3

(2) Charter

(Low score = high standardization of output, high scores = low standardization and a trend to diversify)

(i) Type of out put

a) Consumer	0
b) Producer	1

(ii) Client selection

a) Sell to the public	0

b) Deal with selected client 1

(iii) Multiplicity of output

a) Single standard 0

b) Two 1

c) Three 2

d) Four 3

e) Five 4

f) More than five 5

(3) Location

(High scores = the organization is located in urban populated area and vice-versa)

(i) Distance from the capital

a) Located out-side the capital 0

b) Located inside the capital 1

(ii) Is the organization located in the rural or urban areas

a) Rural area 0

b) Urban area 1

(iii) Density of population

a) Less than 500,000 0

b) Less than one million 1

c) Between (1-2) millions 2

d) Between (2-3) millions 3

e) More than 3 millions 4

(4) Ownership and Control

(i) The organization in a public enterprise 1

(ii) The organization in a private firm managed by professional managers 2

(iii) The organization in a private firm and the owners are the mangers 3

(5) The Size of organization.

(i) The squire footage available for organization's activity

(ii) The total number of employees (full-times vs. part-timers)

(iii) Annual sales volume.

(iv) The total net assets of the organization(re-evaluated)

(6) Technology

(i) Automaticity Mode

The estimate of the automaticity mode is developed by Amber and Amber (1962). This scale is an estimate of the bulk of the equipment used by the organization in its work flow activities.

a) Hand tools and manual machines	0
b) Powered machines and tools	1
c) Single-cycle automatics and self feeding machines	2
d) Automatic: repeats cycle	3
e) Self-measuring and adjusting: feedback	4
f) Computer control: automatic cognition	5

(ii) Mass out put oriented scale.

The corresponding score of the technology in organization is equivalent to the score representing the technology that is pre-dominant in the production system. The scale is adapted from Khandwala (1974)'s scale of measuring mass-output oriented technology.

a) Unit technology	0
b) Small batch technology	1
c) Large batch technology	2
d) Assembly-line technology	3
e) Continuous process technology	4

(7) Task-Environment

(High scores = unfavourable environment, low scores = favourable task environment).

(i) Supply of raw materials

a) Stable supply 1

b) Almost stable supply 2

c) Moderately stable supply 3

d) Almost unstable supply 4

e) Unstable supply 5

(ii) Supply of spare parts and equipment

a) Stable supply 1

b) Almost stable supply 2

c) Moderately stable supply 3

d) Almost unstable supply 4

e) Unstable supply 5

(iii) Supply of work force

a) Stable supply 1

b) Almost stable supply 2

c) Moderately stable supply 3

d) Almost unstable supply 4

e) Unstable supply 5

(iv) Turn-over of labor

a) low rate of turn-over 1

b) Almost low rate. 2

c) Moderate rate of turn-over 3

d) Almost high rate of turn-over 4

e) High rate of turn-over 5

(v) Unionization

a) Docile labour activities. 1

b) Almost docile labor activities. 2

c) Moderately docile labor activities. 3

d) Almost hostile labor activities. 4

e) Hostile labor activities. 5

(vi) The rate of technological change in the industry

a) Low rate of technological change. 1

b) Almost low rate. 2

c) Moderate rate. 3

d) Almost high rate. 4

e) High rate. 5

(vii) Production the industry

a) The firm is the only producer. 1

b) The firm is the dominant producer. 2

c) The firm is the one among small number of producer. 3

d) There is almost a large number of producers. 4

e) There is a large number of producers in industry. 5

(viii) The number of production lines

a) There is one production line. 1

b) There are two production lines. 2

c) There are three production lines. 3

d) There are four production lines. 4

e) There are four production lines. 5

(ix) The customers

a) Deal with the large public. 1

b) Deal with a large number of segments. 2

c) Deal with few numbers of segments. 3

d) Deal with almost selected clients. 4

e) Deal with selected clients only. 5

(A-2) The Structural Dimensions

(1) The organization chart

(2) Job titles of the positions in the organization which correspond to the following levels:

Job tittle	Corresponding
(i) Above the chief executive level	
(ii) Whole organization	
(iii) All work flow activities level	
(iv) Work flow submit level	
(v) Supervisor level	
(vi) Operator level	

(3) Number of job tittles in the organization…

(4) Functional specialization:

A function is specialized when at least one person performs that Function and no other function.

No.	Specialization	Performing		
		One person	More	A department
1-	Public relation & advertising			
2-	Sales and services			
3-	Transport of output & resources			
4-	Employment			
5-	Training			
6-	Welfare and security			
7-	Buying stock control			
8-	Maintenance			
9-	Accounts			
10-	Production control			
11-	Inspection			
12-	Methods (Asses & devise of production methods			
13-	Design and Development			
14-	Organization and Methods			
15-	Legal			
16-	Market research			

(5) Centralization

For measuring centralization, each organization will be given a score. This score is calculated by summing the corresponding scores for each level of authority that takes the specific decision. For example, if the decision is taken above the chief excessive level it will be given (5), if it is at the chief executive level it will be given (4) and so on, until the operator which will be given zero.

Decisions

1- Labour force requirements.

2- Representing the organization in labour disputes.

3- Number of supervisors.

4- Appointment of supervisory staff from outside the organization.

5- Promotion of supervisory staff.

6- Salaries of supervisory staff.

7- To spend unbudgeted or uncalculated money on capital items.

8- To spend unbudgeted or uncalculated money on revenue items.

9- Selection of type of brand for new equipment.

10- Overtime to be worked.

11- To determine new product or service.

12- To determine marketing territories to be covered.

13- What shall be costed. (Costing system).

14- What shall be inspected (items, processes…etc.).

15- Dismissal of an operator.

16- Dismissal of a supervisor.

17- Methods of personal selection.

18- Training methods.

19- Buying procedures.

20- Supplies of materials.

21- Welfare facilities to be provided.

22- Price of the output.

23- Creation of a new department.

24- Creation of new job.

25- The least job title holder who may be allowed to take over as acting chief executive.

(6) The chief executive span of control……..

(7) The span of control of the supervisor…

(8) The organization vertical span…

(9) The administrative component.

(i) The number of supportive staff

a) Managers

b) Professionals

c) Clerks

(ii) The number of production staff

a) Technicians

b) Craftsman

c) Operators

(10) Standardization

(High score = high standardization and vice-versa)

(i) Inspection

a) Frequency (0-none 1- haphazard 2- random sample 3- 100%)

b) Method (0- none 1- visual 2- attributes 3- measurements)

c) Type (0- none 1- raw material + processes or of final inspection 2- processes + final inspection 3- raw material + processes + final inspection 4- special inspection process e.g. statistical Quality control)

d) Sock taking (0-never taken 1- yearly 2- semiannually 3- quarterly 4-monthly 5- weekly 6- daily)

(ii) Operational control

a) Firms plans (0-day 1- week 2- month 3- quarter 4- year 5- over one year 6- permanent)

b) Maintenance ((0-no produce 1- break down procedure 2- mixed 3- planned maintenance 4- programmed replacement)

(iii) Final Control

a) Range (1- whole firm 2- one product 3- some product 4- all products 5- all activities).

e) Comparison with budgets ((0-none 1- yearly 2- half-yearly 3- quarterly 4- monthly 5- weakly 6- continually)

(iv) Communication

a) Decision making (0-as needed 1-semi-standardized 2- standardized 3- project justification)

(v) People recruiting

Selection of personnel (1- interview by supervisor 2-interview by personnel officer 3-grading system or interview board 4-outside appointee). How does it take place for the followings:

a) Selection of operative

b) Selection of foreman

c) Selection of executive

(vi) Sales

a) Catalogue (0- none 1- giving products 2- giving product and price 3- as in 2+ delivery times)

b) Sales policy (1-general aim 2- some specific aim 3- sales policy)

(11) Formalization of Role-definition

The degree of formalization of role-definition in the organization is given by the number of specific-role defining documents, which exist in the organization.

Documents	Scoring
(i) Written union contract	0/1

(ii) Information booklets given to: (none = 0, few employees = 1, many employees = 2, all employees = 3)

(iii) Number of information booklets: (none = 0, one = 1, two = 2, three = 3, four or more = 4)

(iv) Organization chart given to: (none = 0, chief executive only = 1 C.E one other executive = 2, C.E + most all hacks=3)

(v) Written operating instructions 0/1

(vi) Written terms of reference or job description

- For all works 0/1
- For staff (other than line superordinate) 0/1
- for chief executive 0/1

(vii) Manual of procedures 0/1

(viii) Written policies 0/1

(iv) Workflow (production) schedules or programs 0/1

(x) Written research program 0/1

(12) Performance of the organization

(i) Utilized production capacity for the last five years.

(ii) Market share.

(iii) Annual profits and rate of return.

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