

**SPATIO-TEMPORAL PATTERNS AND ENVIRONMENTAL
IMPACT OF INDUSTRIAL AGGLOMERATION IN THE LAGOS
REGION, NIGERIA**

BY

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A thesis in the Department of Geography

Submitted to the Faculty of the Social Sciences

In partial fulfillment of the requirements for the Award of the degree of

DOCTOR OF PHILOSOPHY

of the

UNIVERSITY OF IBADAN

JUNE 2014

ABSTRACT

Studies on industrial agglomeration have focused on the advantages of geographical proximity and increasing returns to scale of production. These studies have largely neglected other fundamental aspects, especially the spatio-temporal dynamics of agglomeration and the perceived environmental impact. This study, therefore, examined the clustering of firms over time and the perceived effects of the clustering on the environment in the Lagos region, between 2005 and 2009.

A survey of industrial estates and firms was carried out. The Manufacturers Association of Nigeria Industrial Directory, and Lagos State Ministry of Commerce and Industry records were used to determine the location of firms. A structured questionnaire was used to collect data on the characteristics and clustering patterns of the existing 103 firms in the twelve industrial estates. Data on the perceived severity of environmental impact of agglomeration were obtained through a questionnaire survey administered to 120 heads of households in a spatial systematic sampling procedure. The head of the household nearest to each of the estates was first sampled. Thereafter, heads of household located at intervals of 10 houses were interviewed. The ANOVA was used to determine the variation in the pattern of agglomeration economies over time. Canonical Correlation was used to determine the relationship between the structural characteristics of firms and agglomeration economies. Pearson Product Moment Correlation was employed to determine the relationship between distance from an industrial estate and the perceived severity of environmental impact. The analyses were done at $p < 0.05\%$.

Agglomeration varied from 23.0% in Ikeja to 1.9% in Ogba industrial estates. This variation may be explained by the age and available facilities in these industrial estates. The relationship between the structural characteristics of firms and agglomeration economies is significant ($F\text{-cal} = 3.52$). Agglomeration economies varied significantly among the firms ($F\text{-cal} = 34.92$). Access to financial institutions, accounted for 33.1% in 2005; 47.6% in 2006; 47.2% in 2007; 45.7% in 2008 and 51.5% in 2009. Telecommunications in contrasts accounted for 4.9% in 2005; 1.9% in 2006; 1.9% in 2007; and 0.0% in 2008 and 2009 respectively. The wood and wood products industry group benefitted the most; in 2005 (31.8%); 2006 (22.8%); 2007 (42.7%); 2008 (38.5%); and 2009 (61.4%) compared to the chemical and pharmaceutical industry group which benefitted the least: 5.2% in 2005; 8.6% in 2006; 7.9% in 2007; 9.5% in 2008; 15.6% in 2009. Air (20%) and noise pollution (20.0%) were perceived by the residents as the most significant environmental impact of agglomeration. About 48.0% respondents indicated that the environmental problems were severe. The severity reflected a distance decay function ($R = -0.641$). Seventy-five per cent of the respondents indicated that firms were not doing enough to address the identified negative impacts.

Agglomeration varied among the industrial estates as well as amongst the industry groups. Air and noise pollution were perceived as the most significant environmental problem associated. Agglomeration should therefore be encouraged to promote industrial development, while the negative impact should be curtailed.

Keywords: Industrial agglomeration, Spatio-temporal variation, Distance decay function, Lagos region.

Word count: 487

ACKNOWLEDGEMENT

I am very grateful to God Almighty, the giver of life and all good things, who has made the completion of this thesis possible. He saved me from accidents many times in the course of this programme. I am also very grateful to my supervisor; Professor C.O. Ikporukpo, who among his tight schedules ensured the successful completion of the thesis, His moral, positive, constructive and kind contributions are highly appreciated.

I cannot but express my profound gratitude to the entire members of the academic staff, Department of Geography, University of Ibadan, for their wonderful contribution that facilitated the successful completion of this thesis. Mention must be made of Professors M.O. Filani, M.A.O. Ayeni, A. Faniran, J.O. Ayoade, A.S. Gbadegehin, A. Aweto, Dr. G.O.Ikwuyatum and Dr. O.O.P. Alokun. I am particularly grateful to Professor S.I.Okafor for his kind contribution, and in making some of his materials which were very relevant available for my use.

My unalloyed appreciation goes to Dr. D.D. Ajayi, I am very grateful for his wonderful assistance and brotherly care, kind contributions towards the successful completion of this thesis. The preparation of this thesis has been made possible with the support of eminent scholars who made relevant materials available for my use. Notable among them are Professors A.J. Scott, Lewis Centre for Regional and Policy studies, C.K. Leung (Associate Professor), California State, Fresno; H.N. Yeung, School of Geography, University of Washington, Seattle and E.L. Echeverri-Carroll, School of Business, University of Texas at Austin.

I am indeed grateful to the entire members of my family, particularly my dear parents, late Mr. and Mrs. Fagbohunka of blessed memory who taught me to understand my limitations, and not waste time on tasks beyond my scope, but to take the future as a brand-new challenge, that I can meet with confidence and hope. My profound appreciation also goes to my wife Mrs. Mercy Iyabo Fagbohunka, and my children Grace, Praise and Samuel, I sincerely appreciate your love, care and unflinching support. My thanks also go to a number of colleagues, Mr. A.F Fatusin, Mr. R.Sumaila, Dr. A. Aribigbola, and Dr. Sola Olorunfemi I am also grateful to Ala Gideon and Paul S. Ohunakin for typing this thesis.

Adejompo Fagbohunka.

June, 2014.

DEDICATION

This work is dedicated to the awesome God, the same yesterday, today and forever. Heb.13:8 and to my late parents

MR. ENIOLA FAGBOHUNKA

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CERTIFICATION

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CHAPTER ONE

1.0 BACKGROUND, AIM AND OBJECTIVES AND METHODOLOGY

1.1 BACKGROUND TO THE STUDY

There has been a significant shift in industrial geography from the traditional focus on Weberian and neo-classical theory to an increasing emphasis on the geographical foundation of production systems and the relationships between business organizations and other capitalist structures, such as state and labor. Apart from the post-fordist flexible specialization thesis and regulationist perspective, more recent works have focused on network analysis (see Yeung, 1994; Ajayi, 1998; 2003; 2006 for example). Agglomeration economies amongst firms also find expression in the network of industrial organization.

The development of agglomeration could be traced to the works of Marshall (1890, 1919) and Weber (1929), the key theoretical dynamics of which are scale effects. Agglomeration economies are the benefits enjoyed by firms locating in the same place. The concentration of the production facilities of a single firm or across multiple firms in a single location generates cost-saving scale effects and often leads to further agglomeration of firms through an industrial location process (Weber, 1929; Hoover, 1937; Venables, 2008). Such cost saving effects of agglomeration is often called agglomeration economies. Agglomerative activity can take many forms (Hoover and Giarratani 1984) and is often considered to result in either “localization “or “urbanization “ (external) economies dependent upon the industrial composition of the cluster or complex. Localization economies involve economies amongst similar firms, while economies amongst unlike firms are known as urbanization economies. The latter form of agglomeration has received greater attention in the literature, often providing a mechanism for analyses of differential urban growth and optimal city size.

Locating a firm in close proximity to similar types of firms or suppliers/demanders may have economic motivations in terms of enhanced productivity or reduced costs. The implied agglomeration, externalities or economies across firms in an industry or sector may be due to various forces, including a conglomeration of specialized inputs and informational or knowledge spillovers. Externalities are costs and benefits of transactions that are not reflected in prices. Pollution is the most commonly used example of a negative externality. Scitovsky (1954) first developed a conceptual framework to distinguish two different types of externalities according to how they are mediated. First technological externalities arise from non-market interactions among firms in proximity and affect the production sets of firms. Shared knowledge and expertise are the most common sources of externalities. In contrast, pecuniary externalities are purely based on market interactions. Therefore, this type of externalities influences firms only in so far as they are involved in activities that affect price mechanism (Ottaviano and Thisse, 2001). Agglomeration has traditionally been viewed as central to cluster development, in which geographical proximity has facilitated crucial externalities, particularly those relating to the generation and diffusion of tacit knowledge through the creation of an innovative environment surrounding the industry.

Regional clusters may be used as a catch-word for older concepts like industrial districts, specialized industrial agglomerations and local production systems. A regional cluster may be defined as a geographically bounded concentration of interdependent firms. According to Rosenfeld (1997) a “cluster should have active channels for business transactions, dialogue and communication”. Without active channels even a critical mass of related firms is not a local production or social system and therefore does not operate as a cluster. It is argued that regional clusters are the best environment for stimulating innovation and competitiveness of firms (Ashem and Isaksen 2000). Krugman (1991) has argued that concentration is the most striking feature of the geography of economic activities and has its benefits. So having production and resources already concentrated in a region gives a region a competitiveness advantage. Clusters are specialized in a small number of industries, reflecting the mere general point that economic, entrepreneurial and technological activities in specific industrial sectors tend to agglomerate at certain places (Malmberg, 1996; Strange, 2008). Building the regional cluster is even perceived by some as the way to compete globally, as economic “specialization is (seen as) the only way to

overcome the `globalization trap` that is outrunning the risk of being out competed across the board” (Lagedijk 2000:165). Indeed, the role which space and distance play in determining the nature and behaviour of the economy is the central departure point which defines the urban and regional economic paradigm. Here, the spatial corollary of aspatial increasing returns to scale is economies of agglomeration, and the spatial corollary of aspatial decreasing returns to scale is diseconomies of agglomeration.

The growth and development of the manufacturing industry in Lagos state has proved to be a challenging area of research, particularly along the broad line of benefits and consequences of industrial development. Industrialization in the Lagos region started with two brickworks in Ebute-Metta in 1859 and 1863, and a palm oil mill established in 1865. The industrial landscapes of Lagos state particularly that of metropolitan Lagos is no doubt the most active and buoyant in Nigeria. The benefits, directly and indirectly to the Lagos state regional economy are no doubt, multifarious and staggering. Lagos developed into the country’s leading industrial centre following the expansion with service and administrative sectors, and the increase in the population. Lagos has since grown into neighbouring villages and expanded both in size and industrial activities. Most of the population lies on the mainland and most industries are located there, more than 90 percent of the industrial establishments in the Lagos metropolitan area begin production only after 1950. The total land area devoted to industrial land use in the Lagos region increased from 7.75 percent in 1966 to 8.41 percent in 1979 and 8.81 percent in 1992 (Babarinde, 1994).

1.2 STATEMENT OF RESEARCH PROBLEM

It must be noted, however, that once an agglomeration of firms becomes established, progressively more external economies are created through a cumulative process. The propensity to agglomerate (locationally) increases further either when transactions include small-scale, irregular, under standardized, or contact-intensive activities that have high unit linkage costs, or when firms seek to reduce demand fluctuations by improving their customer base through location clustering (Leung, 1993; O’ Flaherty, 2005). Existence of externalities and increasing returns to scale in production is the most important explanatory factor for geographic concentration of firms. The literature has identified two types of externalities the negative and positive externalities (Scitovsky, 1954; Camagni, 1995). Pollution is the most commonly used example of negative externality.

Agglomeration of firms has generated a surge of interest among environmentalist and planners who are interested in the environmental impacts of industrial agglomeration. In recent years, Scholars such as Warren (1998) have tried to analyze the correlation between environmental damage and the growth of firms particularly in developing countries where the growth has been phenomenal. According to Scott (2006) the environmental impacts of firms in the developing world have tended to be ignored, although the promotion of such enterprises is seen as a way to provide employment and incomes, there is little evidence available on environmental impact and sustainability. There is indeed the general assumption that because they are development facilitators, these industries have little impacts.

Studies on agglomeration have largely focused on the advantage of geographical proximity of industries, the existence of externalities and increasing returns to scale in production and its ability to affect productivity levels of local firms and boost the economic performance of a region (see for instance Herderson, 1986; Romer, 1986; 1987, Bacson, 1987; Murray, 1987; Forgarty and Garofalo, 1988; Lazerson, 1988; Lucas, 1988; Moomaw, 1988; Storper and Walker, 1989; Brusco, 1990; Porter, 1990; Grossman and Helpman, 1991a; 1991b; Vall ,1992; Wheeler and Mody, 992; Smith and Florida, 1994; Rabelloliti, 1995; Harrison 1996; Aghion and Howitt, 1997; Wiig and Wood, 1997; Maskell and Malmberg,1999; Enright,2000; Feser,2001; and Oyeyinka, 2002). These studies have largely neglected other fundamental aspects, especially the spatio-temporal dynamics of agglomeration and the perceived environmental impact. This study, therefore, examined the clustering of firms over time and the perceived effects of the clustering on the environment in the Lagos region, between 2005 and 2009. The issue of manufacturing industries have received a lot of attention over the years by scholars studying sustainable development strategies (Akibinu 2001, Jayarama 2002, Obada and Agba 2006, Agyekum 2009, Osei 2009, Boakye 2010, and Agbechia 2010). Yet there is still lack of effective understanding of the intrinsic and extrinsic locational effects of this industrial sub-sector across the regions in which they are located.

According to the united Nation, Lagos state will become by 2020 one of nine mega cities in the world. Over 60 percent of all commercial transactions in Nigeria are carried out or finalized in the Lagos region. Lagos region is noted for high concentration of industries. It is on this note that the study examines holistically the impacts of industrial agglomeration on the environment of the Lagos region. In pursuit

of this, some questions are pertinent to serve as guide for the study. What is the spatial pattern of firms in the Lagos region? Is there any significant variation in the agglomeration economies amongst firms? What are the temporal trends of agglomeration economies amongst firms? What are the structural characteristics of manufacturing firms in the Lagos region? Is there any relationship between the structural characteristics and the degree of agglomeration economies enjoyed? What is the impact of industrial agglomeration on the environment of the Lagos region? What can policy makers and researchers alike do to solve some of the inherent problems of agglomeration on the environment in the Lagos region?

1.3 AIM AND OBJECTIVES

The broad aim of this study is to examine the nature and scope of agglomeration economies amongst firms, using the Lagos region as a case study. Specifically, the objectives are to:

1. Examine the Spatial pattern of agglomeration within the Lagos region
2. Analyze the variation in agglomeration economies enjoyed amongst firms.
3. Examine the temporal trend in agglomeration economies amongst firms.
4. Examine the relationship between firm's characteristic and the degree of agglomeration economies enjoyed.
5. Analyze the impact of agglomeration economies on the immediate environment.

1.4 HYPOTHESES

- (i) The distribution of firms in the Lagos region is not clustered
- (ii) Agglomeration economies do not vary significantly amongst the firms.
- (iii) The degree of agglomeration economies enjoyed by firms is not determined by the structural characteristics of firms.
- (iv) Distance from the firm's is not significantly related to the pattern of perception of environmental problems

1.5 JUSTIFICATION OF STUDY

Contemporary thinking in industrial geography places a lot of emphasis on the understanding of the networks of inter-firm relationships. Dicken and Thrift (1992; 286), note that "it is only through an analysis of the networks of inter-firm relationships that the firm as the basic element in the capitalist organization of

production, can be resurrected". The network of industrial organization is closely linked to agglomeration economies amongst firms. Agglomeration and cluster concepts spatially emphasize inter-firm relations that facilitate innovative activity which is recognized as a driving force of sustained economic growth in the new growth theory (Portal, 1990). Cluster policy also encourages the integration of many different aspects of economic development and development policy. Competitiveness is increasingly seen to occur between clusters, value chains or network of firms rather than just between individual firms. It is also argued that regional clusters are the best environments for stimulating innovation and competitiveness of firms (Asheim and Isaksen 2000a; Coe and Helpman, 2009). Also, it must be noted that while several studies on agglomeration economies amongst firms have been conducted in the western world, especially the United States of America and European countries, studies on industrialization in sub-Sahara Africa and especially Nigeria, have largely focused on the examination and analysis of single components of industrial activity or the spatial distribution and development of manufacturing industries. Examples of earlier works include Schatzl (1973), Aboyade (1973; 1977), Onyemelukwe (1974), Vegale (1974), Ayeni (1976; 1981a), Teriba and Kayode (1977), Omuta (1980), Arikawe-Akintola (1986b), and Ighalo (1989). Other studies (Lewis, 1972; 1973; 1974; Oyebanji, 1978, 1980) have focused on small-scale industries at the regional level. More recent studies among which include Lee and Amas (1989), Lee (1981), and Babarinde (1995), have focused on some behavioral aspects of manufacturing. In some cases, explanations have been offered in terms of factor endowments.

Recently, the debate and relevance of clustering as alternative strategy for industrial development in developing countries have dominated many discussions in economic literature. There are limited accounts on SMEs cluster development in Africa. Pedersen (1997) gave a detailed analytical break down of four general types of cluster identified in African clusters. These are: (a) diversified industrial cluster; (b) the subcontractor cluster; (c) the market town- distributive cluster and (d) the specialised conducted in recent times. McCormick (1997) made both theoretical and empirical analyses on the typology of Nairobi garment industry cluster in Kenya. Thus, showing the petty commodity cluster. However, series of case studies on African clusters have been characteristics, benefits of clustering and inter-firms relation in the cluster. Van Dijk (1997) also examined the impact of networks in small enterprises association in Accra, Ghana. The economic activities in the cluster provided an insight

on poverty alleviation strategies of small entrepreneurs in Accra. Mitullah (1996) examined the impact of collective efficiency on the Lake Victoria fishing cluster in Kenya. She analyzed the various market channels, the challenges fishermen face and their response to quality standard. Oyeyinka (2001) made an empirical enquiry into the "process and dynamics" of cluster growth in Nigeria. In his work, he gave a detailed comparative analysis on Lagos and Nnewi manufacturing clusters. McCormick (1998) further examined the ability of clusters to make positive impact in African industrialization process by making general analyses on the trend and development of African clusters. Generally, in contrast to global trend of cluster development, African clusters have not been able to move beyond producing for local markets. This could be as a result of neglect or ineffective policy design, on one side, or absence of institutional and technological backing on the other.

There has been successful stories of cluster development in Nigeria. Particularly the automobile component industry at Onitsha in Anambra state and the computer village in Otigba in Lagos. The Nnewi automotive cluster, based in Anambra in Southeastern Nigeria, is one of the most longstanding and durable in Nigeria. Despite the tremendous importance of industrial agglomeration, there are some negative externalities that are generated. The present study therefore posits that the network of industrial organization, through agglomeration of firms, can be better understood through the impact of agglomeration on the immediate environment. It is apparent from the literature that the location impact of agglomeration on the immediate environment has not received much attention

1.6 DATA COLLECTION PROCEDURE

1.6.1 Secondary Data Types and Sources

The number of industrial estates and the number of firms in each estate in the Lagos region were obtained from the Ministry of Commerce and Industry, Annual Abstract of Statistics of National Bureau of Statistics, Lagos State Ministry of Economic Planning. Data on manufacturing establishments in the Lagos region between 1970-2008, were sourced from the most recent edition of the Manufacturer's Association of Nigeria (MAN) industrial directory. This served as the basic source of secondary data. This directory contains a list of manufacturing establishment employing at least 10 workers. Also, information about manufacturing establishments in the Lagos region was collected from the latest edition of the Nigeria Yearbook and

the Directory of Incorporated Companies. These other sources were used to supplement information provided by the MAN industrial directory. Information pertaining to the nature, location, and addresses of firms were obtained from these sources.

Other necessary information on industrialization like, the trend in industrialization, manufacturing establishments in the Lagos region was collected from documentary reports and magazines. While growth and development of manufacturing and the growth pattern of the Lagos region were collected from published sources. These sources of secondary data were the most recent and comprehensive editions at the time of the fieldwork.

1.6.2 Primary Data and source

Information on the agglomeration and competitiveness amongst firms were collected from relevant operating firms given that no such information existed in the published forms. The collection of data from the primary source was done in two different stages. These were reconnaissance survey and questionnaire administration.

1.6.2.1 Reconnaissance

The reconnaissance was carried out during the months of April and June, 2010. It covered all the twenty industrial estates/areas and outlying firms in the Lagos region. In each of the industrial estates/areas, all the industrial establishments were identified. The purpose of identifying all firms in each estates and other industrial centres was to ensure that none of the industrial establishments was left uncovered during the survey.

Table 1.1, indicates that 103 firms responded in the estates. The location of these firms is shown in Figure 1.1. The distribution of these firms varied from one industrial estate/ to another. There were 13(12.6%) in Apapa, 3(2.9) in Matori, 7(6.8%) in Agbara, 24 (23%) in Ikeja, 14(13.6%) in Ilupeju, 3(2.9%) in Ijora, 7(6.8%) in Iganmu, 10(9.7%) in Oshodi/Isolo, 2(1.94%) in Ogba, 4(3.94%) in Ikorodu, 9(8.7%) in Oregun, 7(6.8%) in Surulere/Mushin. This analysis shows that the number of agglomeration firms varied across the estates; however, none of the firms in Gbagada, Agidingbi, Oyediran/Yaba, Ilasamaja, Lagos South-West, Akowonjo, Kirikiri, Abesan/Ipaja responded . The twelve industrial estates covered were the core areas of industrial activities in Lagos states. The location of each of these firms is shown in Figure 1.1, while the lists of these firms is provided in Table 1.2

Table 1.1 **Distribution of firms**

S/No	Industrial Estate/Area	Number of Firms	Percentage of Total
1	Apapa	13	12.6
2	Matori	03	2.9
3	Agbara	07	6.8
4	Ikeja	24	23
5	Ilupeju	14	13.6
6	Ijora	03	2.9
7	Iganmu	07	6.8
8	Oshodi/Isolo	10	9.7
9	Ogba	02	1.94
10	Ikrodo	04	3.94
11	Oregun	09	8.7
12	Surulere/Mushin	07	6.8
Total		103	100

Field Survey, 2010.

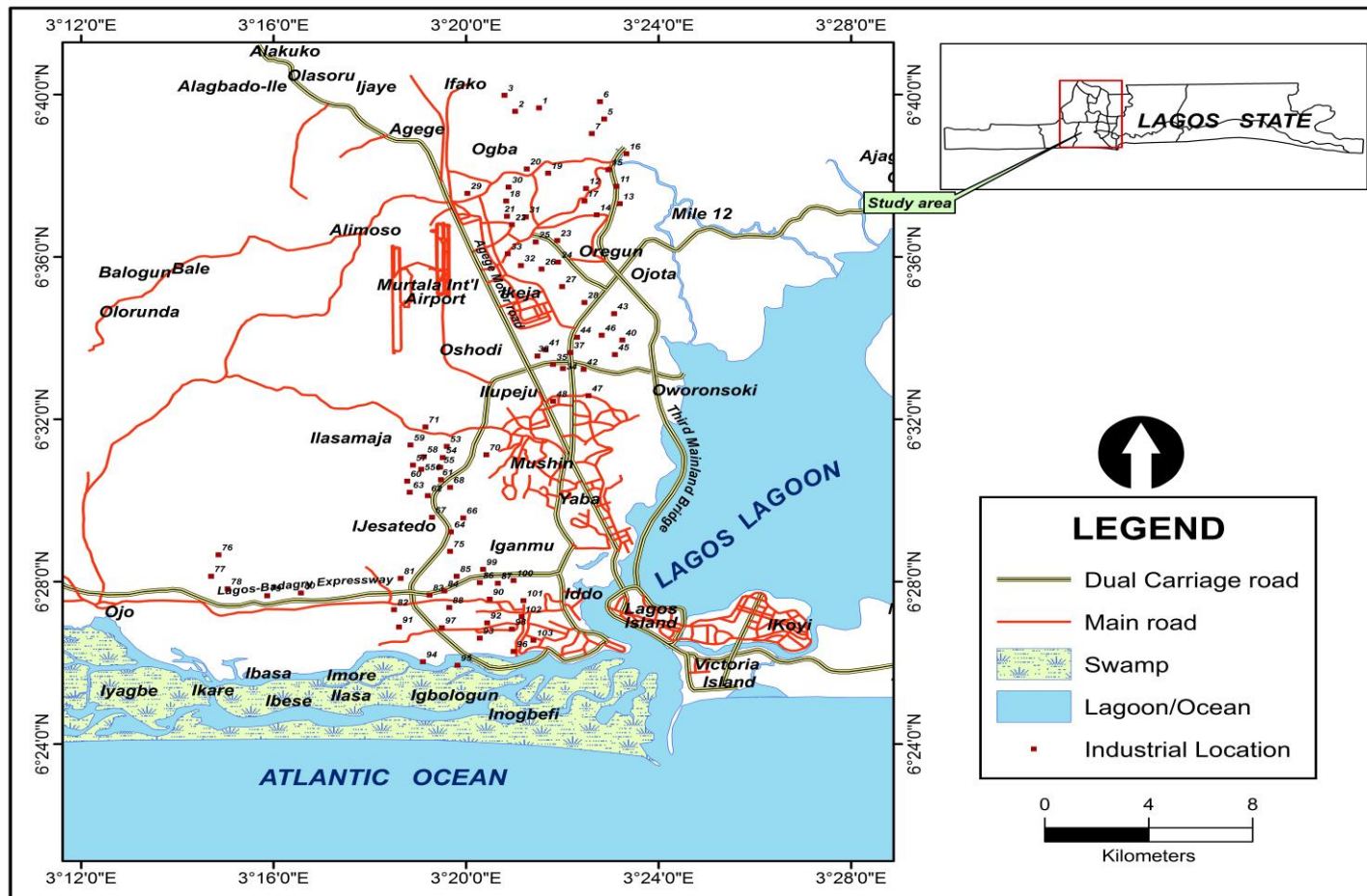


Fig. 1:1 Location of Firms, (the corresponding list of firms is provided in Table 1.2)

Table 1.2 Lists of Firms Shown in Figure. 1.1

S/N	Name of firms	Industrial Estate/area
1.	Abplast Products Plc, Ilupeju.	Ilupeju
2.	HPZ 45/47 Town Planning Way, Ilupeju.	„
3.	Asama 7000s and Beverages, Ilupeju.	„
4.	Bhojsons Industries Ilupeju.	„
5.	Pharm Chem., Industries Ilupeju.	„
6.	Swantex Ltd. Ilupeju.	„
7.	Health Care Products Ltd. Ilupeju.	„
8.	Nigerian Foundaries Ltd, Ilupeju.	„
9.	West African Book Publishers Ltd Ilupeju.	„
10.	AGM Textile, Ilupeju.	„
11.	Wrought Iron (Nig) Ltd Ilupeju.	„
12.	Academy Press, Ilupeju.	„
13.	Nestle Nig. Plc. Ilupeju.	„
14.	Enpee Industries, Ilupeju.	„
15.	Agro-chem Ltd, Isolo.	Oshodi/Isolo
16.	Addis Engineering Ltd, Isolo.	„
17.	Advance coating Technology, Isolo.	„
18.	Afromedia Polestics, Isolo.	„
19.	Apprint Nig Plc Plot 122/132, Isolo.	„
20.	International Textiles, Oshodi/Isolo .	„
21.	Johnwax (Nig) Ltd, Isolo.	„
22.	Aswani Industries Plc, Oshodi/Isolo.	„
23.	Elite Textile, Isolo	„
24.	Shuaib Group Companies, Oshodi/Isolo.	„
25.	Paper Nig Ltd, Iganmu.	Iganmu
26.	Sunflag Textile, Iganmu.	„
27.	Affprint Textile, Iganmu.	„
28.	Maxco Printers, Iganmu.	„
29.	Chartered Aluminum Maga-Maza, Iganmu.	„
30.	Germini Pharmaceuticals, Apapa Express Way, Iganmu.	„
31.	Nigerian Breweries, Abebe Village, Iganmu.	„
32.	Textile, Ijora.	Ijora

33.	Seven Up Bottling Company, Ijora.	„
34.	Kerlin Products, Ijora.	„
35.	Adex Group of Companies, Ikorodu.	Ikorodu
36.	Phoenix steel Mills Ltd, Ikorodu. Shagamu Road.	„
37.	Table Source Nig. Ltd, Ikorodu Road.	„
38.	Lennards Shoes Ojota, Ikorodu.	„
39.	Power Systems Nig Ltd. Matori.	„
40.	Richmond Paper and Packaging Ltd, Matori.	„
41.	Sunrise Chemicals Nig Ltd, Matori.	„
42.	Brandowner of Kingsmen Ayantuga, Crescent, Surulere.	Surulere/Mushin
43.	Brarura Company Nig. Ltd, Surulere.	„
44.	Zenith Ind. Ltd. Ericmoore Rd., Surulere	„
45.	Kengraphics Products Ltd, Randle Avenue, Surulere.	„
46.	Krabo Nig. Plc, Surulere.	„
47.	Nigeria Bag Manufacturing Company Plc, Bagco, Eric moore Rd, Surulere.	„
48.	Johnbull Ind Ltd. Surulere.	„
49.	Absaf Group of Companies, Apapa.	Apapa
50.	Nigerian Motors Ind. Ltd, Oshodi Apapa Expressway	Apapa
51.	Rietzcot Nig Company Plc, wharf Rd., Apapa.	„
52.	Aboseldehyde Plc, Oshodi Apapa Expressway.	„
53.	Sara Prducts Ltd, Kirikiri, Apapa.	„
54.	Boc Nig (Boc gases), Oshodi Apapa Expressway.	„
55.	Bordak Premier Packaging, Dockyard Rd. Apapa.	„
56.	Tapulain Industries, Apapa.	„
57.	Alumaco Industries, Apapa.	„
58.	Star Paper Mills Ltd, Apapa.	„
59.	Angela Plastic Industries Ltd , Apapa.	„
60.	Greif Nig Plc, Apapa.	„
61.	Promasidor , Wharf Rd., Apapa.	„
62.	Pharms Deko Plc, Agbara.	Agbara

63.	Arury Chemicals, Agbara.	„
64.	Vitamalt plc, Agbara.	„
65.	Dale Industries Ltd. Agbara.	„
66.	Sangate Nig Ltd, Agbara.	„
67.	Shongai Packaging, Agbara.	„
68.	Georgia Foods Ltd, Agbara.	„
69.	Adebowale Group of Companies, Ikeja.	Ogba/Ikeja
70.	Low Voltage Switch Board and Control Panels, Ikeja.	„
71.	Speedway International Nig.Ltd, Ikeja.	„
72.	Dunlop Nigeria Plc. Manufacturer of Automobile Tyres Oba Akran Ikeja	„
73.	Vitafoam Nig Plc. Ikeja.	„
74.	Apricot Plastic Industries Ltd, Ikeja.	„
75.	Nigerian German Chemicals, Ikeja.	„
76.	Nigerite Ltd. Ikeja.	„
77.	Nigerian Textile Mills Plc. Ikeja.	„
78.	International Paints for west Africa (IPWA), Ikeja.	„
79.	Longmand Nig Plc. Ikeja.	„
80.	Berger Paints Nig. Plc	„
81.	Guinness (Nig) Plc. Oba Akran Road, Ikeja.	„
82.	Onward paper Mill Ltd. Oregun, Ikeja.	Ogba/Ikeja
83.	Dag Motorcycle Industries Nig Ltd Oregun, Ikeja.	„
84.	African Paints Nig Plc. Oregun, Ikeja	„
85.	Unilever (Nig) Plc. Oregun, Ikeja.	„
86.	Pfizer Products Plc. Oregun, Ikeja.	„
87.	WAPCICO Distillers Oregun, Ikeja.	„
88.	Monson Industries Plc, Oregun, Ikeja.	„
89.	D. N. Meyer Paints, Oregun, Ikeja.	„
90.	A. J. Seward Cosmetics, Oregun,	„
91.	Card, York Ind Ltd. Ikeja.	„
92.	Nampak Nig Plc. Ogba, Ikeja.	„
93.	Air Separation (Nig) Ltd. ACME RD, Ikeja.	„
94.	Hoesch Pipe Mills Ltd. Ikeja.	„
95.	Specomill Textiles Ltd, Ikeja.	„

96. Friesland Foods WAMCO (Nig) Plc.ACME
Road Ikeja „
97. May & Baker (NIG) Plc. Ikeja. „
98. Neimeth International Pharmaceutical Plc, Ikeja „
99. Wahum Packaging Ltd, Ikeja. „
100. Amalgamated Plastic Industrial Ltd, Ikeja. „
101. Grand Foundary and Engineering Works Ltd. Ikeja. „
102. Cadbury Nig. Plc. Ikeja. „
103. British American Tobacco (Nig) Ltd, Ikeja. „

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1.6.2.2 Questionnaire Administration

Two different sets of questionnaire were administered. These are on the agglomeration economies amongst firms and the impact of agglomeration on the immediate environment. The first set of questionnaire was designed to elicit information on agglomeration economies amongst firms. All the firms identified during the reconnaissance survey were covered in the questionnaire administration. The questionnaire sought information on such issues as the industry group (line of activity), the location (address/industrial estate/area); the size and structural characteristics of the firms, the nature, scope and significance of agglomeration amongst firms, factors that enhance agglomeration, effects of agglomeration economies on firms investment and gross financial annual output (See Appendix 1). The questionnaire was administered such that firms in each of the industrial estates/areas and the outlying firms were visited one after the other. In each case, the questionnaires were left with the industrialist/designated officer to complete. One hundred and three questionnaire were administered in twelve industrial estates; one questionnaire in each of the firm. This connotes that all the firms in the industrial estates were successfully covered in the questionnaire administration, which was administered. All the questionnaires were retrieved.

The second questionnaire elicited information on the impacts of agglomeration on the immediate environment. (See appendix II). Information on the environmental impact of agglomeration measured through responses was obtained through a questionnaire survey administered to heads of household. The choice of household heads was done through a spatial systematic sampling procedure. The head of the household nearest to each of the estates was first sampled. Thereafter, heads of household located at intervals of 10 houses were interviewed. On the whole, 120 individuals were covered. This sample was chosen to portray the relationship between firms distance and the perception of environmental problems resulting from firms'. The questionnaire sought information, on the socio-economic characteristics, duration of stay in residence, the effects of the firms operations, perception about the severity of these environmental problems' and the mitigating measures to curtail the negative impacts. However, distances of the residences to the firms were determined

1.6.2.3 Data analysis

Data collected for this study were analyzed using both descriptive and inferential statistical methods.

i. Descriptive statistics

The descriptive statistics employed in the analysis include, frequency tables, cross tabulations, percentages, graphs and figures.

ii. Inferential statistics

The inferential statistics used in the analysis includes; Quadrant Count Analysis, One –Way Analysis of Variance (ANOVA), the canonical Correlation and the Pearson Product (Moment) Correlations statistical techniques. The statistics were employed to test the hypotheses.

Quadrat Count Analysis

Quadrat Count Analytical technique was used to test the hypothesis which states that: the distribution of firms in the Lagos region is not clustered. Quadrat count analysis is a statistical technique often used in the social sciences to analyze the distributional patterns of any feature in space such as industries, towns, building, and health institutions among others. This study applied the quadrant count technique to the analysis of the distributional pattern of agglomeration firms which constitute the first objective of this study. This was done using the Poisson distribution formula.

Poisson distribution is very useful in assessing the probabilities of events that are discrete both in time and in space especially for events with whole number occurrences. It is particularly useful in determining the probability with which different numbers of events or occurrences are likely to occur. For example, we may wish to know the probability of a road accident occurring 0, 1, 2, 3, 4, 5 or 6 times in a given area within a given time frame. Frequency distribution of this type is usually skew and so, we cannot use binomial or normal distribution functions can adequately address a skew distribution.

$$\wedge e^{-z} \left(1 + z + \frac{z^2}{2!} + \frac{z^3}{3!} + \frac{z^4}{4!} + \frac{z^n}{n!} \right)$$

Where e is a mathematical constant whose value is the limit of the expression $(1 + 1/n)^n$. It has a value of 2.7183 (to four places of decimal).

z = is the average value for the set of data.

e^{-z} = is the negative exponential which is the same as $1/e^z$

! = factorial of the number concerned.

1. Grid the map showing the location of the industries
2. Make a summary table of number of industries (x)/Grid and number of grids of occurrence.

3. Determine the mean of industries/grid

$$N = \frac{\sum fx}{\sum f}$$

X= number of industries/Grids (0, 1, 2, 3, 4, and 5)

F= frequency (number) of grid of occurrence of number of industries.

4. Calculate the variance for the occurrence of each industry using the formula that

$$\sigma^2 = \frac{(x-\mu)^2}{n-1}$$

Where σ^2 = variance for each industry

X= number of industry/Grid

N= $\sum fx$ total number of industries

5. Determine the product of the variance for the frequency of each number of industries per grid and total grid of occurrence

$$\sigma^2 \times f$$

Where σ^2 = variance for each occurrence

X= 0, 1, 2, 5

F= frequency of occurrence of number of industry per grid (f₀, f₁, f₂, f₃, f₄,f₅)

6. Determine the variance mean ratio (VMR) for all the industries

$$VMR = \frac{\sigma_0 + \sigma_1 + \sigma_2 + \sigma_3 + \sigma_4 + \sigma_5}{\mu}$$

Where σ_0 = variance for probability

7. Make your decision
 - a. If VMR is lesser than 1, the distribution is regular
 - b. If VMR is equal to 1, the distribution is random
 - c. If VMR is greater than 1, the distribution is clustered.

Analysis of Variance (ANOVA)

Analysis of variance was used to test the hypothesis which states that: agglomeration economies do not vary significantly amongst the firms. The basis for the hypothesis is provided in chapter two.

In order to test whether or not agglomeration economies vary significantly amongst the firms, a one-way analysis of variance (ANOVA) was carried out. The analysis of variance tests if there is “real difference between the means of independent

observations and indicates the magnitude of such difference” (Witherill, 1967: 263). The analysis of variance assumes (i) homogeneity of variance throughout the groups (ii) independence of the observations and (iii) normality of the errors, that is, errors are uncorrelated. The one-way analysis of variance “provides an optimal test for trends across categories of an interval-level independent variable” (Kim and Kohout, 1975: 398).

Agglomeration Economies Variables on which analysis of variance was carried out

- Y₁ Joint Transportation (Percentage Savings accruing from joint transportation (transportation economies)
- Y₂ Joint Power supply (Percentage Savings accruing from joint use of power (power economies)
- Y₃ Joint Raw Material Purchase/Supply (Percentage Savings accruing from joint Raw materials purchase (input economies) .
- Y₄ Collaboration in Research and Development (Percentage Savings accruing from joint R & D)
- Y₅ Joint Labour Supply (Percentage Savings accruing from wage rate (Labour economies i.e reduction in the cost of Labour).
- Y₆ Joint Water Supply (Percentage Savings accruing from joint water supply measured as a percentage reduction in the cost of water supply).
- Y₇ Joint waste treatment (Percentage Savings accruing from joint waste treatment)
- Y₈ Joint Security (Percentage Savings accruing from joint security services).
- Y₉ Joint Telecommunication (Percentage Savings accruing from joint telecommunication).
- Y₁₀ Joint Ports & Shipping (Percentage Savings accruing from joint ports and shipping)
- Y₁₁ Access to Financial institution (Percentage Savings accruing from access to financial institution).

Canonical Correlation

One hypothesis was tested using the Canonical Correlation statistical analysis and this is: the degree of agglomeration economies enjoyed by the firms is not

determined by the structural characteristic of firms. The basis for these hypotheses is provided in chapter two.

In a canonical correlation one has two or more Y variables and two or more X variables. The goal is to describe the relationships between the two sets of variables. You find the canonical weights (coefficients) $a_1, a_2, a_3, \dots, a_p$ to be applied to the p X variables and $b_1, b_2, b_3, \dots, b_m$ to be applied to the m Y variables in such a way that the correlation between CV_{X1} and CV_{Y1} is maximized.

$CV_{Y1} = a_1Y_1 + a_2Y_2 + \dots + a_m Y_m$ $CV_{X1} = b_1X_1 + b_2X_2 + \dots + b_pX_p$ and CV_{Y1} are the first canonical variates, and their correlation is the sample canonical correlation coefficient for the first pair of canonical variates. The residuals are then analyzed in the same fashion to find a second pair of canonical variates, CV_{X2} and CV_{Y2} , whose weights are chosen to maximize the correlation between CV_{X2} and CV_{Y2} , using only the variance remaining after the variance due to the first pair of canonical variates which has been removed from the original variables. This continues until a "significance" cutoff is reached or the maximum number of pairs (which equals the smaller of m and p) has been found.

The appropriate data for canonical correlation analysis are two sets of variables. We assume that each set can be given some theoretical meaning, at least to the extent that one set could be defined as the independent variables and the other as the dependent variables. Once this distinction has been made canonical correlation can address a wide range of objectives. These objectives may be any or all of the following:

Determining whether two sets of variables (measurements made on the same objects) are independent of one another or, conversely, determining the magnitude of the relationships that may exist between the two sets. Deriving a set of weights for each set of dependent and independent variables so that the linear combinations of each set are maximally correlated. Additional linear functions that maximize the remaining correlation are independent of the preceding sets(s) of linear combinations.

The generality of canonical correlation analysis also extends to its underlying statistical assumptions. The assumption of linearity affects two aspects of canonical correlation results. First, the correlation coefficient between any two variables is based on a linear relationship. If the relationship is non-linear, then one or both variables should be transformed, if possible. Second, the canonical correlation is the linear relationship between the variates. If the variates relate in a non linear manner, the

relationship will not be captured by canonical correlation. Thus while canonical correlation analysis' is the most generalized multivariate method, it is still constrained to identifying linear relationships.

Canonical correlation analysis can accommodate any metric variable without the strict assumption of normality. Normality is desirable because it standardizes a distribution to allow for a higher correlation among the variables, but in the strictest sense, canonical correlation analysis can accommodate even non normal variables if the distributional form (e.g. highly skewed) does not decrease the correlation with other variables. This allows for transformed non metric data (in the form of dummy variables) to be used as well. However multivariate normality is required for statistical inference test of the significant of each canonical function. Because tests for multivariate normality are readily available, the prevailing guideline is to ensure that each variable has univariate normality, thus, although normality is not strictly required, it is highly recommended that all variables be evaluated for normality and transformed if necessary.

Homoscedasticity decreases the correlation between variables, this should also be remedied. Finally, multicollinearity among other variable set will confound the ability of the technique to isolate the impact of any single variable making interpretation less reliable. Analogous with ordinary correlation, canonical correlation squared is the percent of variance in the dependent set explained by the independent set of variables along a given dimension (there may be more than one). In addition to asking how strong the relationship is between two latent variables, canonical correlation is useful in determining how many dimensions are needed to account for that relationship. Canonical correlation finds the linear combination of variables that produces the largest correlation with the second set of variables. This linear combination, or "root" is extracted and the process is repeated for the residual data, with the constraint that the second linear combination of variables must not correlate with the first one. The process is repeated until a successive linear combination is no longer significant.

The test of the hypothesis which states that: the degree of agglomeration economies enjoyed by the firms is not determined by the structural characteristic of firms, involved the Canonical Correlation statistical techniques.

- $CV_{Y1} = a_1 Y_1 + a_2 Y_2 + \dots + a_m Y_m$, $CV_{X1} = b_1 X_1 + b_2 X_2 + \dots + b_p Y_p$ Where,
- Y's** = Dependent variables: $CV_{Y1} = b_1 Y_1 + b_2 Y_2 + \dots + b_m Y_m$. i.e. the degree of agglomeration economies (measured as the Percentage monetary benefits of savings realized by firm's as a result of agglomeration.)
- Y₁** = Joint Transportation (Savings accruing from joint transportation (transportation economies))
- Y₂** = Joint Power supply (Savings accruing from joint use of power (power economies))
- Y₃** = Joint Raw Material Purchase/Supply (Savings accruing from joint Raw materials purchase (input economies).
- Y₄** = Collaboration in Research and Development (Savings accruing from joint R & D measured as a percentage monetary savings from R&D)
- Y₅** = Joint Labour Supply (Savings accruing from wage rate (Labour economies i.e reduction in the cost of Labour))
- Y₆** = Joint Water Supply (Savings accruing from joint water supply measured as a percentage reduction in the cost of water supply).
- Y₇** = Joint waste treatment (Savings accruing from joint waste treatment)
- Y₈** = Joint Security (Savings accruing from joint security services).
- Y₉** = Joint Telecommunication (Savings accruing from joint telecommunication).
- Y₁₀** = Joint Ports & Shipping (Savings accruing from joint ports and shipping)
- Y₁₁** = Access to Financial institution (Savings accruing from access to financial institution).
- X's** = Independent variables: $CV_{X1} = b_1 Y_1 + b_2 Y_2 + \dots + b_p Y_p$. i.e. Structural Characteristic of Firms
- X₁** = Age of Firms (Years)
- X₂** = Areal plant size (m²)
- X₃** = Capacity utilization (in percentage)
- X₄** = Labour Size (Number of workers)
- X₅** = Firms Investment (the monetary value)

Pearson Product (Moment) Correlation

Pearson Product (Moment) Correlation statistical technique was used to test the hypothesis which states that: distance from the firm's is not significantly related to the pattern of perception of environmental problems

The basis for the hypothesis is provided in chapter two.

Pearson Product (Moment) Correlation is a statistical technique that can show whether and how strongly pairs of variables are related. Correlation works for quantifiable data in which numbers are meaningful, usually quantities of some sort. There are several different correlation techniques. The survey system and optional Statistical module includes the most common type, called the Pearson or Product moment Correlation.

The main result of a correlation is called the Correlation Coefficient (or 'r'). It ranges from -1.0 to +1.0, the more closely the two variables are related. If r is close 0, it means there is no relationship between the variables. If r is positive, it means that as one variable gets larger the other gets larger. If r is negative it means that as one gets larger, the other gets smaller (often called an "inverse" correlation.)

While correlation coefficients are normally reported as r = (a value between -1 and +1), squaring them makes them easier to understand. The square of the coefficient (or r square) is equal to the percent of the variation in one variable that is related to the variation in the other. After squaring r, ignore the decimal points. A correlation report can also show a second result of each test- statistical significance. In this case, the significance level will tell how likely it is that the correlations reported may be due to chance in the form of random sampling error. While working with small sample sizes, it is better to choose a report format that includes the significance level. This format also reports the sample size

The Pearson Product (Moment) Correlation equation is given by:

$$r = \frac{\sum (x - \bar{x}) (y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}}$$

Y Dependent variables: Responses of the respondents regarding the Perception of the environmental problems severity (measured according to the number of respondent's i.e. the firm's immediate environments residents.)

X = Independent variables: i.e. distance in Km.

1.7 ORGANIZATION OF THE THESIS

Apart from this introductory chapter the thesis is divided into six chapters. Chapter two present the conceptual/theoretical framework and the literature review, while an overview of growth pattern and industrialization in the Lagos region is presented in chapter three. The locational and structural characteristics of firms were examined in chapter four.

Chapter five analyzed the agglomeration economies amongst firms and offered explanation for advantages derived from industrial agglomeration. Chapter six examined the perceived impacts of agglomeration on the environment. Chapter seven presented the summary and conclusion of the findings and the implications of these findings for the development of agglomeration, industrial expansion and the development of Lagos region and Nigeria in general.

UNIVERSITY OF IBADAN

CHAPTER TWO

2.0 LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

This chapter presents the conceptual/theoretical basis for this study, and the review of the literature. The hypotheses tested are also provided.

2.1 LITERATURE REVIEW

The Literature on agglomeration economies has focused on six major sub-themes. These are agglomeration economies as a basis for integration and industrial linkage relations, the scale and benefits of agglomeration economies amongst firms, nature of agglomeration economies amongst firms, diseconomies arising from agglomeration economies of firms, temporal dynamics of agglomeration economies amongst firms and relevant measures to stimulate dynamism and innovation activity in regional clusters.

2.1.1 Agglomeration as a basis for integration and industrial linkage relations

The literature has shown that integration involves all forms of collaborative and co-operative ventures among industrial organizations over space. There are two forms of integration, namely vertical integration and horizontal integration. Vertical integration is “a process which refers to the extent to which successive stages in production and distribution are placed under a single firm shaped by internal economics of scope” (Lee 1994: 292). This involves the amalgamation of productive units at different stages of production. Horizontal integration on the other hand, is a production system whereby “firms producing related products (competitive, complementary or by-products) operate under central control” (Lee, 1994: 292). This involves the firm moving into activities that are closely related to its current activities. Vertical or horizontal integration may offer greater stability or growth of corporate profits and the spreading of risks (Dicken and Lloyd, 1990; Henry, 2007). This is possible because not all activities in the firm will follow an identical cycle of demand. Integration, thus, involves the linkage of firms in a chain of production. In general

terms, this is what is referred to as industrial linkage. Industrial linkage is a process whereby one manufacturing firm purchases inputs of good and services from, or sells output to another manufacturing firm (Keeble, 1976) which includes “all forms of contacts and flows of information and/or materials between two or more individual firms” (Johnson, 1994: 334). This term is most widely used in industrial geography to indicate the interdependence among firms and its effects on location choice. A great deal of information concerning the geographical impacts of industrial linkages were developed by researchers employing a number of approaches, (see for instance, Britton, (1969); Karaska (1969); Richter (1969); and Streit, (1969). Streit (1969) measured the relationship between linked sectors and geographical association in order to appreciate better the role of linkage as an agglomerative force. However, Alokian noted that despite the fact that Britton (1969), Karaska (1969), Taylor and Wood (1973), Gadd (1975), and Mock (1976) argued that technological growth and improved communication and transportation system freed firms from local inter-firm dependence he believed that local linkages still impinges on supposed interrelationship between linkages, external economics and agglomeration.

Urban growth is viewed as continual agglomeration and degglomeration of economic activities responding to external economics and diseconomies created by previous location decisions of firms and individuals (Lichtenberg, 1960; Chintz, 1961). Usually, the industries in such agglomeration have strong functional linkages. Thompson (1972), Glasson (1974), Romer (1987) and Mody (1992) reported that the concentration of firms in an area gives opportunity for linkages among firms and exchange of ideas. The metropolitan area contains not only a large number of different industries but also has a final product market, a labour pool, good communication and variety of specialized services. The study of agglomeration economics emphasizes the linkage relations between economic activities within a relatively restricted geographical area. This is because through such linkages, external economics are transmitted to the individual production units that are linked. Agglomeration/external economics may therefore occur where linkage relationships exist more so within a small geographical area.

Several studies on industrial linkage are based on encouraging certain basic factors. These include importance of flows of commercial, technical and administrative information, existence of relatively well-developed infrastructure such as highways, railroad lines and termini; and many other services that might not exist or would be

less well developed. (see Hagerstrand, 1964; Imrie, 1980; O'Farrell and Loughlin, 1980; Klein, 1982; Sargant, 1961; Townroe, 1969; Smith, 1981; Scott and Bergman, 1995).

2.1.2 The Scale and Benefits of Agglomeration Economies amongst Firms

The economies of scale that are enjoyed by the manufacturing establishments in the metropolitan areas accounts for the concentration of these industries in the city. These economies of scale are both internal and external. The internal economies enjoyed by the firms that are concentrated in an area may include managerial economies, which are likely to be those derived from specialization. That a firm locates in the midst of other manufacturing firms, allows it to employ specialist each of whom by devoting all his attention to a relatively small part of the company's work, may do much to increase productivity. Collaboration in research and development also help the firms that agglomerate especially in the design and development of new products, which may seem to be a protracted and expensive undertaking by a single firm. Also, the provision of specialist maintenance services or training facilities or the development of a pool of labour with the skills appropriate to the industry has been made possible by the agglomeration of firms over space. External economies are also realized through a trade association. This is an association of producers, corresponding to, though not normally parallel to, a trade union. A typical example is the Manufacturers Association of Nigeria (MAN). Economies obtained from membership of a trade association include joint advertising. Similarly, the MAN advertisements' injunction to 'Buy made in Nigeria Goods' is aimed at increasing the sales of manufacturers, not those of a single firm. This aspect of marketing economies is possible because of the concentration of firms in the city. Technical information and market trends may also become available through the association, which may be able to organize trade fairs or other marketing facilities beyond the scope of any single manufacturer.

No doubt, business firms find it profitable to cluster together spatially with firms in their own and other industries. The metropolitan area contains not only a large number of different industries, but also has a final product market (because the threshold requirement is obtained in the city), a labour pool, good communication and a variety of specialized services. The concentration of industries with functional linkages in industrial agglomerations as earlier stated brings about financial savings on the part of the industries concerned. Such savings are achieved because agglomerated

firms can and do share common services such as water, communication facilities, security, transport facilities, communication facilities, diffusion of know-how, research and rapid circulation of capital commodities and labour. Individual industries are thus saved from the cost of providing these services for themselves. Such financial savings are referred to as external economies of scale. Agglomeration also has the advantage of concentrating labour, managerial skill, capital and customers in specific places, thereby making such places still more attractive to industries. This is one reason why agglomeration tends to grow once they come into being. A new industry attracts related industries as well as social services which in turn make the area more attractive for more industries in a chain reaction referred to as the multiplier effect.

It is well established that the geographic distribution of plants is concentrated, both across sectors and within individual industries. Devereux , Griffith and Simpson (2003), and Duranton and Overman (2002) provide evidence on the geographic distribution of production activity in Great Britain, and find examples of such as the ceramics and lace industries that are highly localized. Studies in other countries find similar evidence. Empirical work that has examined the dynamics of agglomeration includes Dumais, Ellison and Glaeser (2002) who use US data to show the new plants entrants have acted to reduce the extent of industry agglomeration; industry concentration have attracted less than their proportionate share of new entrants. This may be due to a decrease in the extent of agglomeration externalities over time, or due to the onset of congestion effects, as competition for immobile factors of production drives up the factors of inputs, and create incentives for firms to disperse geographically. Contrary to this, Dumais, Ellison, Glaeser (2002) find that in a number of the most agglomerated industries in Great Britain, new entry during the 1980s was acting to reinforce geographic concentration, even though the agglomerations date back decades and in some cases even centuries.

2.1.3 Diseconomies Arising from Agglomeration economies amongst Firms

Despite all the advantages that are enjoyed as a result of agglomeration economies, it also has negative effects. Agglomeration cause overcrowding, pollution, high cost of land and traffic congestion. Despite the difficulties in quantifying the costs to health or property arising from air pollution impacts generated by different distributions of industry relative to the surrounding population, there is evidence that general planning strategies for the location of industry have been formulated in several

countries upon the basis of intuitive judgments regarding the balance of social costs and benefits arising from further development in existing agglomerations as compared with policies of dispersal (Porter, 1980). Physical planning policies which incorporate such judgments have been introduced in the Netherlands (Nijkamp, 1977), Scotland (Diamond, 1979) and Sweden (O.E.C.D., 1979a). Although such policies are usually concerned with the distribution of population and economic activity in general, there is also evidence of an awareness of the potentially undesirable social and environmental consequences of the uncontrolled growth of agglomeration of specific types of manufacturing industry.

The negative effects of agglomeration especially that of congestion, may reach a point where industries start moving away, a process referred to as deglomeration. No matter how bad the situation is, some industries can not move away because of industrial inertia. Such industries cannot move because of fixed capital in the form of land, factory buildings and machinery. In such a situation, the cost of moving may be far more than the financial savings that may be obtained at a new location.

In his contribution Dasgupta and others (1998) calculated the particulate emissions in metric tons per employee by firm size in Brazil and discovered that industrial agglomeration contribute a non negligible share of total pollution loads. However, on the aggregate they discovered that agglomeration firms accounts for 62% of industrial pollution in Brazil. This according to him provides evidence for the national policy in regulating agglomeration industries. However this presents a dilemma. Will stringent environmental regulation of agglomeration firms, an industry still at early stage of development in Nigeria not worsen poverty in the developing countries? For example according to Ferreira, Lanjouw and Neri (2003) when stringent environmental regulations shut down many industries in Sao Paolo in 1997, poverty increase by 83% when they joined the pool of informal sector workers and the unemployed, and by 72% when they joined the general working age population.

2.1.4 The Nature of Agglomeration Economies amongst Firms

Studies about the nature of agglomeration economies and its effects have been carried out by many researchers. The study of Weber (1966), suggest that agglomeration of firms comes about as a result of potential benefits (especially lowering of total costs) accruable to firms close together in space. His concern for

overall cost minimization made him to consider the role of agglomeration forces as a factor that could induce firms to locate away from the point of least transport cost.

Taylor's (1969) concept of 'seed bed growth' in industrial location is similar in some respects to Weber's agglomeration phenomenon. He argues that majority of small companies tend to locate in the vicinity of existing industrial concentrations. The point of departure is, however, the reasons for agglomeration of firms. While in Weber's analysis, agglomeration of firms comes as a result of potential benefits accruable to firms close together in space, agglomeration occurs, according to Taylor because of inadequate knowledge or lack of desire of potential entrepreneurs to establish outside the area they know best. Gilbert (1974) in his discussion of agglomeration cited the Swedish school of thought which believes in personal contact and information linkage as being of major importance to location decision-making. Thus, "contact-intensive" people interact more in terms of locating close to each other. Within this general area of information and contact studies, the Swedish school has produced several fundamentally new concepts (Hagerstrand, 1952; and 1967; Tornquist, 1962; 1970; Weinand, 1968; Goddard and Anderson, 1970). Tornquist (1962), for example, has argued that face-to-face contacts are the most effective means of exchanging information, a realization which is highlighted in his finding that personal contacts occupy a large part of the working time of high administrative personnel.

Marshall (1920) suggested three kinds of benefits from agglomeration. The first is spillover of knowledge. Spillovers are particularly important for innovation and R & D activity and related industries. For example, Bottazzi and Peri (1999) have shown that geographical concentration of innovation activity does matter and spillovers are more effective within a region. Linkages can operate through different markets, e.g. labour, intermediate and product markets, but the central notion is that bigger market size increases efficiency and productivity. The cost effects of spatial and industrial inter-dependences are external economics of scale in the sense that they augment (or counteract) internal scale economics. These spillovers act as shift factors that affect cost output relationships, and thus economic performance and competitiveness. This notion of spillovers is conceptually analogous to the localization and urbanization economics that are widely recognized in the urban/regional economies literature. It is similar to the idea of external returns to scale in, for example the new growth (Romer, 1986; Baro, 1991a) and to agglomeration effects associated with activity levels of

related sectors in the macro-economics literature. Positive spillovers or agglomeration economics are often called thick market effects. Krugman (1991) has argued that concentration of economic activity has its benefits. So having production and resources already concentrated on region very likely gives region a competitiveness advantage.

Ciccone and Hall (1996), imply that production is more efficient or cost effective when it is spatially concentrated. Firms benefit from the proximity of firms that are in the same industry or are suppliers, (demanders) of their inputs (outputs). Negative spillovers, or insufficient density to facilitate economical production, can conversely be called thin market effects. Once an agglomeration of firms becomes established, progressively more external economies are created forming a cumulative process. The propensity to agglomerate (locationally) increases further either when transactions include small-scale, irregular, unstandardized, or contact-intensive activities that have high unit linkage costs, or when firms seek to reduce demand fluctuations by improving their customer base through locational clustering (Leung, 1993). This location tendency according to Storper and Scott (1989: 21) “is associated with a flexible regime of capital accumulation or mode of corporate organization characterized by intense external transactions between firms (external economies of scale) as a result of unstable market conditions”. Flexible regime of accumulation encompasses new forms of production characterized by a well-developed ability to shift promptly from one process and/or product arrangement to another it mechanism for rapidly adjusting to changes in the market without harmful effects on the level of efficiency; these have encouraged agglomeration and competitiveness amongst firms. On the other hand, the location dispersal of production occurs when the transaction involves bulky, stable, standardized, or easily manageable activities that have low unit linkage costs. These activities “contain primarily routine deskilled production process and are dispersed to peripheral areas where labour or land costs are low” (Scott 1988a: 210). This locational tendency, as stated by Storper and Scott (1989: 22) is associated with a Fordist regime of capital accumulation typified by deepened internal transaction within firms (internal economies of scale) as a result of stable market circumstances. Consequent on this is the emergence of spatial and international division of labour, with centers dominating in unstandardized skilled labour and the hinterlands depending on routine unskilled activities (Scott and Storper, 1986).

The existence of externalities and increasing returns to scale in production is the most important explanatory factor for the geographic concentration of firms. Even

if individual firms face constant internal returns to scale, agglomeration may generate externalities that create productivity advancements for individual firms in a given locations and therefore lead to increasing returns to scale at an aggregate level. Many studies have shown that agglomeration economics can affect productivity levels of local firms and boost the economic performance of a region (Beason, 1987; Feser, 2001; Fogarty & Garofalo, 1988; Henderson, 1986; Moomaw, 1988; Bottazi & Peri, 2007). They tested the degree to which productivity increases with industry size (localization economies) or city size (urbanization economies). In addition Wheeler and Mody (1992) and Smith and Florida (1994) found that agglomeration economics are positively associated with firms investments and location decisions.

2.1.5 Temporal Dynamics of Agglomeration Economies amongst Firms

The concept of external/agglomeration economies has held a central place within geographical accounts of the spatial concentration of economic activity since Weber's discussion of agglomeration. The use of the concept within the geographical literature has not been without its problems. After a brief estrangement from mainstream industrial geography, the concept is once again the centre-piece of influential accounts of the spatial organization of production. The neoclassical urban systems theory developed by Henderson (1974, 1977 and 1988) and his followers in the 1970s and 1980s has been one of the most influential approaches to urban development and agglomeration until recently. Henderson argued that industry-specific external economies arise due to the result of positive spillovers among firms located nearby. His model basically explains how each city's export sector is developed and how specialized city systems emerge. However, Henderson-type models do not specify the sources of externalities explicitly and rather than treat them as a black box. More recent studies, following Marshall (1890), have suggested that agglomeration benefits arise from the three well-known factors: the diversity of intermediate inputs for a city's export goods (Abdel-Rahman, 1988), deep local labour markets (Hasley and Strange, 1990), and information a knowledge spillovers (Fujita and Ogawa, 1980, 1982). Among these candidates, knowledge spillovers lie at the heart of the discussion, led by the new industrial geography and the new growth theory. Based on the technological learning literature developed by (Lundvall, 1992; Roller, H. 2007). New industrial geographers emphasize the nature and the role of innovations, technology, spillovers, knowledge circulation, and workforce learning from the perspective of a larger

innovations system (Storper, 1995). They also pay attention to the concentration of innovations within area-based networks as “learning regions” (Braczyk, Coke and Heidenrich, 1988; Maskell and Malmberg, 1999; Simmie, 1997; Storper, 1993). The creation of new technology and innovations involve ongoing interactions among local firms, research institutions, financial institution and other related environments (Wiig & Wood, 1997).

The new growth theory also treats external economies created by knowledge spillovers as the most critical factor for productivity increase and long term regional growth. The original model developed by Romer (1986, 1987), Grossman and Helpman (1991a, 1991b), and Aghion and Howitt (1992), however, did not have a spatial aspects. Geography was introduced into the model later by a group of urban economists, and the theory, with a greater emphasis on geography, lends a new perspective to agglomeration and spillover research. In particular, Lucas (1988), shows that the accumulation of human capital can generate positive externalities since new skills acquired by each worker can be shared or spillover to others in the same location eventually making the entire labour pool more productive. Black and Henderson (1999) related knowledge spillovers from human capital to spatial agglomeration by combining models in Lucas (1988), Henderson (1974) and Eaton and Eckstein (1997). It is argued that localized technology spillovers stimulate urban concentration and that consequent human capital accumulation promotes endogenous growth.

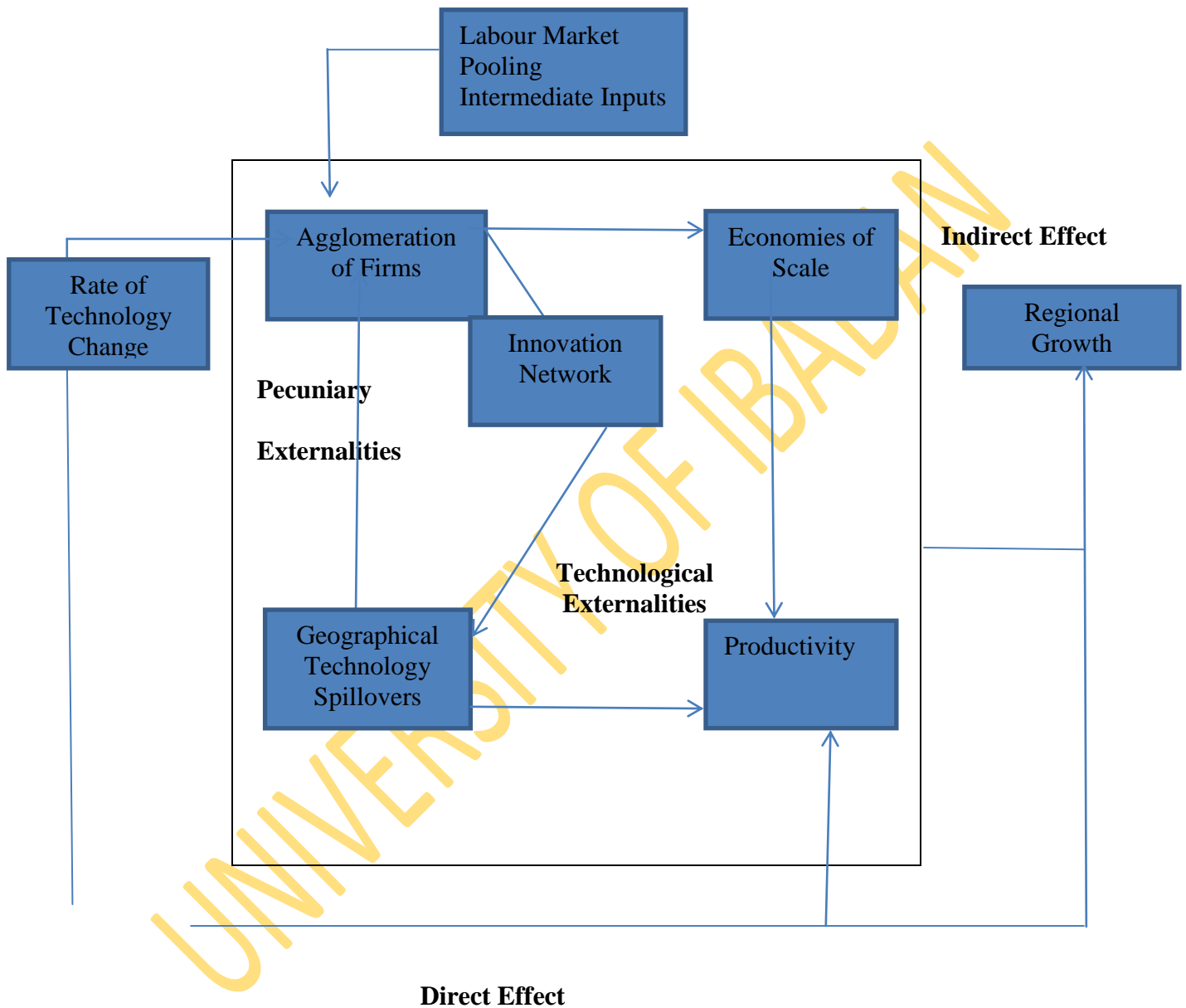


Fig. 2.1: Technology Spillovers, Agglomeration, and Regional Economic Development

Source: Koo, J. (2004)

2.1.6 Relevant Measures to Stimulate Dynamism and Innovation Activities in Regional Clusters

First measures to stimulate dynamism and innovation activity should be context-sensitive (as indicated by Storper and Scott, 1995), and suit varying needs in individual clusters, as clusters are very different. Regions have diverse socio-cultural features, are embedded in different national economies, and different industries, in terms of branch, size and forms of organization, and have their specific requirements and innovation obstacles. Then, individual and collective needs of firms in different sectors and/or regions should be targeted. Thus, there is no 'one-size fits-all' cluster policy instrument or policy portfolio, 'rather, it is precisely regional diversity that is an asset for regional innovation to build upon' (Landabaso 2000: 85).

The need to adopt policies to specific regional circumstances means placing great awareness on the local and regional level in policy design and implementation. According to Landabaso (2000: 90) 'the regions are the most appropriate level for action on innovation (Ibid: 90). This may be the case especially for SMEs, as 'smaller firms-particularly those that lack resources and incentives to develop their own training, research or engineering departments-depend heavily on local services' (Rosenfeld, 1997: 20; Conley and Udry, 2010). Regions may, however, under-invest in policy instruments where the benefits significantly spillover to other regions.

2.2 CONCEPTUAL FRAMEWORK

The relevant concepts / theories reviewed here are agglomeration economies, diffusion of innovation, regional clusters and competitive advantage.

2.2.1 Agglomeration Economies

Industrial agglomeration refers to the concentration of several industries in a given place or area. Such a concentration takes place because the area in question has the greatest location advantage over other areas, including the advantage of proximity to related industries. As stated earlier, manufacturing firms' agglomerate in an industrial estate because of the infrastructural facilities like good roads, electricity and water supply, transport and communication well located industrial site with needed utilities, factory premises and other supportive facilities. The traditional location factors such as transportation and power have become more equally available among

cities of various sizes, but the metropolis has retained its attraction, capitalizing on its role as a rich source of information and professional talent (Hoover and Vernon, 1962; Aghion, and Dewatripoint, 2010). Despite pollution, congestion, high taxes and high land costs, the metropolitan area has remained the preferred site for the fastest growing economic activities particularly manufacturing and service activities. The reason for this industrial concentration particularly in industrial estate may in addition be attributed to the advantage of collaboration in research and development, which was made possible because of industrial concentration in the city. Industrial establishments agglomerate over space because of the collective benefits which they would not enjoy individually in an isolated location.

In the literature, agglomeration economies are divided into 'localization and urbanization' economies (Hoover, 1973). Localization economies result from the proximity of several firms engaged in the same activity. The association of some industries neither trade with one another nor appear to have the same location needs. The study of localization economies tells little about why some activities are concentrated in only a few of the many places that apparently offer similar advantages. Urbanization economies create two types of clustering. The first is the clustering of firms in industrial complexes, such as food processing/container manufacturing, and metal fabrication machinery. The linkages, which hold these firms together, are often input-output flows (Izard, 1959). At times the flow is direct, with one firm serving as the supplier or customers of another. The second type of urbanization economies causes both individual firms and industrial complexes to locate in or near large cities. The economies of scale that are enjoyed by the manufacturing establishments in metropolitan areas accounts for the concentration of these industries in the city. These economies of scale are both internal and external. The internal economies enjoyed by the firms that are concentrated in an area may include managerial economies, which are likely to be those derived from specialization. External economies are also realized through a trade association. Marketing economies, both in the purchase of raw materials and components, and also in the sale of finished products are other advantages derived by firms that agglomerate over space. The concentration of industries with functional linkages in industrial agglomeration brings about financial savings on the part of industries concerned. Such savings are achieved because agglomerated firms can share common services such as water, communication facilities, security, transport facilities and labour. Individual industries are thus saved

from the cost of providing these services for themselves. Such financial savings are referred to as external economies of scale. Agglomeration also has the advantage of concentrating labour, managerial skill, capital and customers in specific places, thereby making such places still more attractive to industries. This is one reason why agglomeration tends to grow once they come into being. A new industry attracts related industries as well as social services, which in turn make the area more attractive for more industries in a chain reaction referred to as multiplier effect. It is important to emphasize that despite all the advantages that are enjoyed as a result of agglomeration economies, it also has negative effects, Agglomeration causes overcrowding, pollution, high cost of land and traffic congestion. The negative effects of agglomeration especially that of congestion may reach a point where industries start moving away, a process referred to as deglomeration.

The concept of external/agglomeration economies has held an important place within industrial geography since Weber's original discussion of the agglomeration of industries. The concept of external/agglomeration economies as formulated by Weber (and the economist Alfred Marshall) forms a generalized theory of agglomeration which has remained largely unaltered within subsequent accounts. The Marshallian / Weberian concept of external/agglomeration economies consists of a diverse set of factors of potential relevance to explaining the spatial concentration of economic activity. Thus there is industrial concentration in the Lagos region because of its strategic position, having the best sea and airport.

2.2.2 Regional Clusters and Competitive Advantage

The success of some regional clusters has focused attention on the creation of external economies and on the role of knowledge intensive, local environments in stimulating the competitiveness of network of firms. Competition is increasingly seen to occur between clusters, value chains or network of firms rather than just between individual firms. It is also argued that regional clusters are the best environments for stimulating innovation and competitiveness of firms (Asheim and Isaksen, 2000; Reiss & Traca, 2008). The first stage in cluster development often involves new firm spin-offs leading to a geographical concentration of firms in nearly the same production stage. The agglomeration is followed by local competition that is an essential driver of innovation and entrepreneurship.

Once an agglomeration of firms becomes established, progressively more external economics are created, forming a cumulative process. The external economics often include; (i) the creation of a set of specialized suppliers and service firms, frequently originating from vertical disintegration of firms and (ii) the creation of a specialized labour market (Storper and Walker, 1989). The development may lower the cost of shared inputs as savings in production costs are passed from specialized suppliers (serving numerous local firms) to client firms. The client firms will then derive a benefit not available to similar firms in less highly localized settings (Harrison, 1996). Cost saving also occurs through the presence of a pool of experienced and skilled workers. The next step may be the formations of new organizations that serve several firms in the growing cluster e.g. knowledge organizations, specialized education establishments and business associations. The setting up of centers for real services such as in some industrial districts. An example is industrial district in the 'third Italy' during the 1980s. Brusco (1990) claims that the introduction of the centers raised innovative capability in the local network of small producers. The development of external economics and the emergence of new local organizations increase the visibility, prestige and attractiveness of a cluster. This may result in more firms and skilled employees moving into the cluster, thus raising the attractiveness even further, as well as resulting in a fertile breeding place for new local companies. Lastly, the creation of non-market relational assets that foster an untraded circulation of information and knowledge, through e.g. informal collaboration and help with coordinating economic activity. Thus, mature regional clusters may contain ensembles of specific, differentiated, and localized relations between persons and organizations that are coordinated by routines or conventions that often only work in the context of proximity (Storper, 1997).

Based on Porter's 1990 concept of an industrial cluster a different and more instrumental approach emerged. Clustering is more or less seen as an independent, partial process with its own laws of development, where the laws of successful clusters can be reverse-engineered in order to imitate the success stories (Storper, 2000). According to Porter (1998a) companies gain competitive strength in regional cluster because of a better access to specialized and experienced employees, supplier, specialized information and public goods, and by the motivating force of local rivalry and demanding customers. It is the case of external economics strengthened by proximity. In spite of the original contextualization of industrial clusters within a

framework of national competitive advantage by Porter, it is the concept of local competitive advantage, which has dominated discussion of cluster development over the past decade. In part, this is due to the longer tradition of research on localizing competitive advantage which linked aspects of the cluster concept specific process and its embedding in local business networks to spatial considerations. While particularly evident in the industrial district literature and the debates over whether areas such as the Third Italy and Baden- Wurttemberg represented new regional development paradigms (Piore and Sabel. 1984; Bos and Koetter, (2010), the importance of local context was endorsed by Porter (1990) and subsequently investigated in greater detail in the writings of Storper (1997), and Enright (2000). The result has been an increasing diversity of spatial scales at which competitive advantage policy is defined. This has manifested in the growing numbers of regional and local cluster policies in Western Europe over the past decade, in regions as diverse as Styria (Austria), Flanders (Belgium), and North-Rhine Westphalia (Germany), the Basque country (Spain) and Scotland (the U.K.), as well as at state level throughout the US (particularly Arizona and North Carolina) (Enright, 1996). They differ from policies in support of national competitive advantage in certain key respects. National competitive advantage policies frequently concentrates on support for large firms as the key drivers of developments in certain sectors (as in the case of Denmark and the Netherlands). As a result, they have tended to proceed out of national industrial policy, providing assistance directly (through subsidies) or indirect (by supplying facilities from which only large firms are likely to benefit). In contrast, sub-national cluster strategies tend to favor SMEs: smaller firms not only require more public intervention to overcome internal and external limits on their capacity to innovate, but that capacity is often linked to key cluster characteristics, notably networking with other firms and research institutes. As a result, sub-national cluster policies tend to be more deeply rooted in spatial policy traditions. A substantial body of literature has emerged on the theory of the geographical clustering of firms and a large number of empirical studies have attempted to identify and assess the role of clustering of economic activity in relation to innovation and economic performance. Most of these employ quantitative and case study methods. An important contributor to the cluster debate, at least in terms of public awareness, is Porter (1990), whose work may be, as Martin and Sunley (2001) argue, a case of clever positioning and marketing of the cluster idea. A Porter

(national) competitiveness and the strength of national clusters are directly related. A successful cluster promotion policy is the key to economic performance.

However, at least two distinct concepts of cluster are employed. Porter's (1990) use of the term relates clustering to (essentially national) competitiveness and he alludes strongly to input-output types of relations, involving multiplier effects, as well as perhaps unclearly defined linkages between factors inputs, supporting industries and demand conditions, in the context of a competitive environment. He also refers to the importance of innovation, information flows and common goals, mediated by personal and community relationships and patterns of ownership. Geographical proximity appears more as an incidental factor within an essentially national cluster of interlinked industries, which gives rise to a lack of clarity on the relationship between the Porter clusters diamond and geographical space. The other use of the term builds directly on the concept of agglomeration economies, incorporating an explicit spatial dimension. Gordon & McCann (2000) suggest that there are two versions of this concept of agglomeration, the open membership model where cluster membership is open to any firm locating in the area under market conditions and a social network or club version, involving social capital within an institutional framework and with limited access. However, on closer analysis this distinction becomes blurred. In addition, they identify a type of cluster based upon input-output type linkages, the industrial complex. They establish a three-fold typology of clusters: (i) a model of pure agglomeration (ii) the industrial complex model, based fundamentally on input-output relations and (iii) the social network model, drawing on ideas of social capital. Whilst useful, it is questionable how far the three types of cluster are in fact independent.

2.3 HYPOTHESES

The following hypotheses, which derive from the conceptual/theoretical and literature review, were tested in this study. The basis for each hypothesis is provided.

- (i) The distribution of firms in the Lagos region is not clustered.

Locational theorists have drawn attention to the significance of external economies that may be enjoyed by a manufacturing firm as a consequence of the industrial environment in which it is located. Traditionally viewed issue of selecting a location must be seen not in isolation but in the context of interrelationship of existing sets of production and service units and management objectives within the organization (Phillip, 2003) .

- (ii) Agglomeration economies do not vary significantly amongst the firms;
The literature has revealed that the concentration of the production facilities of a single firm or across multiple firms in a single location generates cost-saving effects and often leads to further agglomeration of firms through an industrial location process (Hoover, 1937; Weber, 1929).
- (iii). The degree of agglomeration economies enjoyed by firms is not determined by the structural characteristics of firms.
The concentration of industries with functional linkages in industrial agglomeration brings about financial savings on the part of industries concerned. Such savings are achieved because agglomerated firms can share common services such as water, communication facilities, security, transport facilities and labour, these savings may be used for industrial expansion in form of physical elements and organizational elements provision, which constitute industrial structure (Lazerson, 1988; Bloom, N. 2007).
- (iv) Distance from the firm's is not significantly related to the pattern of perception of environmental problems.
The literature has recognized that the dominant location pull exerted by the metropolitan areas upon industry location serves to emphasize that the location theory be directed toward interdependence and total system nations. Industrial establishments, therefore, agglomerate over space because of the collective benefits which they would not enjoy individual in an isolated location (Funderbug, 2000). Despite all the advantages that are enjoyed as a result of agglomeration economies, it also has negative effects. Agglomeration cause, overcrowding, pollution, high cost of land and traffic congestion. Despite the difficulties in quantifying the costs to health or property arising from air pollution impacts generated by different distributions of industry relative to the surrounding population, there is evidence that general planning strategies for the location of industry have been formulated in several countries upon the basis of intuitive judgments regarding the balance of social costs and benefits arising from further development in existing agglomerations as compared with policies of dispersal (Porter, 1980).

CHAPTER THREE

3.0 AN OVERVIEW OF GROWTH PATTERN AND INDUSTRIALIZATION IN THE LAGOS REGION

This chapter discusses the various aspects of the Lagos region, the study area.

3.1 JUSTIFICATION FOR CHOICE OF STUDY AREA

The Lagos region covers metropolitan Lagos made up of twenty local government and thirty seven local community development areas (LCDAS) among which are, Ikeja, Apapa, Mushin, Ikorodu, Epe and Badagry to mention just a few. This region which is situated along the south west of Nigeria, approximately between latitudes $6^{\circ}27'$ and $6^{\circ}37'$ north of the equator and longitudes $3^{\circ}15'$ and $3^{\circ}47'$ east of Greenwich meridian (see Fig. 3), with a land area of about $1,088\text{km}^2$, covers about 32 percent of the land area of Lagos state. About 20 percent of this area is made up of Lagoons and mangrove swamps.

Lagos region is the leading, industrial, commercial, financial and maritime nerve-centre of the country. Over 60 percent of all commercial transactions in Nigeria are carried out or finalized in the Lagos region. About 70 percent of the total value of industrial investments in Nigeria is in the Lagos region. Over 65 percent of the country's industrial employment is concentrated in this region, leaving the remaining 35 percent in other parts of the country. It is, in part, the recognition of the marked concentration of industries in the Lagos region that informed its choice as the study area for this work.

Perhaps it is this strategic position of the Lagos region within the country, which explains why industrial concerns and trading companies, such as United African Company (UAC), Union Trading Company (UTC), Patterson and Zochonis (PZ), have their head offices, located in this region. In addition, major financial centres such as the Nigerian Stock Exchange and the head office of major banks, insurance companies and other financial institutions are located in this region. The Lagos region has two seaports, Tincan and Apapa. The two ports handle about 60 percent of Nigeria's total export excluding crude oil and about 70 percent of imports. Major terminals for both

road and rail routes are located in the Lagos region. The strategic location of the Lagos region is further strengthened by the presence of the most important airport.

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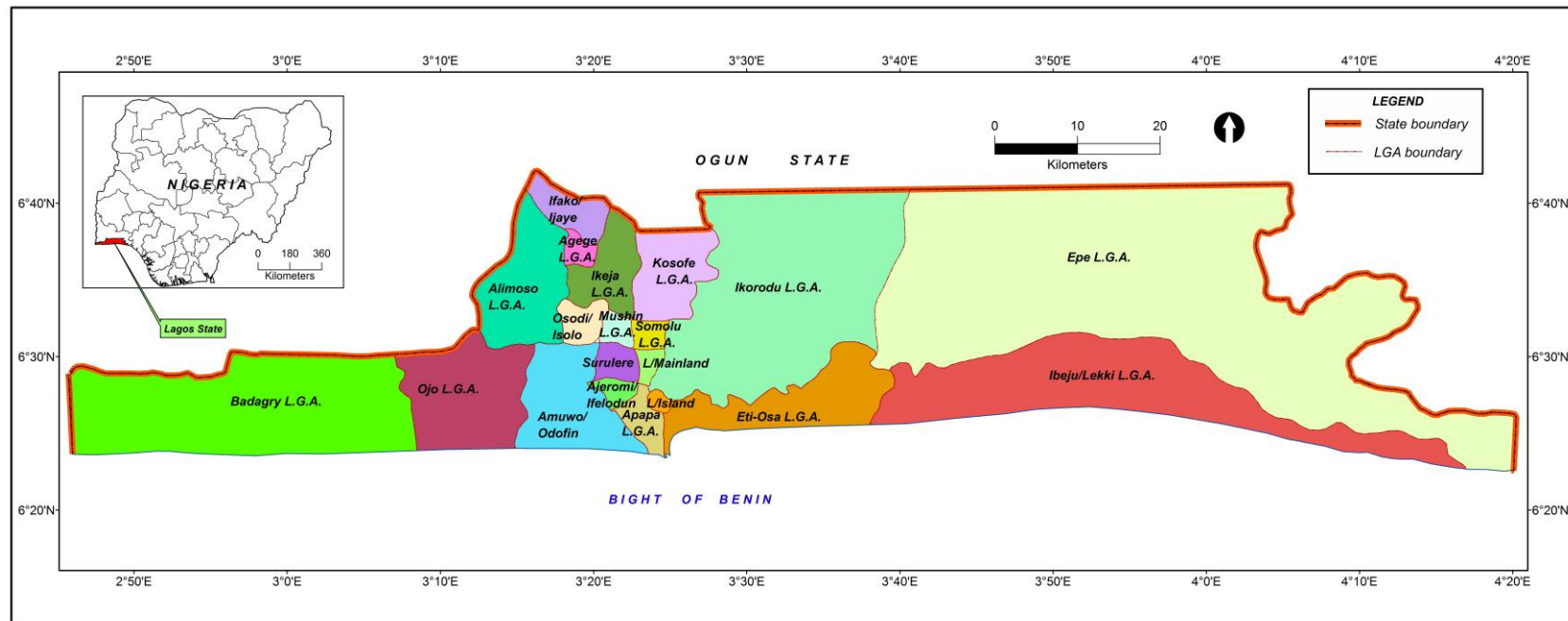


Fig. 3.1: Lagos Region

3.2 GROWTH PATTERN OF THE LAGOS REGION

The indigenous populations of Lagos are Aworis; there is nevertheless an admixture of other pioneer immigrant settlers collectively called lagosian but are approximately the Ekos. The city of Lagos was in the 15th century, a small fishing and farming settlement on an island chosen for that purpose by people from the Nigerian hinterland. This island was inhabited because it was comparatively safe from attacks during inter-tribal wars. Lagos became a port of call for Portuguese merchants who later christened it Lagos de' curamo because of its prominence during the slave trade of the 17th and 18th centuries.

In May 1968 by virtue of the promulgation (establishment) Edict No. 3 of April 1968 five divisions were created in Lagos state, namely Lagos (Eko), Ikeja, Ikorodu, Epe and Badagry. The divisions were further divided into 57 local government areas in development and participatory democracy nearer to the people. Three major factors account for the subsequent growth of the Lagos region over time. These factors are (i) the construction, in 1958, of the railway as the most important means of linking the city (the port) with a rich hinterland, (ii) the development of the Lagos harbor into the largest along the west African coast 1908 and 1917, and (iii) the construction in 1900, of carter bridge (reconstruction in 1933 and 1979 to link the Island with the mainland and the hinterland. In addition to this is the official commissioning of the third Mainland Bridge in 1992, to link Lagos Island with Oworonshoki, which has since become another growth point in the Lagos region.

The core of the state and a highly urbanized local government areas consisting of Lagos Island, Lagos Mainland, Surulere, Apapa and Eti-Osa. The centre and most developed of this chain of Island is Lagos Island. The Island is the cultural watershed of the white cap (Idejo) chieftains with the Oba of Lagos as the paramount monarch. As the population of Lagos increased, spatial expansion became inevitable with an initial area of 4km² on the Lagos Island, and an estimated population of 28,518 in 1871, the population of the city increased to 126,108 in 1981. The Inland areas expanded to 62.8km to encompass areas immediately outside the Island and beyond. It is not only the city which has expanded over the years, the largely rural settlements such as Mushin, Oshodi, Ikeja, Agege, Shomolu, Bariga, Surulere and villages west of Apapa, Agbara, Sango/Ota and Ojodu/Isheri which were outside the then urban area, have also expanded.

According to the post-independence census in 1963, a population of 1,122,733 was recorded for metropolitan Lagos while a population of 665,246 was recorded for the city of Lagos and 457,487 for the settlements outside Lagos. The population of the Lagos region was 5,525,261 in 1991. The Lagos state population figure for the 2006 national population census is 8,048,430 the provisional result released generated much controversy, Lagos state government believed that the result needs to be authenticated.

Lagos state took off as an administrative entity on April 11, 1968 and playing the role of state and federal capital. Lagos region is not only an important commercial/industrial centre in Nigeria and the West African sub-region, but also the seat of government, centre of learning as well as an important cultural centre. All these put together inform the process of migration into Lagos state and the beginning of a distinctive type of urban growth (Lagos state Property Development Corporation, 1978). Lagos provides a good outlet for goods from the hinterland transported by rails, road and the waterways through the Lagos harbour.

3.3 Trend in Industrialization in Lagos region

The growth and development of the manufacturing industry in Lagos state has proved to be a challenging area of research, particularly along the broad line of benefits and consequences of industrial development. Given the unquestionable role of Lagos state as the industrial and commercial nerve centre of the entire country, the manufacturing sector of the Lagos economy has continued to attract a lot of attention by successive government, in military or civilian at both state and federal levels, even at the local government level. Private investors both indigenous and foreign, as well as researchers are not left out behind in this respect.

Industrialization in the Lagos region started with two brickworks in Ebute-Metta in 1859 and 1863, and a palm oil mill established in 1865. The printing works of a mission was established in 1905, the government printing press in 1906, and the Daily Times in 1925. All these were located on the Island of Lagos, and the railway printing works Ebute-Metta (Schatzl, 1973; Ajayi, 1998). Other large firms were Lever Brothers Soap factory established in 1925, and a metal container factory established in 1940, both in Apapa.

The industrial landscapes of Lagos state particularly that of metropolitan Lagos is no doubt the most active and buoyant in Nigeria. The benefits, directly and indirectly to the Lagos state regional economy are no doubt, multifarious and

staggering. Lagos developed into the country's leading industrial centre following the expansion with service and administrative sectors, and the increase in the population. During the 1950s and 1960s, the built up area continued to expand northwards beyond the actual city limits. Lagos has since grown into neighbouring villages and expanded both in size and industrial activities. Out of the 230 manufacturing establishments operating in the Lagos area in 1969, 5 percent were established before 1946, another 3.5 percent between 1946 and 1950; and 67.5 percent after 1963. More than 90 percent of the industrial establishments in the Lagos metropolitan area begin production only after 1950. The total land area devoted to industrial land use in the Lagos region increased from 7.75 percent in 1966 to 8.41 percent in 1979 and 8.81 percent in 1992 (Babarinde, 1994).

The number of manufacturing establishments in Lagos region between 1970 and 2004, shown in Table 3.1 indicates that the number of establishments increased from only 284 in 1970 to 307 by 1985, 350 by 1989, 529 by 1993, 560 by 1997, 631 by 2001, 640 by 2005 and 670 by 2009.

Table 3.1 Manufacturing Establishments in the Lagos Region, 1970-2008.

Year	Number of Establishment	% Increase
1970	284	-
1985	307	8.10
1989	350	14.0
1993	529	51.1
1997	560	5.86
2001	631	12.7
2005	640	1.43
2008	670	4.69

- Sources:**
1. MAN – Industrial Directory, 2005.
 2. Federal Ministry of Industries – Abuja, 2008
 3. Schaztl, 1973;
 4. Ajayi, 1998.

3.4 Lagos State Industrial and Commercial Policy

The Industrial Policy (IP) of Lagos can be explained through equation of exchange

$$IP = f(TP, \text{Foreign exchange } p, \text{MFT prod.} \dots \dots \dots u)$$

Where,

The Industrial Policy incorporates the element of

- (i) Small and Medium Enterprises
- (ii) Industrial Development Centres.
- (iii) Raw Material Development Centres
- (iv) Estate of Market and Plazas
- (v) Establishment of trade fair and exhibition
- (vi) Commercialization and privatization of government owned enterprises.

Secondly, it also provides effective resistance to harmful development parameters. This was carried out in the process of identification of

- Harmful things like unproductive causes of investment and timely financial and correct warning signal or credit, tools, indicators, etc.
- Adequate signaling of resistance against bad funding policy management, and obstacles to development.
- Negative indicators of business environment and possible solutions etc

Thus, the totality of resources at Lagos State level in a particular case is decided by taking the state's pool of experts as resource creators and resource resisters. Such that "the extent of human satisfaction at individual, national and international levels obtainable from Lagos State becomes a function of both resources and resistance and not of resources alone".

The relationship of natural resources endowment to total population has a significant bearing on the eligibility of regions. It is regarded that regions having abundant, readily exploitable mineral, especially "petroleum or a well developed primary export products (niuts, sugar, coffee, rubber, etc.) can generally mobilize these products for export far more rapidly than the development of industrial goods for export". The availability of these two factors (natural resources and population) even though regarded as significant, are not an end to development "they are presently 'Natural Stuff'". Evidence is available that supports the stand that regions without such opportunities but having favourable industrial and export conditions got included in development of industry for exportable as a matter of urgency. Similarly, the issue of

population when converted from its neutrality concept can boost natural resource position of Lagos Area.

3.5 Industrial Estates in the Lagos region

With the continued but guided operations of the law of cumulative causation, and all the possible astronomical increase in the multiplier effect of the initial advantages of the state as the commercial, industrial and financial nerve centre of Nigeria is most likely to be maintained for many years to come even into the twenty-fifth century.

Industrial activities are concentrated in Agege, Eti-Osa, Ikeja, Lagos Island, Lagos Mainland, Mushin, Ojo and Shomolu local government areas of Lagos state, and the adjoining hinterlands of Agbara, Sango/Ota and Ojodu/Isheri areas to which manufacturing industries in Lagos metropolis relocated.

Table 3.2 shows the year of establishment of the industrial estates/areas. Six of the industrial estates were established before 1960 these are:- Apapa, Motori, Gbogeda, Ikeja, Ogba and Surulere. While six were established between 1962-1971 these are Agbara, Ilupeju, Ijora, Iganmu, Oshodi, Isolo and Iregun. Land area of Lagos South West and Ikorodu industrial estates are 185 and 190 hectares respectively. Other industrial areas have below 180 hectares. Such estate as Yaba and Surulere has 20 hectares each, while Kirikiri has 30 hectares. There is also variation in the number of operating industrial establishments among the industrial estates/areas while Apapa has a total of 41 (6.1%) industrial establishment, Motori has 32 (4.8%) Oregun has 26 industrial establishment, Agbara and Ijora has 48 (7.2%), Ikeja each has 66 (9.9%) industrial establishment, Lagos South West and Ilepeju has 56 (8.4%) industrial establishments respectively, Iganmu has 29 (4.3%), Oshodi/Isolo has 56 (8.4%), Ogba has 25 (3.7%) Gbagada, Agidirigbi, Oyediran, Yaba, Kirikiri and Surulere has 18 (2.7%) industrial establishments each, Ilasamaja has 20 (3.7%), Akowonjo has 16 (2.4%) and Abesan/Ipeje has 11 (1.6%) industrial establishment.

Table 3.2: Spatial Distribution of Firms

Location	Size in Hectares	Year of establishment.	No of firms	(%)
Apapa	70	1957	41	6.1
Matori	120	1958	32	4.8
Gbagada	50	1958	18	2.7
Agbara	90	1981	48	7.2
Ikeja	180	1957	66	9.9
Ilupeju	110	1962	56	8.4
Ijora	160	1965	48	7.2
Iganmu	80	1965	29	4.3
Oshodi/Isolo	120	1968	56	8.4
Ogba	150	1957	25	3.7
Agidingbi	70	N.A	18	2.7
Oyediran/Yaba	20	N.A	18	2.7
Ilasamaja	42	N.A	20	3.7
Lagos South-west	185	N.A	56	8.4
Ikorodu	190	N.A	50	7.5
Akowonjo	50	N.A	16	2.4
Oregun	100	1971	26	3.9
Surulere	20	1957	18	2.7
Kirikiri	30	N.A	18	2.7
Abesan/Ipaja	100	N.A	11	1.6
Total	<u>3,461.31</u>		<u>670</u>	<u>100</u>

Sources: 1. MAN – Industrial Directory, 2005

2. Lagos State Ministry of Commerce and Industry, 2008.

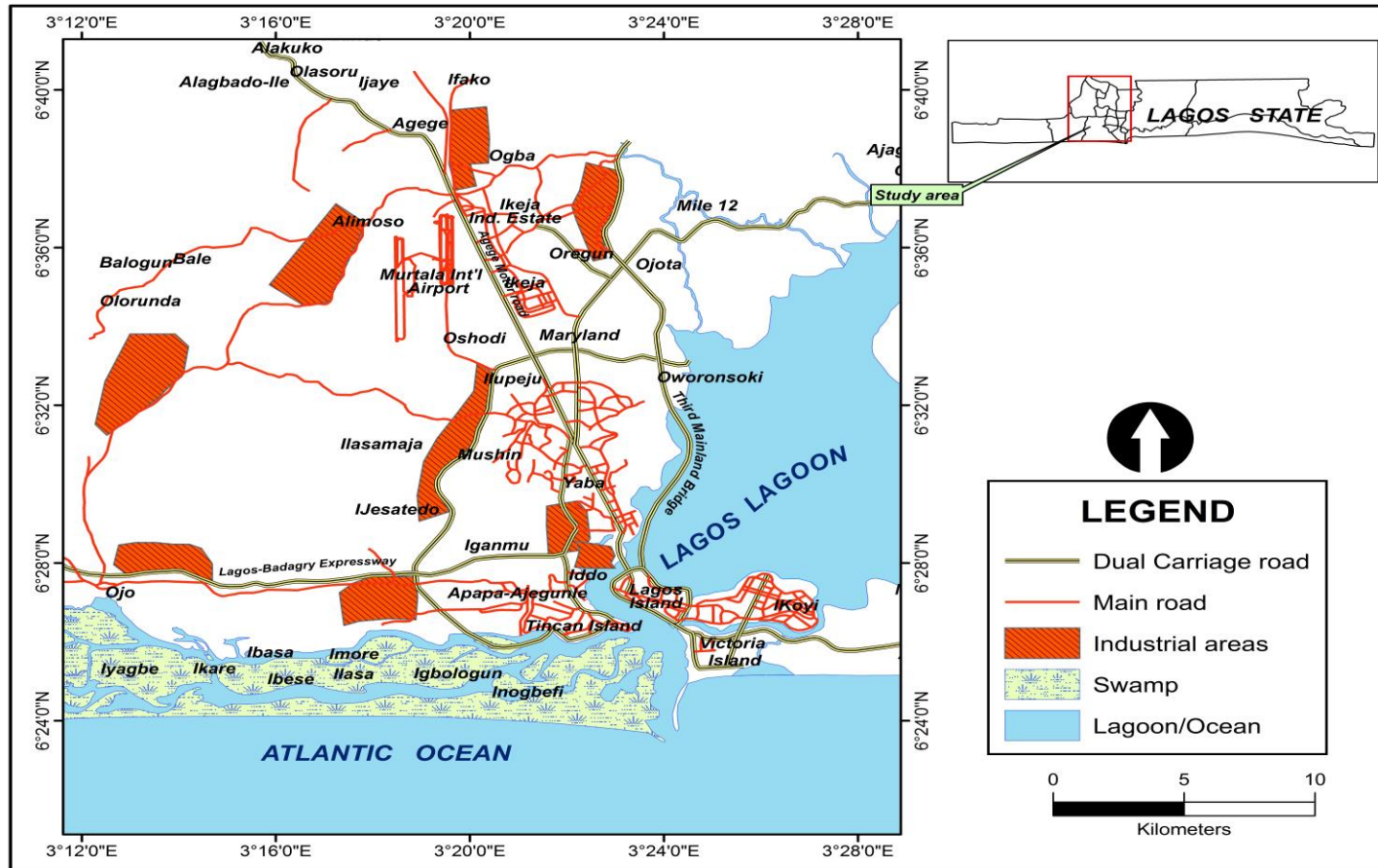


Fig. 3.2: Lagos Showing Industrial Estate Areas

CHAPTER FOUR

4.0 LOCATIONAL AND STRUCTURAL CHARACTERISTICS

This chapter examined the location factors of manufacturing establishments, the structural characteristics and working relationship of firms in the Lagos region.

4.1 Firms Location and Relative Importance of Location factors.

This section examined the firm's location and the significant variation in the importance attached to the factors of location by firms.

4.1.1 Firms Location.

The differential spread of industrial activity in space and time is a function of natural, social, political, economic and institutional factors. The interplay of these forces leads to the observed industrial landscape in the Lagos region. Out of the 103 firms (100%) that responded in the estates, there are 24(23%) firms in Ikeja, 14 firms (13.6%) in Ilupeju, while 13 firms (12.6%) in Apapa and 10 firms in Oshodi/Isolo. Also, there are nine (8.7%) firms in Oregun, seven (6.8%) firms each in Surulere/Mushin, Agbara and Iganmu Industrial estates and four (3.94%) firms in Ikorodu. Furthermore, there are three firms (2.9) each in Matori and Ijora estates and two firms (1.94%) in Ogba. This analysis has shown significant variation in the spatial distribution of agglomeration firms in each of the estates. The spatial distribution of agglomeration firms is presented in table 1.1 and fig. 1.1.

The hypothesis which states that: the distribution of firms in the Lagos region is not clustered was tested using the variance mean ratio (VMR) of Poisson distribution analytical techniques..

$$\lambda e^{-z} \left(1 + z + \frac{z^2}{2!} + \frac{z^3}{3!} + \frac{z^4}{4!} + \frac{z^n}{n!} \right)$$

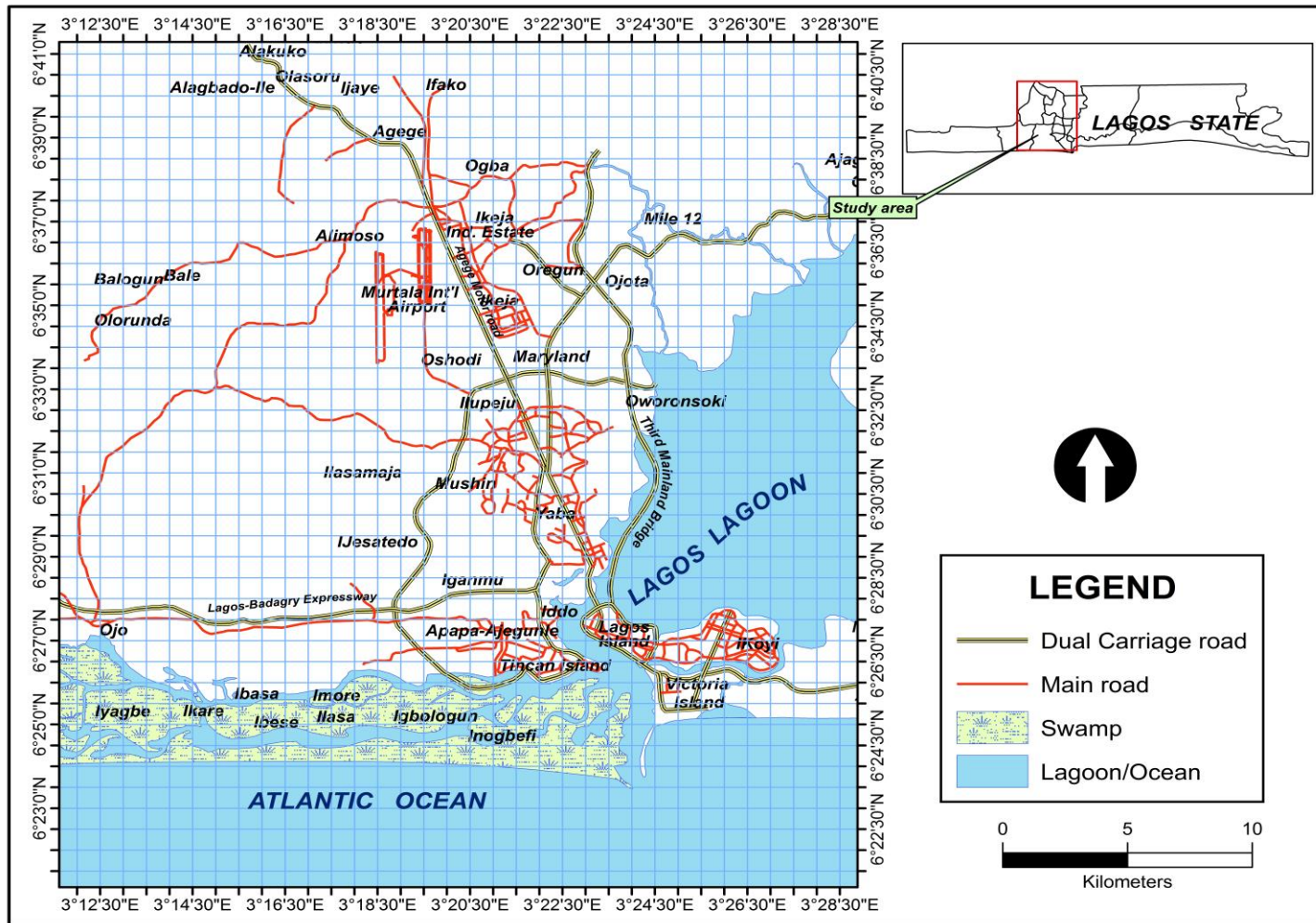


Fig. 4.1: Quadrat Count Analysis of the Agglomeration Firms

The hypothesis which states that: the distribution of firms in the Lagos region is not clustered was tested by using the variance mean ratio (VMR) method of Poisson distribution analytical techniques.

The variance mean ratio is

$$0.8496 + 0.00954 + 0.4464 + 0.526 + 0.1264 + 4132 / 0.41$$

$$\frac{2.457}{0.41} = 5.993$$

If variance mean ratio (VMR) is greater than 1 the distribution is clustered. Therefore, the hypothesis which states that the distribution of firms in the Lagos region is not clustered is rejected this connotes that the distribution of firms in the Lagos region is clustered (See Appendix III).

4.1.2 Firms Location Factors

Table 4.1 depicts the relative importance of location factors. Out of 103 firms (100%), 41 firms (17.0%) considered market facilities as the most important location factor, 33 firms (13.7%) considered nearness to raw material as the most important. Another, 29 (12.0%) considered nearness to transportation, 16(6.64%) considered labour supply as the most important, R & D and power supply were rated equally as the most important by 17 firms (7.05%) respectively. Furthermore, 15 firms (6.22%) considered water supply, 19 firms (7.88%) considered ports and shipping as the most important, while, 25 firms (10.4%) considered access to financial institution. Five firms (4.15%) considered government policy and telecommunication as the most important, while availability of cheap land was ranked least in the ranking. It is apparent that market facilities were ranked/rated as the most important location factors.

Table 4.1 The Relative Importance of Location Factors.

Factors	Frequency	Percentage
Nearness to raw materials	33	13.7
Market facilities	41	17.0
Transportation	29	12.0
R & D	17	7.05
Water supply	15	6.22
Labour	16	6.64
Power supply	17	7.05
Personal reasons	14	5.81
Cheap land	0	0
Government policy	05	4.15
Telecommunication	05	4.15
Ports & shipping	19	7.88
Access to financial institution	25	10.4
Total	236	100

Source: Author's Analysis, 2011.

Total is greater than 103, because of multiple response

The hypothesis which states that the location of industries on the various estates is not significant was tested using the chi-square analytical technique as depicted in table 4.4. The calculated chi-square value is 170.345 at 0.05 level of significance and 102 degree of freedom, while the tabulated value is 140.2. Since calculated is greater than the tabulated value, H_0 is rejected, thus signifying that the location of industries in the various estate is significant (see Appendix IV)

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Table 4.2 Summary of the Chi-Square Analysis of the Industry Group on the Basis of the Estates

Variable	α	Df	Cal X^2 value	Tab X^2 value	Decision
Industries group and estates	0.05 5%	(n - 1) =(103 - 1) = 102	170.345	140.2	H_0 is rejected H_1 is accepted

Source: Author's Analysis, 2011.

4.2 Structural Characteristics

Industrial structure has two basic elements which are: the physical and the organizational. The physical elements can be divided into the spatial/ physical aspect which is the distribution of industrial activity to specific location and non-spatial aspect which includes the raw material sourcing, the labour force, sources of labour gross output and value added by manufacture. The organizational structure includes the nature of control and ownership structure.

Size characteristic are most frequently expressed in terms of labour force in Nigeria. This is because labour is the most ascertainable size variable, more so in a region where statistics are still quite difficult to obtain from manufacturing and other economic units, and where proper documentation and data banks are yet to be effectively developed.

Industrial location decisions of a country's or regions entrepreneurs cannot be fully appreciated and properly assessed without taking into consideration the structural characteristics of the industries involved. This is why great attention has been paid to the structural aspects of manufacturing industries. The structural characteristics referred to in this chapter include the following: the type of establishment, the age of firms, estimated firms investment (in naira), the plant size (floor space square meters) and the labour force; indicated by number of employees while the operational characteristics include working relationship with other firms as well as the nature of the relationship and relative importance of location factors.

4.2.1 Industry Group

Table 4.3 reveals that 12 firms (11.7%) belongs to Food Beverages and Tobacco group, 16 (15.5%) in the Chemical and Pharmaceutical group, 09 (8.7%) belongs to the Domestic and Industrial Plastics and Rubber. Another 13 (12.6%) were of the Basic Metal, Iron and Steel Fabricated Metals, 16 (15.5%) were in the group of Pulp, Paper and Paper Products, printing and Publishing, 21 (20.4%) belongs to the group of Textile, Wearing Apparel and Leather products. Also, 2 (1.9%) were in the group of Wood and Wood products, 04 (3.97) firms belongs to the group of Non-Metallic Mineral Products and 04 (3.9%) firms were of the electrical/electronic group.

Obviously, there are more firms in the textile, wearing apparel and leather products group.

Table 4.3 Industry Group and Number of Industries in Each Group

S/N	Type of establishment	Frequency	Percentage
1.	Food beverages and Tobacco	12	11.7
2.	Chemical & Pharmaceuticals	16	15.5
3.	Domestic and industrial and plastics rubber	09	8.7
4.	Basic metal iron and steel fabricated metals	13	12.6
5.	Pulp, paper and paper products printing and publishing	16	15.5
6.	Textile, wearing apparel and leather products	21	20.4
7.	Wood and wood products including furniture	02	1.9
8.	Non-metallic mineral products	04	3.9
9.	Motor vehicle and miscellaneous	06	5.8
10.	Electrical/electronic	04	3.9
	Total	103	100

Source: Author's Analysis, 2011.

4.2.2 Industry Group in the different Estates

Table 4.4 shows the industry group in relation to the different estates. Out of the 12(11.7%) firms that belong to the food, beverages and tobacco industry group; two (1.94%) firms each are in Apapa and Oshodi/Isolo only one (0.97%) firm in Agbara, whereas there are four (3.9%) firms in Ikeja. Another three (2.9%) are in Ilupeju. Out of the 16(15.5%) firms that belong to the chemical and pharmaceuticals; three (2.9%) firms are in Apapa, two (1.9%) each are in Agbara, Ilupeju, Ijora and Oregun. While four (3.9 %) firms are in Ikeja and only one (0.97%) firm in Ikorodu. Out of the nine (8.7%) firms in the Domestic and industrial plastics industry group; three (2.9%) firms are in Ikeja, one (0.97%) each in Ilupeju, Ikorodu and Oregun. Another three (2.9%) firms are in Oshodi/Isolo.

Out of 13(12.6%) firms in basic metal iron, and steel fabricated metals industry group; four (3.9%) firms are in Apapa, three (2.9%) firms are in Ikeja and Ilupeju respectively. Also, two (1.94%) in Iganmu and one (0.97%) in Oshodi/Isolo. Out of the 16(15.5%) firms in pulp, paper and paper products, printing and publishing industry group; two (1.94%) firms are in Apapa, only one (0.97%) in Agbara, while four (3.9%) in Ikeja. Furthermore, three (2.9%) firms in Ilupeju, whereas there are two (1.94%) in Iganmu and three (2.9%) firms in Oshodi/Isolo.

Out of 21(20.4%) firms in Textile, wearing apparel and leather products; two (1.94%) firms are in Agbara, Ilupeju, Iganmu Ogba and Ikorodu respectively. Whereas, there are three (2.9%) firms in Ikeja and four (3.9%) in Mushin/Surulere. Only one (0.97%) each in Matori and Ijora. In the wood and wood product industry group, the two (1.94%) firms are in Matori. In non-metallic mineral products industry group; two (1.94%) firms are in Oregun, while one (0.97%) firm each is in Iganmu and Mushin/Surulere. Out of six (5.8%) firms in Motor vehicle and miscellaneous industry group; there are three (2.9%) in Ikeja, two (1.9%) in Oregun and one (0.9%) in Mushin/Surulere. Out of the four (3.9%) firms belonging to Electrical/Electronic industry group; one (0.97%) firms are in Agbara, Oshodi, Ogba and Ikorodu respectively.

Table 4.4 Industry Group on the Basis of the Estates

Industry Group	Apapa		Matori		Agbara		Ikeja		Ilupeju		Ijora		Iganmu		Oshodi		Ogba		Ikorodu		Oregun		Mushin/ Oshodi	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Food, beverages & tobacco	2	1.94			1	0.97	4	3.9	3	2.9					2	1.94								
Chemical & pharmaceutical	3	2.9			2	1.94	4	3.9	2	1.94	2	1.94					1	0.97			2	1.94		
Domestic & industries & plastics							3	2.9	1	0.97					3	2.9			1	0.97	1	0.97		
Basic metal iron and steel Fabrication	4	3.9					3	2.9	3	2.9			2	1.94	1	0.97								
Pulp, paper and paper products, printing	2	1.94			1	0.97	4	3.9	3	2.9			2	1.94	3	2.9							1	0.97
Textile, weaving apparel & leather good	2	1.94	1	0.97	2	1.94	3	2.9	2	1.9	1	0.97	2	1.94					2	1.94	2	1.94	4	3.9
Wood & wood good including furniture			2	1.94																				
Non-metallic mineral products													1	0.97							2	1.94	1	0.97
Motor vehicle and miscellaneous							3	2.9													2	1.94	1	0.97
Electrical/ electronic					1	0.97									1	0.97	1	0.97	1	0.97				
TOTAL	13	12.6	3	2.9	7	6.8	24	23	14	13.6	3	2.9	7	6.8	10	9.7	2	1.94	4	3.94	9	8.7	7	6.8

Source: Author's Analysis, 2011.

4.2.3 Age of Establishment

The age of firms presented in Fig. 4.2 shows that out of the 103 (100%) firms, only two (1.94%) firms were established between 1945 and 1950. Another 3(2.9%) firms were established between 1951 and 1955, while four (3.9%) firms were established between 1956 and 1960. The number of firms established increased to five (4.9%) in 1961-1965, while six (5.8%) firms were established between 1966 and 1970. Also the number of firms established between 1971 and 1975 increased to 8(7.8%), 10(9.7%) firms between 1976 and 1981 and 14(13.6%) between 1981-1985. Furthermore, the number of firms established between 1986 and 1990 were 11(10.61), whereas the eight (7.8%) were established between 1991 and 1995. Also, 11(10.6%) were established between 1990 and 2000, and 12(11.7%) between 2001 and 2005, while nine (8.7%) firms between 2006-2010. The number of firms established has shown a steady increase especially between 1945-1985, it decline slightly in 1986 and 1995 and rise again between 1996-2005.

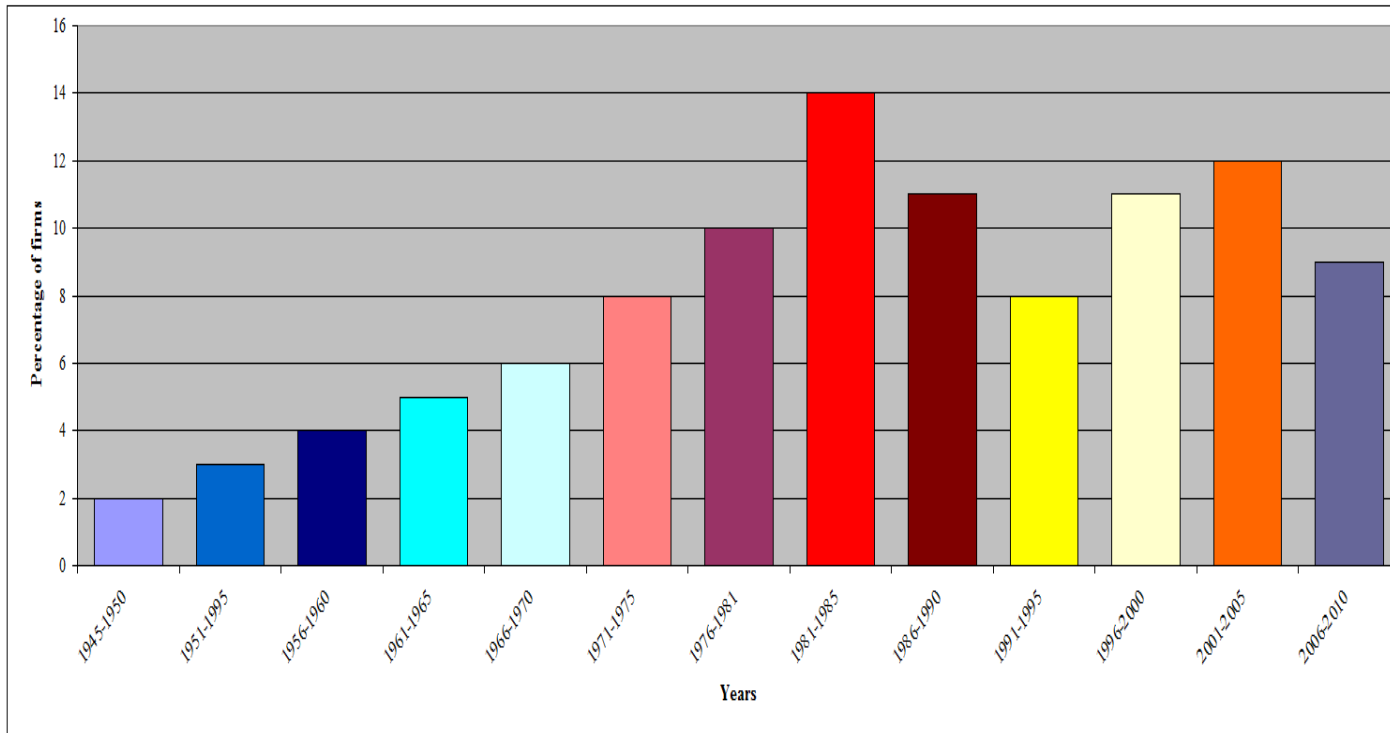


Fig 4.2: Ages of Firms

Source: Author's Analysis, 2011.

Fig.4.3 shows the age of firms in each of the estates. Out of the 103 (100%) firms, only one (0.97%) firms each where established between 1945 and 1950 in Ikeja and Ilupeju. Only one (0.97%) each were established between 1951 and 1955 in Apapa, Ikeja and Oshodi/Isolo. Also one (0.97%) firms each were established between 1956 and 1960 in Apapa, Ikeja, Ijora and Oshodi/Isolo. Another two (1.94%) firms and Ilupeju whereas only one (0.97%) firms was established in Ikorodu. Another two (1.94%) firms each were established between 1961 and 1965 in Ikeja and Ilupeju, whereas only one (0.97%) firms where established in Ikorodu. Another 2(1.94%) firms were established between 1966 and 1970 in Apapa, Oshodi/Isolo, and Oregun. Also, two (1.94%) firms each were established between 1971 and 1975 in Agbara, Oregun and Surulere/Mushin, while one (0.97%) firm's each were established in Ilupeju and Ijora. Between 1976 and 1980, 3(2.9%) firms each were established in Apapa and Ikeja, two (1.94%) in Ijora, whereas only one (0.97%) firm's each in Ilupeju and Oregun. Another two (1.94%) firms each were established between 1981-1985 in Apapa, Matori and Agbara, four (3.9%) in Ikeja, 3(2.9%) in Oregun and 1(0.97%) in Ogba.

Furthermore, 5(4.9%) firms were established between 1986 and 1990 in Ikeja, 3(2.9%) in Apapa, two (1.94%) in Ilupeju, one (0.97%) in Agbara. Also, three (2.9%) firms each were established between 1991 and 1995 in Ikeja and Ilupeju, whereas two (1.94%) were established in Agbara. Another, two (1.94%) firms each were established in 1996 and 2000 in Ikeja, Ilupeju and Oshodi/Isolo while three (2.9%) in Iganmu and one (0.97%) in Matori and Ijora. Moreover, two (1.94%) firms each were established between 2001 and 2005 in Ikeja, Ilupeju, Iganmu and Oregun, whereas 3(2.9%) firms were established in Oshodi and one (0.97%) in Ikorodu only one (0.97%) firm each in Iganmu and Oshodi/Isolo.

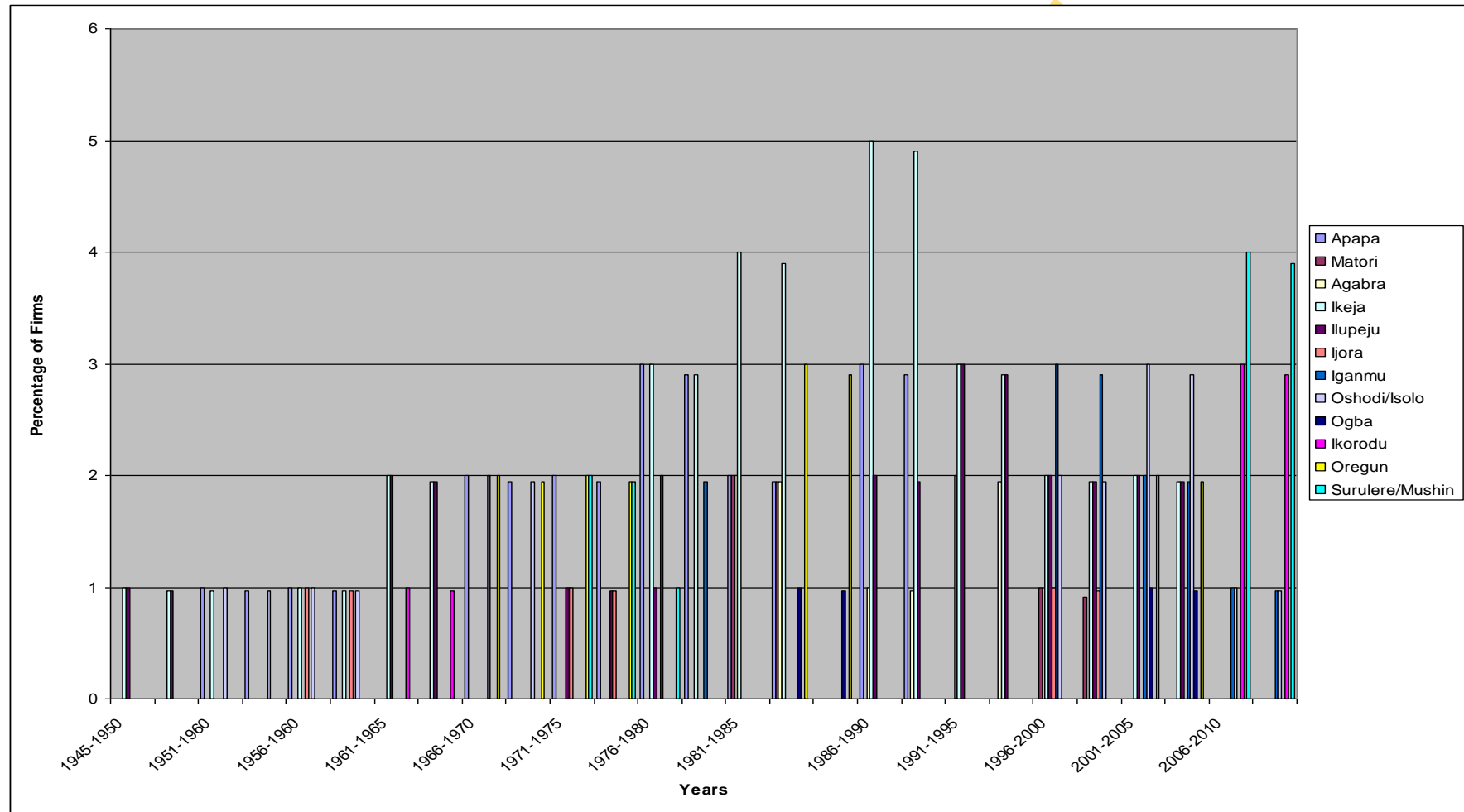


Fig: 4.3 Years of Establishment of firms in each of the Estates.

Source: Author's Analysis, 2011.

4.2.4 Areal Size of Plants

Fig. 4.4 depicts the areal size of plants, 41 (39.8%) firms have their areal size less than 501 square meters, while 32 (31.1%) firms were in the category of 501-1000 square metres, 21 (20.4%) firms have areal size ranging from 1001-2000 square meters, six (5.8%) firms have areal size between 2001-3000 square meters, three (2.9%) have their areal size greater than 3000 square meters. Majority of the firms have their areal size less than 500 square metre.

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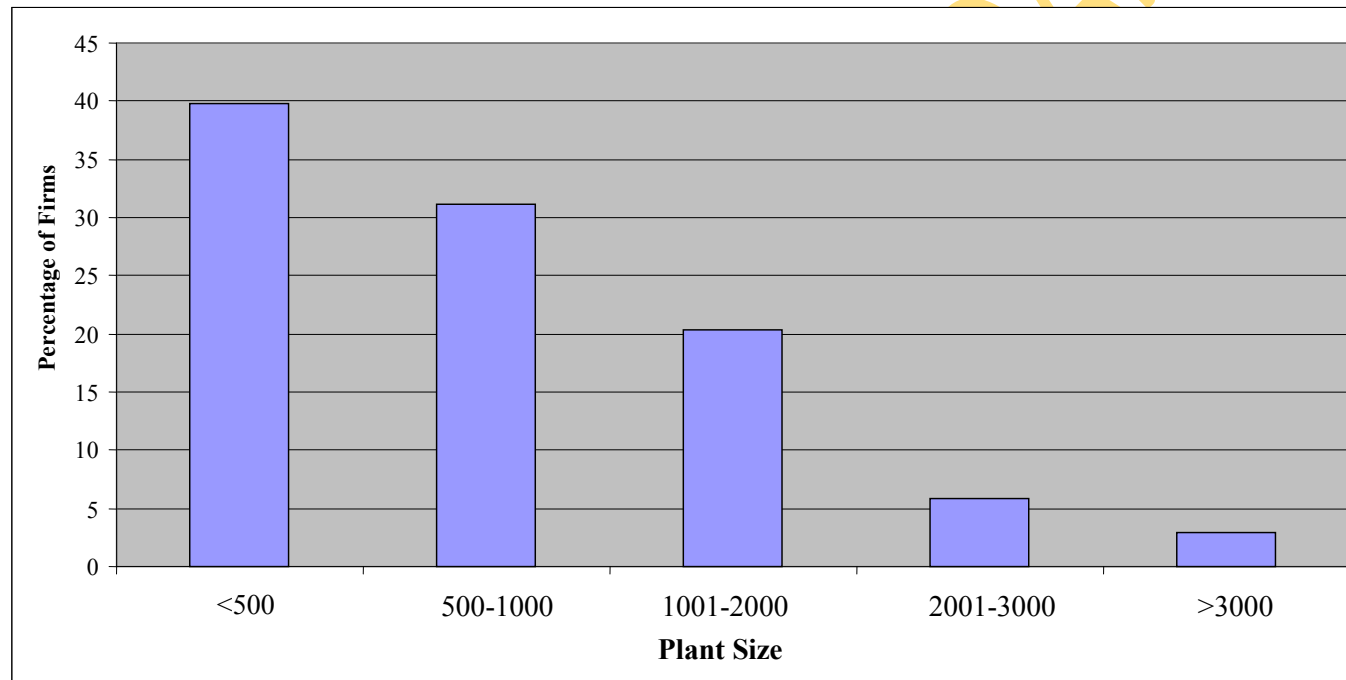


Fig: 4.4 Areal Plant Size in Metre Square (M²)

Source: Author's Analysis, 2011.

Fig. 4.5 shows the Areal Plant size on the basis of the Estates, while 8(7.8%) firms in Apapa have Areal plant size <501 square metres, there are five (4.9%) in Ilupeju. Also, three (2.9%) firms each in Agbara, Oshodi/Isolo and Surulere/Mushin have areal size <500 square metres, whereas there are two (1.9%) in Iganmu, only one (0.97%) firm each in Matori, Ijora, Ogba and Ikorodu. Out of the 32 (31%) firms having the areal size between 501 and 1000 square metres, 8(7.8%) firms were in Ikeja, 5(4.9%) in Ilupeju, three (2.9%) firms are in Apapa, Iganmu and Oshodi/Isolo. Also, two (1.9%) firms are in Agbara and only one (0.97%) firm is in Ikorodu, Oregon, Surulere/Mushin and only one (0.9%) in Ijora which have areal size between 501 and 1000 square metres.

Another four (3.9%) firms have areal size between 1001 and 2000 square metres in Ikeja while there are three (2.9%) in Ilupeju, while two (1.9%) firms each in Agbara, Iganmu, Oshodi/Isolo and Surulere/Mushin have areal size between 1001 and 2000 square metres, whereas only one (0.97%) firm's each in Apapa, Matori, Ijora, Ogba, Ikorodu and Oregon which have areal size between 1001 – 2000 square metres.

Furthermore, two (1.9%) firms in Ikeja have areal plant size between 2001 and 3000 square metres, whereas only one (0.97%) firm each have areal plant size between 2001-3000 square metres in Apapa, Ilupeju, Oshodi/Isolo and Oregon. Another two (1.9%) firms in Ikeja have areal plant size above 3000 square metres, whereas only one (0.97%) firm in Oregon have areal plant size above 3000 square metres.

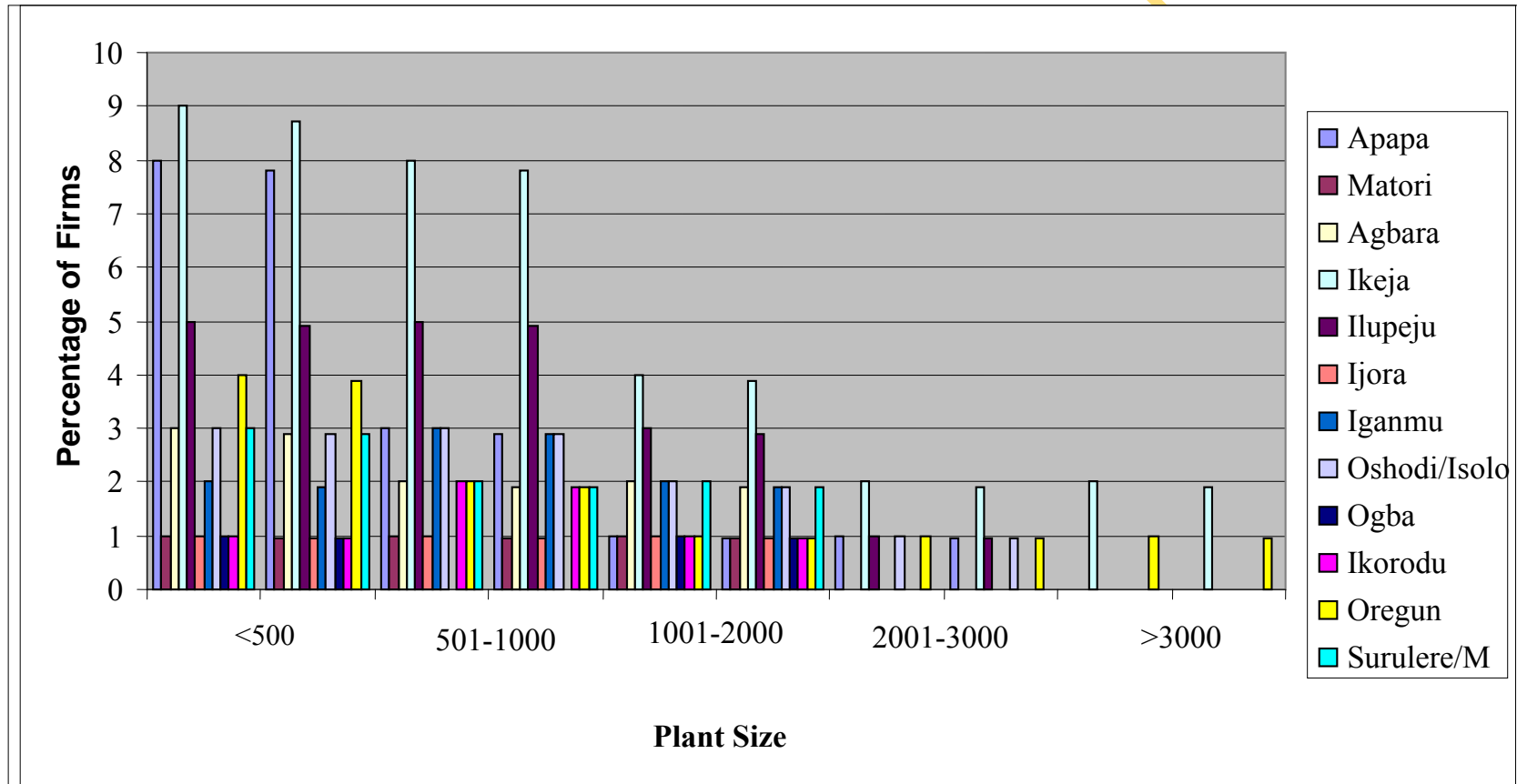


Fig. 4.5: Areal Plant Size in each of the Estates in Meters Square (m²)

Source: Author's Analysis, 2011.

4.2.5 Capacity Utilization of Firms

Fig. 4.6 reveals the capacity utilization of firms. None of the firms have their capacity utilization less than 21%, 4(3.9%) firms have their capacity utilization between 21-40%, while, 10 (9.7%) firms have between 41-60%, 35 (34%) firms have between 61-80%, and 54 (52.4%) have their capacity utilization between 81-100%. This indicates that majority of the firms have their capacity utilization between 81-100%.

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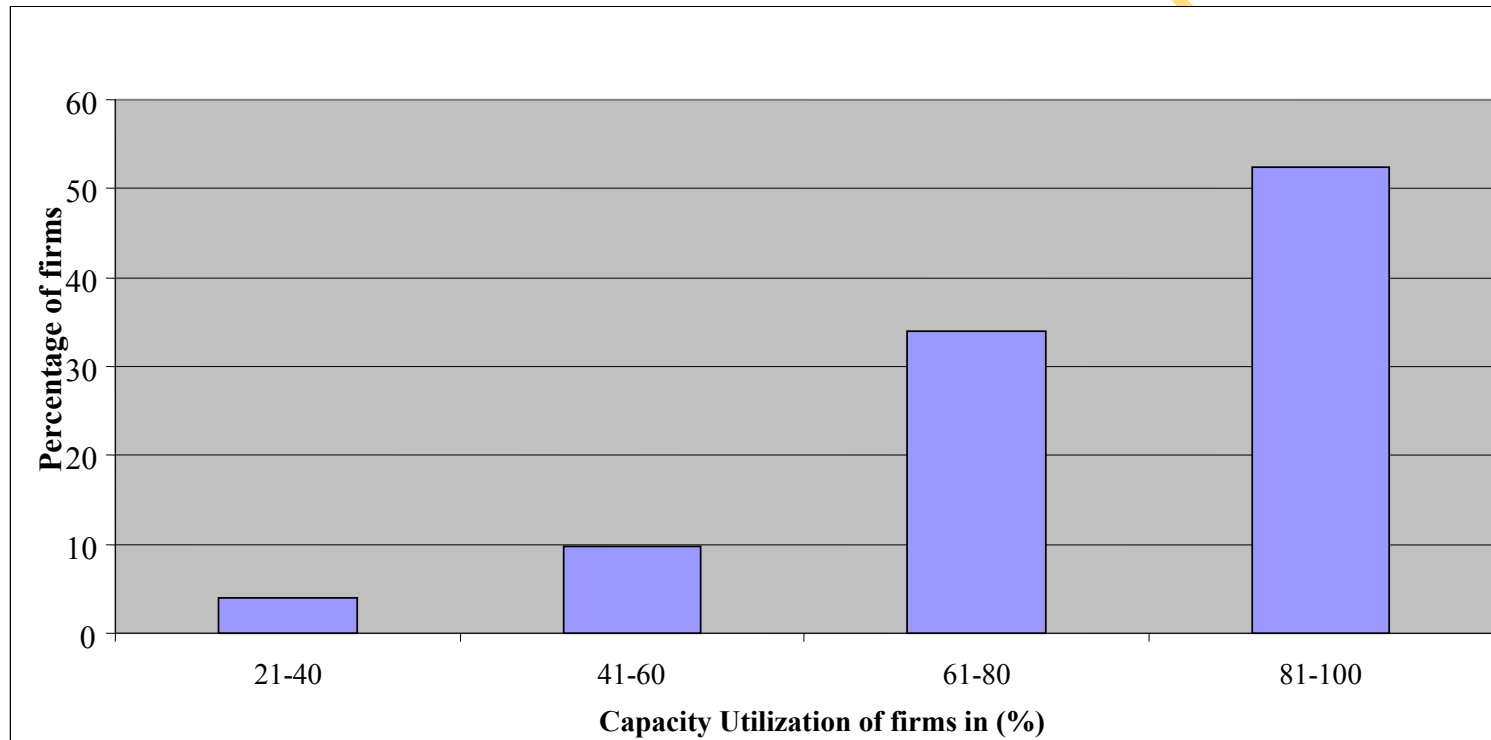


Fig. 4.6 Firms Capacity Utilization
Source: Author's Analysis, 2011.

Fig 4.7 shows the Capacity Utilization of firms in each of the estates. Out of the 54(52.4%) firms having capacity utilization between 81 and 100%, 8(7.8%) firms each were in Oshodi/Isolo and Oregun while seven (6.8%) firms were in Ikeja, 6(5.8%) firms each were in Ilupeju and Iganmu, whereas there are four (3.9%) firms in Ikorodu. Also, three (2.9%) firms have capacity utilization between 81-100% in Ijora, and two (1.9%) firms each in Apapa, Agbara and Ogba. Furthermore, out of the 35(40%) firms that have between 61 and 80% capacity utilization, five (7.8%) firms were in Apapa, while five (4.9%) were in Agbara and Ilupeju. Out of the 10(9.7%) firms that have capacity utilization between 41 and 60%, two (1.9%) firms each were in Apapa, Ikeja, Ilupeju, and Oshodi/Isolo only one (0.97%) firm's each in Oregun and Surulere/Mushin. Out of the four (3.9%) firms that have capacity utilization between 21 and 40%, two (1.9%) were in Ikeja, only one (0.97%) each is in Apapa and Ilupeju.

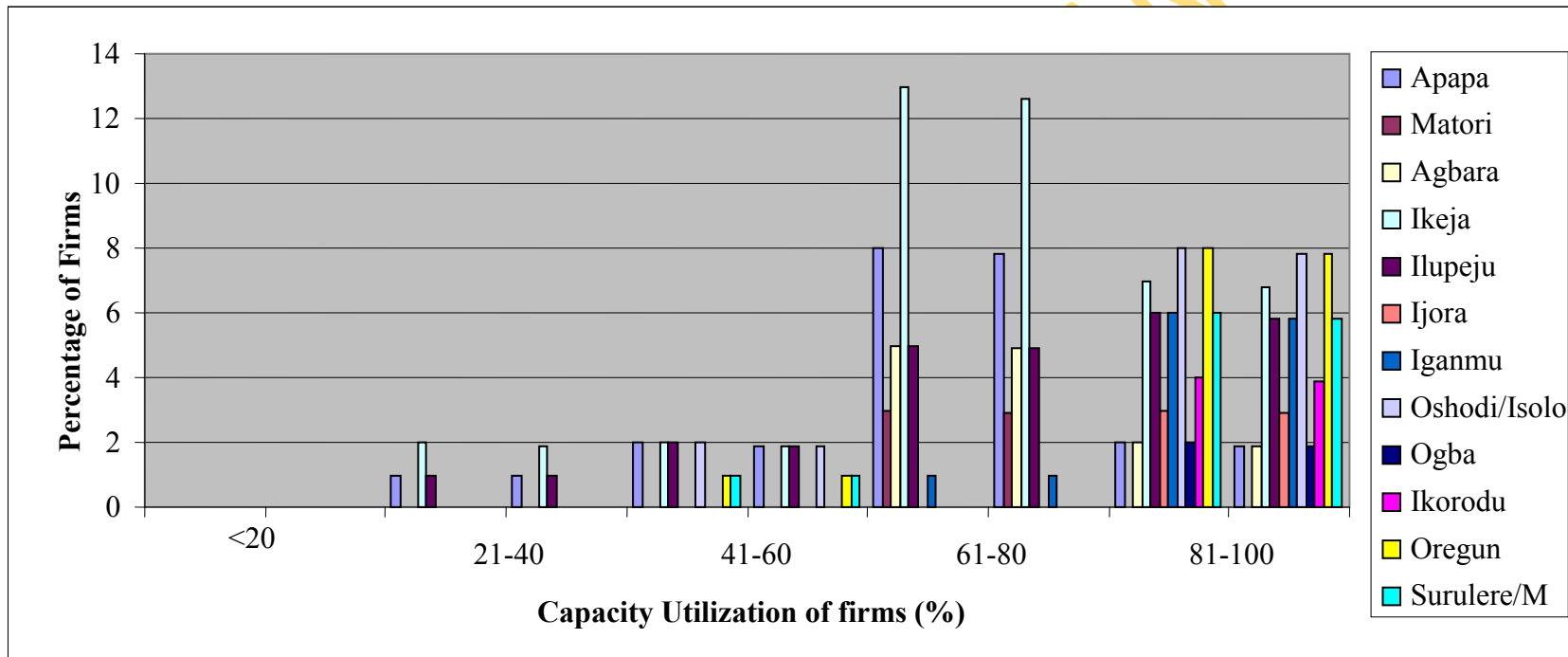


Fig 4.7: Capacity Utilization of Firms in each of the Estates

Source: Author's Analysis, 2011.

4.2.6 Firm's Investment

Fig. 4.8 shows the estimated firms investment. Out of 103(100%) firms, nine (8.7%) firms invested less than ₦1m, 12 (11.7%) firms invested between ₦1m -50m naira, four (3.9%) firms invested between ₦51m -₦ 100 while, eight (7.8%) firms invested between ₦ 101m- ₦150m, also, 11 (11%) firms invested between ₦ 151m - ₦ 200m and 59 (57%) firms invested above ₦200m. It is apparent that many of the firms invested above ₦200m; this also points to the fact that most of the firms are large scale industries, federal government 1990 opined that large scale industries are those firms having above 750,000.00 investments.

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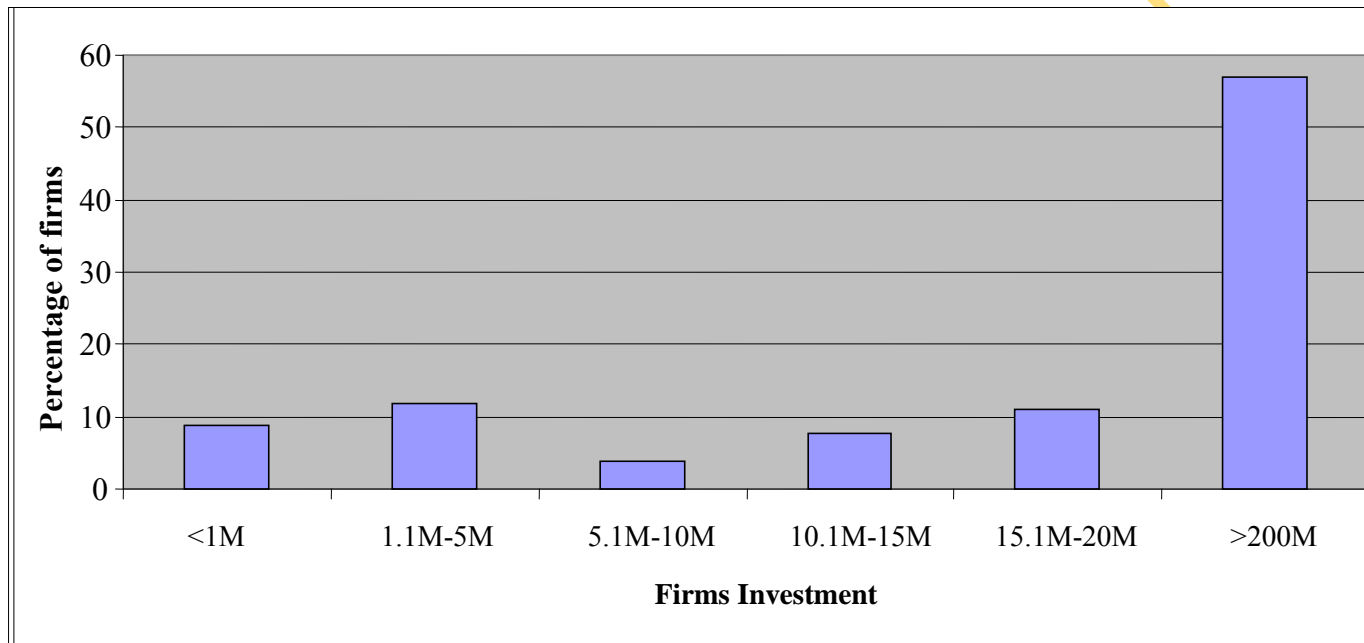


Fig.4.8 Firms Investment in Naira (₦)
Source: Author's Analysis, 2011.

Fig 4.9 shows the estimated firm's investment in each of the estates. Out of nine (8.7%) firms that invested <N1m, two (1.9%) are in Ikorodu while one (0.97%) firms each are in Agbara, Ikeja, Ilupeju, Oshodi/Isolo, Oregun and Surulere/Mushin. Out of the 12(11.7%) firms that invested between N1m and N50m, three (2.9%) are in Apapa, one (0.97%) each are in Matori, Ikeja, Ilupeju, Oregun and Surulere/Mushin. Another four (3.9%) firms invested between N51m and N100m, out of which three (2.9%) firms are in Ikeja, only one (0.97%) in Apapa.

Out of the eight (7.8%) firms that invested between N151 and N200m, three (2.9%) are in Apapa, while two (1.9%) firms each are in Agbara, Ikeja and Ilupeju. Whereas there is only one (0.94%) in Oshodi/Isolo. Furthermore, out of 11(10.7%) firms that invested between N101m and N150m, 3(2.9%) are in Apapa, while one (0.97%) is in Matori, Agbara, Ikeja, Ilupeju and Oshodi/Isolo. Out of the 59(57%) firms that invested above N200m, 16(15.5%) are in Ikeja, while 9(8.7%) are in Ilupeju. Also, seven (6.8%) were in Oregun, whereas 6(5.8%) firms each were in Iganmu and Oshodi/Isolo. Another, five (4.9%) firms are in Surulere/Mushin, while there are two (1.9%) firms each in Apapa and Ogba. Only one (0.97%) firms in Ikorodu.

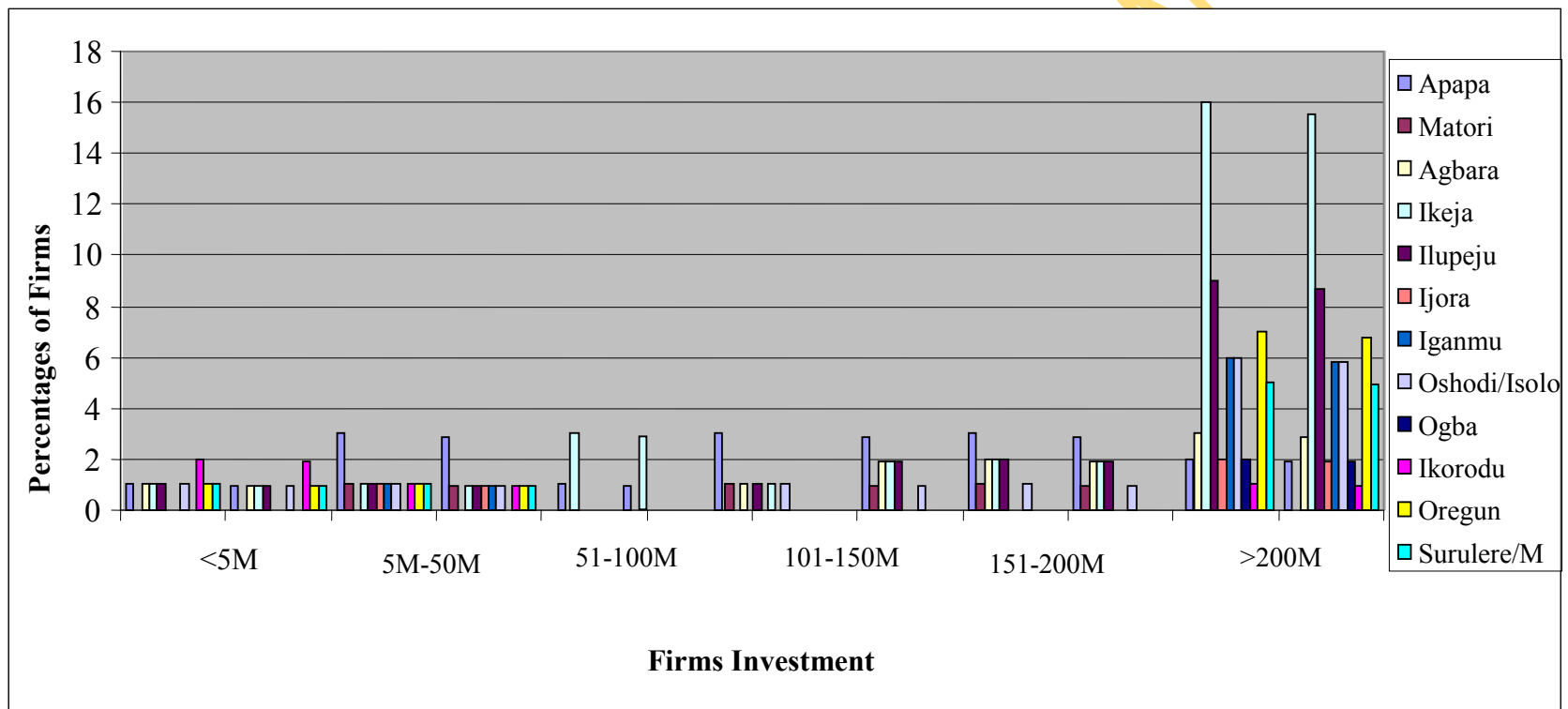


Fig. 4.9 Estimated Firms Investment on the Basis of the Estates in Naira (₦)
 Source: Author's Analysis, 2011.

4.2.7 Gross Financial Annual Output

Table 4.5 shows the gross financial annual output of firms. Out of 103 (100%) firms, five (4.9%) firms have less than ₦10m, 22 (21.4%) firms have between ₦10m – ₦100m, four (3.9%) firms have gross financial annual output between ₦101m – ₦190m, while, three (2.9%) firms have between ₦191m – ₦281m , only two (1.9%) firms have between ₦282m – ₦372m , 67(65%) firms have above ₦372m gross financial annual output. This connotes that majority of the firms have gross financial annual output above ₦372m.

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Table 4.5 Gross Financial Annual Output of Firms

Gross Financial Annual Output of Firms ₦m	No of Firms	Percentage
Less than ₦10m	5	4.9
₦ 10m- ₦100m	22	21.4
₦ 101m- ₦ 190m	4	3.9
₦ 191m-₦ 281	3	2.9
₦ 282m- ₦ 372m	2	1.9
Greater than 372m	67	65
TOTAL	103	100

Table 4.6 shows the gross financial annual output in each of the estates. Out of the five (4.9%) firms having <N10m gross financial annual output, 2 two (1.9%) firms are in Oregun and one (0.97) firm's each are in Apapa, Ikeja and Ilupeju. Another, 22(21.4%) firms have between N10m and N100m gross financial annual output, out of which five (4.9%) each are in Apapa and Ikeja. While there are two (1.9%) firms each in Ilupeju, Oshodi/Isolo, Ogba and Oregun. Also, out of four (3.9%) firms having between N101m and N190m, two (1.9%) are in Agbara, only one (0.97%) each in Apapa and Matori.

Furthermore, out of the three (2.9%) firms that have between N191m and N281m gross financial annual output, two (1.9%) firms are in Apapa, only one (0.97%) in Ikeja. Moreover, out of the two (1.94%) firms that have between N282m and N372m, only one (0.97%) each in Apapa, and Ikeja. Out of the 66(64.07%) firms that have above N372m gross financial annual output, 17(16.5%) are in Ikeja, eight (7.8%) in Ogba, whereas there are five (4.9%) firms each in Agbara, and Oshodi/Isolo. Another six (5.8%) in Surulere/Mushin, while there are three (2.9%) in Apapa. Also, there are two (1.9%) firms Iganmu and one (0.79%) each in Matori and Ikorodu.

Table 4.6 Gross Financial Annual Output on the Basis of the Estates

	< ₦10m		₦10m -100m		₦101m-₦190m		₦191m- ₦281m		₦282m- ₦372m		>₦372m	
	No	%	No	%	No	%	No	%	No	%	No	%
APAPA	1	0.97	5	4.9	1	0.97	2	1.9	1	0.97	3	2.9
MATORI			1	0.97	1	0.97					1	0.97
AGBARA					2	1.9					5	4.9
IKEJA	1	0.97	5	4.9			1	0.97			17	16.5
ILUPEJU	1	0.97	2	1.9							11	10.7
IGANMU			1	0.97							2	1.9
OSHODI/ ISOLO			2	1.9							5	4.9
OGBA			2	1.9					1	0.97	8	7.8
IKORODU	2	1.9	1	0.97							1	0.97
OREGUN			2	1.9							7	6.8
SURULERE /MUSHIN			1	0.97							6	5.8
TOTAL	5	4.9	22	21.4	4	3.9	3	2.9	2	1.94	66	64.07

Source: Author's Analysis, 2011.

4.2.8 Labour Size and Type

Based on the two variables of the number of employees and the sum of capital investment, the Nigerian government recognizes large and small scale manufacturing plants. A small scale establishment is the one that employed 50 employees or less and has ₦750, 000.00 or less capital investment (federal government of Nigeria, 1985). While large scale manufacturing plants are those that employed more than 50 employees and their capital based (share capital investment) is far greater than ₦750, 000.00.

Tables 4.7 and 4.8 respectively, show the management staff as well as auxiliary and clerical staff that are employed by the manufacturing establishments. Obviously, all forms of human activity require the supply of labour, but the requirements may vary considerably among different firms. The requirements of a large firm are different from those of a small firm, not only in the total number of workers required, but also in certain circumstances, in terms of their types and skills, largely because the bigger firm is better able than its smaller counterpart to derive scale economies through the introduction of specialization and division of labour.

Table 4.7 reveals that 38 (36.9%) firms have less than six management staff, 46 (44.7%) have between 6-10 management staff, 12 (11.7%) have between 11-14; 4 (3.9%) have between 15-19 management staff, only two (1.9%) have between 20-24 only, one (0.97%) have between 25-29 management staff.

Table 4.8 depicts the auxiliary, clerical and operational/technical staff, 73 (70.9%) firms have less than 51, 24 (23.3%) firms have between 51-100, only one (0.97%) firm has between 101-150, while 2 firms (1.9%) have between 151-200, only one (0.97%) firms have between 201-250, 251-300 respectively, also, one (0.97%) have above 300.

Spatially, labour requirements vary considerably because of the tendency for human activity to agglomerate at certain locations that have at times possessed an initial advantage with respect to other locations. As successfully more firms and industries concentrate in a place, in order to derive economies of scale, their demand for a particular kind of labour becomes localized in that area. Concentration of manufacturing establishments in the Lagos region attracted all kinds of labour skilled, semi-skilled and unskilled labours. Availability of labour results from the creation of spatial inequalities in labour demand, a process that itself is multiplicative in effect and

that forms an integral part of the processes of spatial agglomeration and location specialization.

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Table 4.7: The Management Size of Firms

Management Staff	Frequency	Percentage
< 6	38	36.9
6-10	46	44.7
11-14	12	11.7
15-19	4	3.9
20-24	2	1.9
25 and above	1	0.97
Total	103	100

Source: Author's Analysis, 2011.

Table 4.8 The Firms Auxiliary /Clerical and Operational Staff

Auxilliary/Clerical and Operational Staff	Frequency	Percentage
< 51	73	70.9
51-100	24	23.3
101-150	1	0.97
151-200	2	1.9
201-250	1	0.97
251-300	1	0.97
300 and above	1	0.97
Total	103	100

Source: Author's Analysis, 2011.

Table 4.9 shows the Management Staff on the basis of the Industry group. Out of the 38(36.9%) firms that employed <six workers, five (4.9%) each are in the Food Beverages and Tobacco group, Chemical and Pharmaceutical and Basic Metallic, Iron and Steel Fabrication Metal. While four (3.9%) firms are in the Textile Wearing Apparel and Leather product group, Electrical/Electronic whereas, three (2.9%) firms are in Pulp, Paper and Paper product, Printing and Publishing. Another two (1.9%) firms are in the Wood and Wood product including Furniture, Non-metallic Mineral product, and Motor, Vehicle and Miscellaneous Industry group. Also, out of 46(44.7%) firms that employed between 6 and 10 workers, nine (8.7%) firms are in Pulp, Paper and Paper product, Printing and Publishing, whereas eight (7.8%) firms are in the Chemical and Pharmaceutical group. Another, five (4.9%) firms each are in the Food Beverages and Tobacco; Basic Metallic Iron and Steel Fabrication Metal. While two (1.9%) firms each are in the Textile, Wearing Apparel and Leather product and Non Metallic Mineral product. Whereas there is only one (0.97%) firms in Domestic and Industrial Plastic Rubber Industry group. Furthermore, out of the 12 (11.7%) firms that employed between 11 and 14, there are three (2.9%) firms each in Pulp, Paper and Paper product, Printing and Publishing; Textile, Wearing Apparel and Leather products. While there are two (1.9%) firms each in Food, Beverages and Tobacco, Chemical and Pharmaceutical, Basic Metallic Iron and Steel Fabrication Metal. Also, out of the four (3.9%) firms that employed between 15 and 19 workers, 2 (1.9%) firms are in Domestic and Industrial Plastic Rubber, while one (0.97%) each are in the Chemical and Pharmaceutical. Basic Metallic Iron and Steel Fabrication Metal.

Table 4.10 reveals the auxiliary, clerical and operational staff across industry group. Out of 73(70.8%) firms that employed <50 auxiliary, clerical and operational staff, 11(107%) firms each are in the Chemical and Pharmaceutical; Pulp, Paper and Paper product, Printing and Publishing. While 10(9.7%) firms are in Textile, Wearing Apparel and Leather product, nine (8.7%) firms each are in Food, Beverages and Tobacco; Basic Metallic Iron and Steel Fabrication Metal. There are seven (6.8%) firms in Domestic and Industry Plastic Rubber, whereas there are six (5.8%) firms in Motor Vehicle and Miscellaneous Industry group. Four (3.9%) firms each are in Non-Metallic and Electrical/Electronic, while there are two (1.9%) firms in Wood and Wood product including furniture.

Furthermore, out of the 24(23%) firms that employed between 51 and 100 workers, four (3.9%) auxiliary, clerical and operational staff each are in Basic Metallic Iron and Steel Fabrication Metal. Pulp, Paper and Paper product, Printing and Publishing. Also, there are 9(8.7%) firms in Textile, Wearing Apparel and Leather product, whereas three (2.9%) firms exist in Chemical and Pharmaceutical industry group. Another, two (1.9%) firms are in Domestic and Industrial Plastic Rubber. There is only one (0.97%) firms employed between 101 and 150 auxiliary, clerical and operational staff and that is in Food, Beverages and Tobacco. Another, two (1.9%) firms employed between 151 and 200 auxiliary, clerical and operational staff, this is in the Chemical and Pharmaceutical; Pulp, Paper and Paper product, Printing, and Publishing. Only one (0.97%) firms which belongs to Chemical and Pharmaceutical industry group employed between 201 and 250. Also only one (0.97%) firms each which belongs to Textile, Wearing Apparel and Leather product employed between 251 and 300 workers, and above 300 auxiliary, clerical and operational staff.

Table 4.9 The Management Staff on the Basis of the Industry Group

Industry Group	< 6		6 -10		11 -14		15 – 19		20 – 24		> 25		Total	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Food beverage and Tobacco	5	4.9	5	4.9	2	1.9							12	11.7
Chemical and pharmaceutical	5	4.9	8	7.8	2	1.9	1	0.97					16	15.5
Domestic and Industrial Plastic rubber	6	5.8	1	0.97			2	1.9					9	8.7
Basic metallic iron & steel Fabrication metal	5	4.9	5	4.9	2	1.9	1	0.97					13	12.6
Pulp ,paper, & paper product, Printing and publishing	3	2.9	9	8.7	3	2.9			1	0.97			16	15.5
Textile, wearing apparel & Leather product	4	3.9	2	11.7	3	2.9			1	0.97	1	0.97	21	20.4
Wood & wood product including furniture.	2	1.9											2	1.9
Non-metallic mineral product	2	1.9	2	1.9									4	3.9
Motor, vehicle & miscellaneous	2	1.9	4	3.9									6	5.8
Electrical/ Electronic	4	3.9											4	3.9
Total	38	36.9	46	44.7	12	11.7	4	3.9	2	1.9	1	0.97	103	100

Source: Author's Analysis, 2011.

Table 4.10: The Auxiliary, Clerical and Operational Staff on the Basis of Industry Group

Industry Group	Auxiliary, Clerical and Operational Staff															
	<51		51-100		101-150		151-200		201-250		251-300		>300		Total	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Food beverage and Tobacco	9	8.7	2	1.9	1	0.97									12	11.7
Chemical and Pharmaceutical	11	10.7	3	2.9			1	0.97	1	0.97					16	15.5
Domestic and Industrial Plastic rubber	7	6.8	2	1.9											09	8.7
Basic metallic iron & steel Fabrication metal	9	8.7	4	3.9											13	12.6
Pulp ,paper, & paper product, Printing and publishing	11	10.7	4	3.9			1	0.97							16	15.5
Textile, wearing apparel & Leather product	10	9.7	9	8.7							1	0.97	1	0.97	21	20.4
Wood & wood product including furniture.	2	1.9													02	1.9
Non-metallic product	4	3.9													04	3.9
Motor, vehicle & miscellaneous	6	5.8													06	5.8
Electrical/ Electronic	4	3.9													04	3.9
Total	73	70.8	24	23	1	0.97	2	1.9	1	0.97	1	0.97	1	0.97	103	100

Source: Author's Analysis, 2011.

4.3 Nature of Relationship amongst Firms

This section discusses firm's working relationship and its nature, as well as sharing of some basic amenities by the firms.

4.3.1 The Nature of Working Relationship

Table 4.11 reveals the working relationship and the nature of such relationship among manufacturing firms. Out of 103 (100%) firms, 50 (11.7%) firms are involved in raw materials purchases/supply, 42 (9.8%) are involved in subcontract, 34 (7.96) were involved in collaboration in R & D and sales promotion respectively, while 47 (11%) are involved in transportation, 29 (6.79%) are involved in power supply, 27 (6.3%) are involved in water supply, 40 (9.4%) in security, another 24 (5.6%) are involved in waste treatment, also, six (1.41%) are involved in telecommunication, furthermore, 45 (10.5%) in ports and shipping, while, 49 (11.5%) are involved in Labour supply relationship. It is vivid from the foregoing that most of the firms were involved more in raw materials purchase/supply relationship.

Table 4.11: Types of Working Relationship

Working relationship	Frequency	Percentage
Raw materials purchase/supply	50	11.7
Subcontract	42	9.8
Collaboration in research and development	34	7.96
Sales promotion	34	7.96
Transportation	47	11
Power supply	29	6.79
Water supply	27	6.3
Security	40	9.4
Waste treatment	24	5.6
Telecommunication	6	1.41
Ports and shipping	45	10.5
Labour supply	49	11.5
Total	427	100

Source: Author's Analysis, 2011.

The total is greater than 103 because of multiple responses.

4.3.2 Services Sharing Amongst Firms

Table 4.12 shows the sharing of services with other firms. Out of 103 (100%) firms, 43(6.76%) firms share electricity, 45 (7.1%) firms share water, 59(9.3%) firms share Labour, while, 73(11.5%) share transport facilities, 68 (10.7%) share security, 46 (7.2%) share waste treatment, 57(9%) share sub contract services, 71(11%) share raw materials purchase/supply services, seven (1.1%) share telecommunication services, 43(6.76%) share ports and shipping services, another 63(9.9%) share sales promotion services, while 61 (9.6%) firms collaborate in R&D. It is evident from the above table that transport facilities formed the most important facility being shared by the firms.

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Table 4.12: Sharing Services with other Firms

Services	Frequently	Percentage
Electricity	43	6.76
Water	45	7.1
Labour	59	9.3
Transport facilities	73	11.5
Security	68	10.7
Waste treatment	46	7.2
Sub contract	57	9
Raw materials purchase/supply	71	11
Telecommunication	7	1.1
Ports and shipping	43	6.76
Sales promotion	63	9.9
Collaboration in R& D	61	9.6
Total	636	100

Source: Author's Analysis, 2011.

Total is greater than 103 because of multiple response

CHAPTER FIVE

5.0 AGGLOMERATION ECONOMIES AMONGST FIRMS

This chapter examines the nature and scope, as well as variation in agglomeration economies amongst firms. Two hypotheses are tested. These are: agglomeration economies do not vary significantly amongst firms and; the degree of agglomeration economies enjoyed by firms is not significantly determined by the structural characteristics of firms.

5.1 Advantages Offered by Locating within the Estate

The establishment of industrial estate coupled with the provision of essential infrastructural facilities attracts the concentration of manufacturing establishments and other activities in the estate. The various advantages offered within an estate, has the capacity of attracting industries to locate in the estate.

5.1.1 Location Advantages amongst Firms

The various advantages offered in the estate were revealed in table 5.1. Out of 103(100%), 48(16.2%) of the firms attested to the transportation advantages, 43 (14.5%) raw materials. Another, 37(12.5%) opined labour advantages, 30(10.1%) power supply, 65 (22%) market, 15(5.1%) subcontract, while, 29 (9.8%) attested to water supply advantages. Furthermore, 11(3.7%) enjoyed security advantages, 13(4.4%) attested to ports and shipping, while five (1.7%) attested to sales promotion advantages.

Table 5.1 Advantages Offered by Locating within the Estate

Advantages	Frequency	Percentage
Transport	48	16.2
Raw materials	43	14.5
Labour	37	12.5
Power supply	30	10.1
Market	65	22
Sub contract	15	5.1
Water supply	29	9.8
Security	11	3.7
Ports and shopping	13	4.4
Sales promotion	05	1.7
	296	100

Source: Author's Analysis, 2011.

Total is greater than 103, because of multiple response.

5.1.2 Location Advantages on the Basis of Each Estate

The advantages offered in each industrial estate were revealed in table 5.2. Out of the 48(0.68%) firms that enjoyed transport advantages; 20(6.8%) firms are in Ikeja, nine (3%) in Apapa, four (1.41%) in Ilupeju, three (1%) in Agbara. Whereas there are two (0.68%) firms each in Matori, Oshodi/Isolo, Oregun and Surulere/Mushin. There is only one (0.34%) firm's in Ijora, Iganmu and Ikorodu. Out of the 43(14.5%) firms that benefited from the raw material purchase/supply advantages 10(3.4%) firms are in Ilupeju, six (2%) in Apapa, while four (1.4%) firms each are in Ikeja and Iganmu. Another, two (0.68%) firms each are in Matori, Agbara, Ijora and Oregun, whereas there is only one (0.34%) firms each in Ogba, Ikorodu and Surulere/Mushin. Out of 37(12%) firms that are enjoying Labour advantages, nine (3%) are in Ikeja, five (2%) firms each are in Agbara, Ilupeju and Oshodi/Isolo. There are four (1.4%) firms in Apapa, three (1%) in Iganmu, two (0.68%) in Ikorodu, while, there is only one (0.3.4%) in Surulere/Mushin. 30(10.1%) firms enjoyed power supply advantages, out of which there are 49(14.2%) in Agbara 10(3.4%) in Ikeja, while there are 7(2.4%) firms in Apapa. Another three (2%) firms each in Apapa and Oshodi/Isolo also benefited from power supply, while there are two (0.68%) firms in Matori and 1(0.68%) firms in Oregun.

Out of 65(22%) firms that benefited form market advantages in the estates. There are 10(3.4%) firms each in Ikeja and Ilupeju, whereas there are eight (2.7%) in Apapa. Another six (2%) firms also enjoyed market advantages in Iganmu while there are five (1.77%) in Oshodi /Isolo, five (1.7%) each firms in Surulere/Mushin, three (1%) each in Agbara, Ijora, and Oregun. Four (1.4%) firms in Surulere/Mushin, three (1%) in Matori two (0.68%) each in Ogba and Ikorodu also enjoyed market advantages, 15(5.1%) firms enjoyed subcontract advantages out of which there are five (1.7%) in Ikeja, whereas there are two (0.68%) firms each in Apapa, Agbara, Ilupeju, Oshodi/Isolo and Oregun. Out of the 29(9.8%) firms that enjoyed water supply advantages, there are five (1.7%) firms each in Agbara, and Surulere/Mushin, whereas there are four (1.4%) in Apapa and three (1.4%) firms each in Ikeja, Oshodi/Isolo. Another two (0.68%) firms each in Ilupeju, Ijora Iganmu and Oregun and one (0.34%) in Matori also benefited from water supply. Eleven (3.7%) firms enjoyed security advantages out of which there are 4(1.4%) firms in Ikeja, three (1%) in Oshodi/Isolo, two (0.68%) in Ilupeju, while there is one (0.34%) firm each in Apapa and Oregun.

Furthermore, another 13(4.4%) firm's enjoyed ports and shipping advantages out of which there are four (1.4%) firms in Ikeja, three (2%) in Oregun. Whereas there are two (0.68%) firms in Apapa, Oshodi/Isolo and only one (0.34%) firm's each in Agbara and Ilupeju. Five (1.7%) firms enjoyed sales promotion advantages, out of which two (0.68%) are in Ikeja and one (0.34%) each in Ilupeju, Oshodi/Isolo and Ikorodu. Out of 74(100%) firms that enjoyed Access to financial institution advantages, 10 (13.5%) firm's each are in Apapa, Ilupeju and Oshodi/Isolo, whereas there are 16(21.6%) in Ikeja. Another five (6.8%) firms each in Iganmu, Oregun, Surulere/Mushin, three (4.1%) in Ikorodu and two (2.7%) firms each in Matori and Ogba also benefited from access to financial institution.

Table 5.2 Advantages Offered in Each Industrial Estate

Industrial estate	Transport		Raw material		Labour		Power supply		Market		Sub contract		Water supply		Security		Port shipping		Sales promotion			
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Apapa	9	3	6	2	4	1.4	7	2.4	8	2.7	2	0.68	4	1.4	1	0.34	2	0.68			43	14.4
Matori	2	0.68	2	0.68	01	0.34	2	0.68	3	1	-	-	01	0.34							12	4
Agbara	3	1	2	0.68	05	2	49	1.4	5	1.7	2	0.68	5	1.7			1	0.34			28	9.5
Ikeja	20	6.8	4	3.4	09	3	10	3.4	10	4.4	5	1.7	3	1.4	4	1.4	4	1.4	2	0.68	77	26
Ilupeju	4	1.4	10	3	05	1.7	3	2	10	3.4	2	0.68	2	0.68	2	0.68	1	0.34	1	0.34	40	13.5
Ijora	1	0.34	2	0.68	01	0.34			5	1.7			2	0.68							11	3.7
Iganmu	1	0.34	4	1.4	03	1			6	2			2	0.68							16	5
oshodi/isolo	2	0.68	3	1	05	1.7	3	2	5	1.7	2	0.68	3	1.8	3	1	2	0.68	1	0.34	30	10
Ogba	-		1	0.34	01	0.34			2	0.68											4	1.4
Ikorodu	1	0.34	1	0.34	02	0.68			2	0.68									1	0.34	7	2.4
Oregon	2	1	2	0.68			1	0.68	5	1.7	2	0.68	2	0.68	1	0.34	3	2			19	6.4
Surulere /Mushin	2	0.68	1	0.34	01	0.34			4				5	1.7							12	4
Total	48	0.68	43	14.5	37	12	30	10.1	65	22	15	5.1	29	9.8	11	3.7	13	4.4	5	1.7	296	100

Source: Author's Analysis, 2011.

5.1.3 The Enjoyment of Firm's Initial Advantages

Table 5.3 shows that out of 103 (100%) firms, 88(85.4%) firms responded that they are still enjoying the initial advantages, while 15 (14.6%) firms opined that the initial advantages offered by locating in the estate are no longer enjoyed.

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Table 5.3 The Enjoyment of Firms Initial Advantages

Response	No of firms	Percentage
Initial Advantages Enjoyed	15	14.6
Initial Advantages not Enjoyed	88	85.4
Total	103	100

Source: Author's Analysis, 2011.

5.2 The Development of Agglomeration Economies amongst Firms

This section examines the temporal trend of agglomeration economies amongst firms.

5.2.1 Temporal Variation in Agglomeration Economies in each Industry Group

Fig 5.1 shows the temporal Variation in agglomeration economies by the industry groups, between 1957-1965, seven industry groups enjoyed agglomeration economies. These industry groups are food, beverages and tobacco; chemicals and pharmaceuticals; plastic, domestic and Industrial plastics and rubber; pulp, paper and paper products, printing and publishing; textile, wearing apparel and leather products; Electrical/Electronics and non-metallic mineral products. While, between 1966-1974, six industry groups enjoyed agglomeration economies. These industry groups are food, beverages and tobacco; chemicals and pharmaceuticals; basic metal, iron and steel fabricated metals; pulp, paper and paper products, printing and publishing; textile, wearing apparel and leather products; wood and wood products; other industry groups featured between 1975-1983. These industry groups are chemicals and pharmaceuticals; plastics, domestic and industrial plastics and rubber; basic metal, iron and steel fabricated metals, pulp, paper and paper products, printing and publishing; non-metallic mineral products; wood and wood products; and motor vehicle and miscellaneous assembly, seven industry groups enjoyed agglomeration economies between 1984-1992. These industry groups are chemicals and pharmaceuticals; domestic and industrial plastic and rubber; basic metal, iron and steel fabricated metals; pulp, paper and paper products, printing and publishing; textile, wearing apparel and leather products; Electrical/Electronics; motor vehicle and miscellaneous assembly; furthermore, seven industry groups enjoyed agglomeration economies between 1993-2001. These industry groups are food, beverages and tobacco; chemicals and pharmaceuticals; plastic, domestic and Industrial plastics and rubber; basic metal, iron and steel fabricated metals; pulp, paper and paper products, printing and publishing; textile, wearing apparel and leather products, Electrical and Electronics. Also five industry groups are involved in agglomeration economies between 2002-2010. These industry groups are food, beverages and tobacco; chemicals and pharmaceuticals; plastic, domestic and Industrial plastics and rubber; basic metal, iron

and steel fabricated metals; pulp, paper and paper products, printing and publishing; textile, wearing apparel and leather products.

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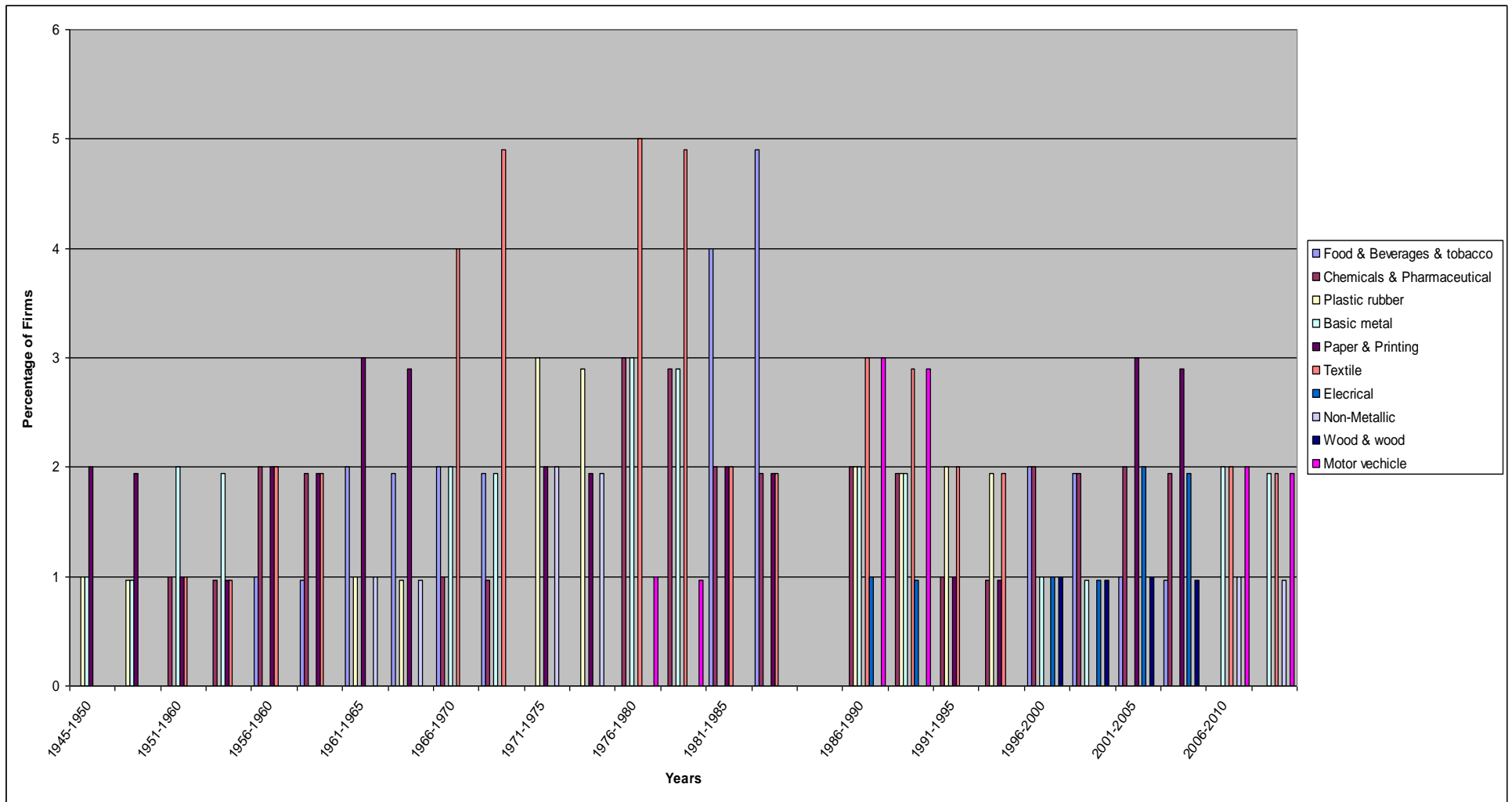


Fig 5.1 Temporal Trend in Agglomeration Economies in each Industry Group

Source: Author's Analysis, 2011.

The hypothesis which states that: Agglomeration economies do not vary significantly among firms is tested, using the analysis of variance (ANOVA).

Agglomeration Economies Variables

- Y₁ Joint Transportation (Percentage Savings accruing from joint transportation (transportation economies)
- Y₂ Joint Power supply (Percentage Savings accruing from joint use of power (power economies)
- Y₃ Joint Raw Material Purchase/Supply (Percentage Savings accruing from joint Raw materials purchase (input economies).
- Y₄ Collaboration in Research and Development (Percentage Savings accruing from joint R & D)
- Y₅ Joint Labour Supply (Percentage Savings accruing from wage rate (Labour economies i.e reduction in the cost of Labour).
- Y₆ Joint Water Supply (Percentage Savings accruing from joint water supply measured as a percentage reduction in the cost of water supply).
- Y₇ Joint waste treatment (Percentage Savings accruing from joint waste treatment)
- Y₈ Joint Security (Percentage Savings accruing from joint security services).
- Y₉ Joint Telecommunication (Percentage Savings accruing from joint telecommunication).
- Y₁₀ Joint Ports & Shipping (Percentage Savings accruing from joint ports and shipping)
- Y₁₁ Access to Financial institution (Percentage Savings accruing from access to financial institution).

The Analysis of Variance carried out in testing the hypothesis (i.e. agglomeration economies do not vary significantly amongst firms, as depicted in Table 5.4 shows that the result was significant at 5% level ($0.000 < 0.05$). Therefore, null hypothesis H_0 above is rejected, which means the acceptance of the alternative hypothesis H_1 , connoting that Agglomeration Economies vary significantly amongst the firms. This result tends to confirm Ciccone's (1991) assertion that agglomeration of firms comes about as a result of potential benefits (especially lowering of costs) accruable to firm's close together in space.

Table 5.4 Summary of the Analysis of Variance (ANOVA) for the Benefits of Agglomeration Economies.

	Sum of Squares	Df	Mean Square	F-Cal.	F-Tab
Between Groups	100142.756	10	10014.276	34.917	1.84
Within Groups	224277.491	782	286.800		
Total	324420.247	792			

Source: Author's Analysis, 2011.

5.3 Temporal Trend in Agglomeration Benefits

This section examines the variation in agglomeration benefits enjoyed by firms, between 2005-2009; first at the aggregate level and second on the bases of each industry group.

5.3.1.0 Firms Agglomeration Benefits at the Aggregate Level

5.3.1.1 Firms Agglomeration Benefits in 2005

The percentage of firms indicating a saving as a result of agglomeration economies enjoyed in 2005 is revealed in table 5.5. Out of 103(100%) firms, 16(15.5%) enjoyed <10% savings in joint transportation, 13(12.6%) firms realized between 11 and 20% savings. Another, 30(29.1%) firms realized between 41 and 50% savings, while 10(9.71%) firms benefited between 51 and 60% savings, 5(4.9%) firms enjoyed between 61 and 70% savings. While 02(1.94%) enjoyed between 71 and 80% savings in joint transportation. furthermore, 2(1.94%) firms saved between 81and 90% as a result of joint transportation. This reveals that most of the firms benefited immensely due to joint transportation, 34 (33%) firms were able to realize between 41-90% savings.

In 2005 due to joint power supply, 49(47.6%) firms were able to realize <10% savings, 12(11.7%) firms realized between 11 and 20% savings. Another 9(8.7%) firms benefited between 21 and 30%, 8(7.8%) firms also benefited between 31 and 40%, while 6(5.8%) firms realized between 41 and 50% savings. Also, 10(9.71%) firms enjoyed between 51 and 60% savings, 4(3.9%) firms realized between 61 and 70% savings, 3(2.9%) saved between 71 and 80% as a result of joint power supply. Only 2(1.94%) enjoyed between 81 and 90% savings from joint power supply. This indicates that 25 (24.3%) firms benefited between 41-90% due to joint power supply.

Table 5.5 also shows the percentage savings incurred as a result of joint raw materials purchase/supply. Nine (8.7%) firms enjoyed <10% savings, 15(14.6%) firms realized between 11 and 20% savings, 14(13.6%) firms benefited between 21 and 30%, while 20(19.4%) firms realized 31 and 40%. Another, 18 (17.5%) firms benefited between 41 and 50%, 14(13.6%) between 51` and 60%, 6(5.8%) between 61 and 70% benefits and four (3.9%) between 71 and and 80% benefits. While, 3(2.9%) firms benefited between 81 and 90%. This connotes that 45 (44%) firms enjoyed between 41 and 90%. Savings from joint raw materials purchase/supply.

In 2005, 50(48.5%) firms enjoyed <10% savings from collaboration in research and development, while 16(15.5%) firms each realized between 11 and 20%, 21 and 30%. Also, 10(9.71%) firm benefited between 21 and 30% and 31-40% savings respectively. Furthermore, 9(8.7%) firms realized between 41 and 50% savings, five (4.9%) firms between 51 and 60% savings, only two (1.94%) firms realized between 61 and 70%. While, one (0.97%) firm enjoyed between 71 and 80% savings due to collaboration in R&D. It is obvious that 17(16.5%) enjoyed between 41 and 80% savings as a result of collaboration in R & D.

Also, due to joint labour supply. 31(30.1%) firms realized <10% savings, 20(19.4%) firms saved between 11 and 20%, 15(14.6%) benefited between 21 and 30%. While, 14(13.6%) firms enjoyed between 31 and 40% savings, 10(9.71%) firms between 41 and 50%, 7(6.8%) between 51 and 60%. Another, 5(4.9%) firms saved between 61 and 70% benefits, only one (0.97%) firm's realized between 71 and 80% savings. 23(22.3%) firms have between 41 and 80% benefits due to joint labour.

As a result of Joint Water Supply. 72 (70%) firms realised <10% savings, 18 (17.5%) firms saved between 11 and 20%. While 6 (5.8%) firms saved between 21 and 30% , another four (3.9%) firms benefited between 41 and 50% . Only 1(0.97%) firm's saved between 61-70%. This clearly indicates that only 5 (4.9%) firms benefited between 41 and 70% savings as a result of Joint Water Supply.

Furthermore, 39 (37.9%) firms have <10% savings arising from joint wastes treatment, 15(14.6%) have between 11 and 20% savings. Another, 20(19.4%) firms enjoyed between 21 and 30% savings, 13(12.6%) realized between 31 and 40% , while, seven (6.8%) firms have between 41 and 50%. Also, four (3.9%) firms each realized between 51 and 60% and 61-70% benefits each, only one (0.97%) realized between 71 and 80% savings due to joint waste treatment.

Moreover, out of 103 (100%) firms, 47 (45.6%) firms benefited <10%, 32(31.1%) firms realized between 11 and 20% savings. Also, 8(7.8%) firms saved between 21 and 30%, while 9(8.7%) have between 31 and 40%. Another six (5.8%) firms saved between 41 and 50%, only (0.97%) firm's realized between 51-60% savings as a result of joint security.

As a result of a joint telecommunication, 69(67%) firms have <10% savings, 18(17.5%) firms have between 11 and 20% savings. Another, nine (8.7%) firms realized between 21 and 30% savings, while two (1.94%) firms benefited between 31 and 40%, 3(2.94%) firms enjoyed between 41 and 50%. Also one (0.97%) firm's each

enjoyed between 51-60% and 61-70% savings in joint telecommunication. This analysis revealed that only five (4.9%) firms realized between 41-70% savings in joint telecommunication. The least significant form of agglomeration economies was the joint telecommunication, which accounted for 4.9% savings for the year 2005.

Table 5.5 depicts savings arising as a result of joint ports and shipping, 46(44.5%) firms saved <10%, 27(26.2%) realized between 11-20%. While 11(10.6%) firms enjoyed between 21-30% savings, 9(8.7%) firms benefited between 31-40% and five (4.9%) firms realized between 41-50%. Three (2.9%) saved between 51-60% and two (1.94%) firms enjoyed between 61-70% savings due to joint ports and shipping. It can be deduced that 10(9.7%) firms enjoyed between 41-70% savings.

In 2005 as a result of access to financial institution, 12(11.7%) firms realized <10% savings, 15(14.6%) firms benefited between 11-20%. Also, 22(21%) firms enjoyed between 21-30%, while 20 (19.4%) firms have between 31-40% benefits. Another, 15(14.6%) firms saved between 41-50%, 10(9.71%) firms realized between 51-60% and 4(3.9%) firms saved between 61-70%. Three (2.9%) firms realized between 71-80%, only one (0.97%) firm's each saved between 81-90% and 91-100% respectively. This therefore, connotes that 34(33%) realized between 41-100% savings as a result of access to financial institution. Access to financial institution was the dominant form of agglomeration economies, accounted for 33.1% savings in 2005.

5.3.1.2 Firms Agglomeration Benefits in 2006

The percentage of firms indicating a saving in 2006 as results of agglomeration economies enjoyed is revealed in Table 5.6. Out of 103(100%) firms, due to joint transportation, 25(24.3%) realized <10% savings, 16(15.5%) realized between 11-20%. While, 27(26%) firms realized between 21 and 30%, 10(9.71%) firms saved between 31 and 40% and 9(8.7%) firms saved between 41 and 50%. Furthermore, seven (6.8%) firms saved between 51 and 60%, 6(5.8%) firms realized 61 and 70% , also two (1.94%) firms saved between 71 and 80%. Only one (0.97%) firm's saved between 81 and 90%. Apparently, 25(24.3%) firms realized between 41-90% savings due to joint transportation.

Also, table 5.6 depicts savings realized as a result of joint power supply, 36(35%) firms have <10% benefits, nine (8.7%) firms have between 11 and 20% benefits, while, 30(29.1%) realized between 21 and 30% savings. Another, 10(9.71%) realized between 31 and 40% savings, six (5.8%) firms each saved between 41-50%

and 51-60% benefits respectively. Also, four (3.9%) firms benefited between 61 and 70%, only one (0.97%) firm's each benefited between 71 and 80%, 81-90% respectively. This connotes that 18 (17.5%) firms realized between 41 and 90% savings due to joint power supply.

Furthermore, 34(33%) firms enjoyed <10% savings in joint raw material purchase/supply, while five (4.9%) firms enjoyed between 11 and 20% savings. 13(12.6%) enjoyed between 21 and 30% savings, while 20(19.4%) firms realized between 31 and 40%. Also, 19(18.4%) firms saved between 41 and 50%, six (5.8%) firms saved between 51 and 60%, while 5(4.9%) firms saved between 61 and 70%. From the foregoing, it is obvious that 31(30.1%) firms realized between 41 and 80% savings due to joint raw materials purchase/supply.

In 2006 as a result of collaboration in research and development, 41(39.8% firms saved <10%, 7(6.8%) firms saved between 11 and 20%, while two (1.94%) firms saved between 21 and 30%. 19(18.4%) firms realized between 31 and 40% savings, 16(15.5%) firms realized between 41 and 50%, eight (7.8%) benefited between 51 and 60%. Also, four (3.9%) firms saved between 61 and 70%, five (4.9%) firms realized between 71 and 80%, only one (0.97%) firm's saved between 81-90%. It can therefore, be asserted that 34(33%) saved between 41 and 90% as a result of collaboration in R & D.

Due to joint labour, 43(41.7%) firms realized <10% savings, 13(12.6%) saved between 11 and 20%, 10(9.71%) realized between 21 and 30%. 8(7.8%) firms realized between 31 and 40%, nine (8.7%) firms benefited between 41 and 50%, while eight (7.8%) firms realized 51 and 60% savings. Another, three (2.9%) saved between 61 and 70%, nine (8.7%) firms saved between 71 and 80%. It is apparent that 29 (28.2%) firms saved between 41 and 80% as a result of joint labour supply.

Table 5.6 shows the percentage savings enjoyed by firms in 2005 arising as a result of Joint Water Supply. 65 (63%) firms saved <10%, 9 (8.7%) firms realized between 11-20% savings, while 20 (19%) firms benefited 21-30% savings. Six (6%) firms realized 31 – 40% savings, 2(1.94%) firms saved between 41 and 50%, only one (0.97%) firm's saved between 51 and 60%. This connotes that only, three (2.9%) firms realized between 41 and 60% due to joint water supply.

As a result of joint waste treatment, 50 (48.5%) firms realized <10% savings, 10(9.71%) firms each realized 11 and 20% and 21-30% respectively. Thirteen (12.6%) firms saved between 31 and 40%, nine (8.7%) firms benefited between 41 and 50%,

while seven (6.8%) firms realized 51-60%. 3(2.9%) firms, 61-70%, only one(0.97%) firm's realized between 71-80% as a result of joint waste treatment. This indicates that 20 (19.4%) firms realized between 41 and 80% savings in joint waste treatment.

Table 5.6 also shows percentage savings in joint security. Out of 103(100%)firms, 37(35.9%) firms realized <10% savings, 12 (11.7%) firms saved between 11 and 20%, while 10(9.71%) firms saved between 21 and 30%. 14(13.6%) firms realized 31-40% savings, 10(9.71%) firms saved between 41 and 50%, while 12(11.7%) firms saved between 51 and 60%. 5(4.9%) firms realized between 61 and 70%, two (1.94%) firms realized between 71 and 80%. Only, 1(0.97%) firm's saved between 81 and 90%. It is apparent that 30 (29.1%) firms saved between 41 and 90% due to joint security.

Also, as a result of joint telecommunication, 76(73.8%) firms saved <10%, nine (8.7%) firms saved between 11-20%, while, 10(9.71%) firms realized 21-30%. 6(5.8%) firms, 31-40%, only 2(1.94%) firms realized 41-50% savings. This further shows that only two (1.94%) firms realized between 41-50% savings in joint telecommunication. The least significant form of agglomeration economies was the joint telecommunication, accounted for 1.9% savings for the year 2006.

Moreover, as a result of joint ports and shipping, 49 (47.6%) firms enjoyed <10% savings, 15(14.6%) firms saved between 11-20%, 10 (9.71%) firms saved 21-30%, only two (1.94%) firms saved between 31-40%. Also, eight (7.8%) firms realized between 41-50%, seven (6.8%) firms saved between 51-60%, nine (8.7%) firms benefited between 61-70% and three (2.9%) firms saved between 71-80%. This connotes that 27 (26%) firms realized between 41-80% savings due to joint ports and shipping.

As a result of access to financial institution, nine (8.7%) firms realized <10% savings, 14(13.6%) firms enjoyed 11-20% savings. 19(18.4%) firms saved between 21 and 30%, 12 (11.7%) firms, 31-40%, 10(9.71%) firms, 41-50%. Another, 15 (14.6%) saved between 51 and 60%, 10(9.71%) firms saved 61-70% and five (4.9%) firms realized 71-80% savings. Nine (8.7%) firms also saved between 81 and 90%. It can be deduced that 49(47.6%) firms saved between 41 and 90% as a result of access to financial institution. Access to financial institution was the dominant form of agglomeration economies, accounted for 47.6% savings in 2006.

5.3.1.3 Firms Agglomeration Benefits in 2007

The percentage of firms indicating a saving in 2007 as a result of agglomeration economies enjoyed is revealed in table 5.7. Due to joint transportation, 26(25.2%) firms saved <10%, 17(16.5%) firms saved between 11 and 20%, while 12(11.7%) firms realized 21-30%. Another, 16(15.5%) firms saved between 31 and 40%, 10(9.71%) firms saved 41-50%, 9 (8.7%) firms saved 51-60%, while, six (5.8%) firms saved between 61 and 70%. Also, five (4.9%) firms saved 71-80%, only 2(1.94%) firms saved between 81 and 90%. This shows that 32 (31.1%) firms enjoyed between 41 and 90% savings in joint transportation.

As a result of joint power supply, 44 (22.7%) firms saved <10%, while 12(11.7%) firms saved between 11 and 20%, 18(17.5%) firms saved between 21 and 30%. Another, eight (7.8%) firms realized between 31 and 40%, seven (6.8%) firms, 41 and 50%, 5(4.9%) firms, 51 and 60%, eight (7.8%) firms, 61 and 70%. Only one (0.97%) firm's realized between 71 and 80% savings. This further points to the fact that 21(20.4%) saved between 41 and 80% due to joint power supply.

Also, due to joint raw material purchase/supply, 30(29.1%) firms saved <10%, four (3.9%) firms saved 10-20%, only one (0.97%) firm's saved between 21 and 30%. Also, 10(9.71%) firms benefited 31-40%, 6(5.8%) firms, saved 41-50%, 16(15.5%) firms realized 51-60% savings. Furthermore, 15(14.6%) firms each saved between, 61 and 70% and 71-80% respectively, four (3.9%) firms saved 81-90%, only two (1.94%) firms saved between 91 and 100%. This clearly shows that 58(56.3%) firms realized between 41 and 100% savings in joint raw materials purchase/supply.

Due to collaboration in R & D, 35 (34%) firms realized <10%, 12(11.7%) firms realized 11-20%, 7 (6.8%) firms realized 21-30%. Also, 10(9.7%) realized 31-40%, 15(14.6%) firms saved between 41 and 50%, 12 (11.7%) firms saved between 51 and 60%. While 5(4.9%) firms each saved between 61 and 70%, and 71-80% respectively, only two (1.94%) firms saved between 81 and 90%. This further asserts that 39(37.9%) firms realized between 41 and 90% savings in collaboration in research and development.

Furthermore, 30 (29.1%) firms realized <10% savings as a result of joint labour, 12(11.7%) firms realized 11-20%, 11(10.7%) firms, 21-30%, 10(9.71%) firms 31-40%. Another, 15(14.6%) firms saved 41-50%, 11(10.7%) firms realized 51-60%, six (5.8%) firms, 61-70%, 7(6.8%) realized 71-80% savings. Only one (0.97%) firm's

realized between 91 and 100% savings. It is apparent that 40 (38.8%) firms realized savings between 41 and 100% as a result of joint labour.

It is vivid from table 5.7 that 14(13.6%) firms realized <10% savings as a result of access to financial institution, while 10(9.71%) firms realized between 11 and 20%. 18(17.5%) firms saved 21-30%, 12 (11.7%) firms saved 31-40%, 20(19%) firms saved 41-50%. Also, six (5.8%) firms saved 51-60%, 7(6.8%) firms saved between 61 and 70%, 6(5.8%) firms, 71-80%, while five (4.9%) firms each saved between 81 and 90% and 91-100% respectively. This indicates that 50 (48.5%) firms saved between 41 and 100% as a result of access to financial institution.

Due to Joint Water Supply, 59 (57.3%) firms realized <10% savings, 12 (11.7%) firms saved between 11 and 20%. While, 19 (18%) firms saved between 21 and 30%, 8 (7.8%) firms saved between 31 and 40%, two (1.94%) firms each saved between 41 and 50% and 51-60% respectively. Only one (0.97%) firm's realized between 61 and 70% savings. It can be deduced that five (4.9%) firms saved between 41 and 70% as a result of Joint Water Supply.

As a result of joint savings in waste treatment, 31 (30%) firms realized <10% savings, 20(19%) firms realized 11-20%, while 10(9.71%) firms realized 21-30%. Another, 19(18%) firms saved between 31 and 40%, 10(9.71%) firms saved between 41 and 50%, 7(6.8%) firms, 51 and 60%. While two (1.94%) firms saved between 61 and 70%, three (2.9%) saved 71-80%, only one (0.97%) firm's each saved between 81 and 90% and 91-100% respectively, It is therefore, obvious that 24 (23.3%) firms saved between 41 and 100% due to joint waste treatment.

As a result of joint Security, 49 (47.6%) firms saved <10%, 21(20.4%) firms saved between 11 and 20%, 10(9.71%) firms benefited 21-30% savings. Another, 15 (14.6%) firms saved between 31 and 40%, while five (4.9% firms saved between 41 and 50%. Also, two (19.4%) firms realized between 51 and 60% , one (0.97%) firm's saved between 61-70%. This indicates that eight (7.8%) firms saved between 41 and 70% due to Joint Security.

Table 5.7 reveals that, 81(78.6%) firms realized <10% savings in joint telecommunication, 12(11.7%) firms saved between 11 and 20%. While 7(6.8%) firms saved between 21 and 30%, 2(1.94%) firms benefited 31-40%. Only one (0.97%) firm's saved between 41 and 50%. This connotes that only one (0.97%) firm's saved between 41 and 50% as a result of joint telecommunication. The least significant form

of agglomeration economies was the joint telecommunication, accounted for 1.9% savings for the year 2007.

Moreover, 42(40.8%) firms benefited <10% as a result of joint Ports and Shipping, 21 (20.4%) firms saved between 11 and 20%, while 13(12.6%) firms saved between 21 and 30%. Also, nine (8.7%) saved 31-40%, 6(5.8%) saved between 41 and 50%, 8(7.8%) saved 51-60%, while it was nil for 61-70% and four (3.9%) firms realized 71-80 savings, meaning that 18(17.5%) firms saved between 41 and 80% in joint Ports and Shipping. It is vivid from table 5.11 that 14(13.6%) firms realized between 0-10% savings as a result of access to financial institution, 10(9.71%) firms realized between 11-20% savings, 18(17.5%) firms saved 21-30%, 12 (11.7%) firms saved 31-40%, 20(19%) firms saved 41-50%, 6(5.8%) firms saved 51-60%, 7(6.8%) firms saved between 61-70%, 6(5.8%) firms, 71-80%, while five (4.9%) firms each saved between 81-90% and 91-100% respectively. This indicates that 50 (48.5%) firms saved between 41-100% as a result of access to financial institution. Access to financial institution was the dominant form of agglomeration economies, accounted for 47.2% savings in 2007.

5.3.1.4 Firms Agglomeration Benefits in 2008

The percentage of firms indicating a saving as a result of agglomeration economies in 2008 is revealed in table 5.8. Due to joint transportation is revealed in table 5.8, 29(28.2%) enjoyed <10% savings, 10(9.71%) firms saved between 11 and 20%, 20(19%) firms 21-30%, 10 (9.71%) firms saved between 31 and 40%. Another, 14(13.6%) firms saved between 41 and 50%, 10(9.71%) saved 51-60%, five (4.9%) firms saved between 61 and 80%, only 1(0.97%) firms saved between 81-90%. While, two (1.94%) firms saved between 81 and 90%. This indicates that 32 (31.1%) firms realized savings between 41 and 90% due to joint transportation.

As a result of joint power supply, 38(36.9%) firms realized <10% savings, 18(17.5%) realized between 11 and 20% savings, 9(8.7%) realized between 21 and 30% , only one (0.97%) firm's realized 31-40%. Also, 19(18.4%) firms saved between 41 and 50%, nine (8.7%) between 51-60%, seven (6.8%) between 61-70%, while two (1.94%) firms saved between 71 and 80%. This connotes that 35 (34%) firms saved between 41 and 90%.

Also, 24 (23.3%) firms enjoyed <10% savings as a result of joint raw materials purchase/supply, while 26(25.2%) realized between 11 and 20%. Another, 9(8.7%) firms realized between 21 and 30%, six (5.8%) firms realized 31-40%, 12(11.7%) firms benefited 41-50%, while 17(16.5%) firms benefited 51-60%. Also, eight (7.8%) firms realized between 61 and 70%, only 1 (0.97%) firm's saved between 81 and 90%. This connotes that 38 (36.9%) firms realized between 41 and 90% due to joint raw materials purchase/supply.

The percentage savings in collaboration in research and development is shown in table 5.8, 42 (40.7%) firms saved <10%, 12(11.7%) saved between 11 and 20%, three (2.9%) firms saved 21-30%. Another, 10(9.71%) firms saved 31-40%, 17(16.5%) firms saved 41-50%, while 9(8.7%) firms saved 51-60% and 8(7.8%) firms saved between 61 and 80%. Only two (1.94%) firms each realized savings between 71 and 80% and 51-60%. Also, eight (7.8%) firms saved between 61 and 80%. Conclusively, 36 (35%) firms realized between 41 and 90% savings due to collaboration in R & D.

Furthermore, 43 (41.7%) firms benefited <10% due to joint labour supply, 18(17.5%) firms realized between 11 and 20% savings, 17(16.5%) firms realized 21-30%. While, four (3.9%) firms saved 31-40%, 15(14.6%) firms, 41-50%, 6(5.8%) firms saved between 51 and 60%. It therefore means that 21(20.4%) firms benefited between 41 and 60% as a result of joint labour.

Due to Joint Water Supply, 60 (58%) firms realized <10%, 19 (18%) firms saved between 11 and 20%, while, nine (9%) firms saved between 21 and 30%. Also, 10 (10%) firms realized between 31 and 40% savings, another three (3%) firms saved between 41 and 50%, while two (1.94%) firms saved between 51 and 60%. This indicates that five (4.9%) firms saved between 41 and 60% due to Joint Water supply.

As a results of joint waste treatment, 53 (51.5%) firms realized <10% savings, 6(5.8%) firms between 11 and 20%, 12 (11.7%) firms realized 21-30% savings. Also, 11(10.7%) firms saved 31-40%, eight (7.8%) firms between 41 and 50%, and 10(9.71%) firms 51-60%. Only 1(0.97%) firms each realized 61-70%, 71-80% and 81-90% savings respectively. This signified that 21(20.4%) benefited between 41 and 90% as a result of joint wastes treatment.

Table 5.8 depicts the percentage monetary savings due to joint security, out of 103 (100%) firms, 55 (53%) realized <10% savings, while 16(15.5%) firms realized between 11 and 20%. Another, 12 (11.7%) firms saved between 21 and 30%, 7(6.8%)

firms realized between 31 and 40%, while five (4.9%) firms each realized between 41 and 50% and 51-60% respectively. Also, two (1.94%) firms saved between 61 and 70%, only one (0.97%) firm's realized between 71 and 80% savings. It is obvious that 13(12.6%) firms realized between 41 and 50% savings as a result of Joint Security.

Moreover, 79(76.7%) firms realized <10% savings in joint telecommunication. 15(14.6%) firms saved between 11 and 20%, 8(7.8%) firms saved between 21 and 30%, only one (0.97%) firms saved 31-40%. This implies that none of the firms realized 41-100% benefits due to joint telecommunication. The least significant form of agglomeration economies was the joint telecommunication, accounted for 0.00% savings for the year 2008.

Also, 51 (49.5%) firms realized <10% savings due to joint port and shipping, seven (6.8%) firms realized between 11-20% savings, 13(12.6%) firms 21-30% savings, 10(9.71%) firms saved between 31-40%, 5(4.9%) firms saved between 41-50%, 12(11.7%) firms between 51-60%, 5(4.9%) firms saved between 61-80%. This is a clear indication that 22 (21.4%) firms realized between 41-70% savings arising from joint ports and shipping.

Table 5.8 further reveals that 20(19.4%) firms saved <10% due to access to financial institution, while 17(16.5%) firms saved between 11 and 20%. 12(11.7%) firms benefited between 21 and 30%, 7 (6.8%) firms enjoyed 31-40% and 25(24.3%) firms enjoyed between 41-50% savings. 9(8.7%) firms saved 51-60%, 5(4.9%) realized 61-70% savings, while three (2.9%) firms realized 71-80%. Another, five (4.9%) firms realized 81-90% savings. It can be deduced that 47 (45.6%) firms realized between 41 and 90% savings as a result of access to financial institution. Access to financial institution was the dominant form of agglomeration economies, accounted for 45.7% savings in 2008.

5.3.1.5 Firms Agglomeration Benefits in 2009

The percentage of the firms indicating a saving in 2009 as a result of agglomeration economies enjoyed by firms is revealed in table 5.9. Due to joint transportation, 40(38.8%) firms saved <10%, 19(18.4%) saved between 11 and 20% while four (3.9%) benefited 21-30%. Nine (8.7%) benefited 31-40%, 12(11.7%) benefited, 41-50%, 8(7.8%) firms benefited 51-60%, 5(4.9%) saved 61-70%, 4(3.9%) firms saved between 71 and 80%. And two (1.94%) firms saved between 81 and 90%. It is therefore, obvious that 31(30.1%) firm saved between 41 and 90% due to joint transportation.

It is evident from table 5.9 that 28(27.2%) firms enjoyed <10% saving in power supply, eight (7.6%) firms enjoyed between 11 and 20%, 21 (20.4%) firms enjoyed 21-30%, 13(12.6%) firms benefited 31-40%. Another, 15(14.6%) saved between 41 and 50%, 6(5.8%) saved between 51 and 60%, 7(6.8%) firms realized 61-70% savings, while four (3.9%) firms saved 71-80%. Only one (0.97%) firm realized between 81 and 90% savings. Obviously, 33(32%) firms realized between 41 and 90% saving due to joint transportation.

Also, as a result of joint raw material supply/purchase, 31 (30.1%) benefited <10%, 14 (13.6%) firms benefited 11-20%, 10(9.71%) saved between 21-30%. Also, 12(11.7%) firms realized 31-40% savings ,11(10.7%) realized 41-50% , 9(8.7%) 51-60% savings, 8(7.8%) firms, 61-70%, 5(4.9%) firms realized between 71-80%. While, three (2.9%) firms saved between 81 and 90%. This further shows that 36 (35%) firms enjoyed between 41 and 90% savings due to joint raw material purchase/supply.

Furthermore, out of 103(100%) firms, 36(35%) firms realized <10% savings in collaboration in research and development, 23(22.3%) firms saved 11-20%, 12(11.7%) saved 21-30%, 10(9.71%) firms realized between 31 and 40%. Also, 16(15.5%) firms, 41-50%, four (3.9%) firms, 51-60% savings, two (1.94%) firms saved between 61 and 70%. This connotes that 22(21.4%) firms enjoyed between 41 and 70% savings in collaboration in research and development.

It is apparent from table 5.9 that 38(36.9%) firms enjoyed <10% saving due to joint labour, nine (8.7%) firms enjoyed 11-20% , 15(14.6%) firms enjoyed 21-30%, while 20 (19%) firms realized 31-40%. Seven (6.8%) firms each realized 41-50% and 51-60% savings respectively, three (2.9%) firms realized 61-70% and four (3.9%) firms saved 71-80%. conclusively, 21 (20.4%) firms saved between 41 and 80% as a result of joint labour.

Moreover, 20(19.4%) firms realized <10% savings as a result of joint waste treatment, 25(24.3%) firms benefited 11-20%, 18(17.5%) benefited 21-30%, 16(15.5%) benefited 31-40%. 13(12.6%) firms saved 41-50%, while 6(5.8%) firms saved 51-60%, four (3.9%) firms, 61-70% and only one firm each realized between 71 and 80% and 80-90% savings respectively. This indicates that 25(24.3%) firms benefited between 41 and 90% as a result of joint waste treatment.

Due to Joint Security, 42(41%) firms realized <10% savings, 14(13.6%) firms saved between 11 and 20%. 12(11.7%) firms saved between 21 and 30%, another 19(18.4%) firms saved between 31 and 40%, six (5.8%) firms realized between 41 and

50%. While five (4.9%) firms saved between 51 and 60%, three (2.9%) firms saved between 61 and 70% also, two (1.94%) firms saved between 71 and 80%. This connotes that 16(15.5%) firms realized between 41 and 80% savings due to Joint Security.

As a result of Joint Water Supply in 2009, 69 (67%) firms realized <10% savings, 21 (20%) firms realized between 11 and 20% savings, five (4.9%) firms saved between 21 and 30%. While three (2.9%) firms saved between 31 and 40%, two (1.94%) firms each realized between 41 and 50%, and 51-60% respectively. Only one (0.97%) firm's realized between 61 and 80%, meaning that five (4.9%) firms realized between 41 and 80% due to Joint Water Supply.

Also, 55(53.4%) firms realized <10% savings in joint telecommunication, 31(30.1%) firms benefited 11-20%. Also, 15(14.6%) firms realized between 21-30%, only two (1.94%) firms saved between 31 and 40%. This shows that none of the firms realized between 41 and 100% savings due to joint telecommunication. The least significant form of agglomeration economies was the joint telecommunication, accounted for 0.00% savings for the year 2009.

It is obvious from the table 5.9 that 32(31.1%) enjoyed <10% savings as a result of joint ports and shipping, 18(17.5%) firms realized between 11 and 20%, 16(15.5%) saved between 21 and 30% , while 10(9.71%) firms each saved 31-40% and 41-50% respectively. eight (7.8%) firms realized 51-60%, 5(4.9%)firms, 41-50% , 8(7.8%) firms realized 51-60%, 4(3.9%) firms saved 71-80% . It can be concluded that 27(26.2%) firms saved between 41 and 80% due to joint port and shipping.

Another, 8(7.8%) firms realized <10%, due to access to financial institution, 19(18.4%) firms saved between 11 and s20%, 18(17.5%) firms saved 21-30%. While five (4.9%) firms saved 31-40%, 32 (31.1%) firms, 41-50%, 8(7.8%) firms saved 51-60% and 6 (5.8%) firms saved 61-70%. Three (2.9%) firms saved 71-80%, while two (1.94%) firms each saved 81-90% and 91-100% respectively. 53(51.5%) firms (more than half of the firms) enjoyed tremendous savings as a result of access to financial institution. Access to financial institution was the dominant form of agglomeration economies, accounted for 51.5% savings in 2009.

Table 5.5: The Benefits (saving) Enjoyed by Firms in 2005

% Savings	Joint transport		Joint power supply		Joint raw material P/S		Collaboration R & D		Joint labour		Joint water supply		Joint waste treatment		Joint security		Joint telecommunication		Joint ports & shipping		Access to financial institution	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<10	16	15.5	49	47.6	9	8.7	50	48.5	31	30.1	72	70	39	37.9	47	45.6	69	67	46	44.5	12	11.7
11-20	13	12.6	12	11.7	15	14.6	16	15.5	20	19.4	18	17.5	15	14.6	32	31.1	18	17.5	27	26.2	15	14.6
21-30	30	29.1	09	8.7	14	13.6	10	9.71	15	14.6	6	5.8	20	19.4	08	7.8	09	8.7	11	10.6	22	21.4
31-40	10	9.71	08	7.8	20	19.4	10	9.71	14	13.6	02	1.94	13	12.6	09	8.7	02	1.94	09	8.7	20	19.4
41-50	15	14.6	06	5.8	18	17.5	9	8.7	10	9.71	04	3.9	7	6.8	06	5.8	03	2.9	5	4.9	15	14.6
51-60	10	9.71	10	9.71	14	13.6	5	4.9	7	6.8	0		4	3.9	01	0.97	1	0.97	3	2.9	10	9.71
61-70	05	4.9	04	3.9	06	5.8	2	1.94	5	4.9	01	0.97	4	3.94	-	-	1	0.97	2	1.94	4	3.9
71-80	02	1.94	3	2.9	04	3.9	1	0.97	1	0.97	-	-	1	0.97	-	-	-	-	-	-	3	2.9
81-90	02	1.94	2	1.94	3	2.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.97
91-100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.97
Total	103	100	103	100	103	100	103	100	103	100		100	103	100	103	100	103	100	103	100	103	100

Source: Author's Analysis, 2011

Table 5.6: The Benefits (savings) Enjoyed by Firms in 2006

% Saving	Joint transport		Joint power supply		Joint raw materials P/S		Collaboration in R & D		Joint Labour		Joint Water Supply		Joint waste treatment		Joint security		Joint telecomm		Joint port & shipping		Access to financial institution	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<10	25	24.3	36	35	34	33	41	39.8	43	41.7	65	63	50	48.5	37	35.9	76	73.8	49	47.6	09	87
11-20	16	15.5	09	8.7	05	4.9	07	6.8	13	12.6	09	8.7	10	9.71	12	11.7	09	8.7	15	14.6	14	13.6
21-30	27	26	30	29.1	13	12.6	02	1.94	10	9.71	20	19	10	9.71	10	9.71	10	9.71	10	9.71	19	18.4
31-40	10	9.71	10	9.71	20	19.4	19	18.4	08	7.8	6	6	13	12.6	14	13.6	06	5.8	02	1.94	12	11.7
41-50	09	8.7	06	5.8	19	18.4	16	15.5	09	8.7	2	1.94	09	8.7	10	9.71	02	1.94	08	7.8	10	9.71
51-60	7	6.8	06	5.8	06	5.8	08	7.8	08	7.8	1	0.97	07	6.8	12	11.7	-	-	07	6.8	15	14.6
61-70	6	5.8	04	3.9	05	4.9	4	3.9	03	2.9	-	-	03	2.9	05	4.9	-	-	09	8.7	10	9.71
71-80	2	1.94	01	0.97	1	0.97	5	4.9	09	8.7	-	-	01	0.97	02	1.94	-	-	03	2.9	05	4.9
81-90	1	0.97	01	0.97	-	-	1	0.97	-	-	-	-	-	-	1	0.97	-	-	-	-	09	8.7
91-100	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	103	100	103	100	103	100	103	100	103	100		100	103	100	103	100	103	100	103	100	103	100

Source: Author's Analysis, 2011.

Table 5.7 : The Benefits (savings) enjoyed by Firms in 2007

% Savings	Joint transportation		Joint power supply		Joint raw materials P/S		Collaboration R & D		Joint labour		Joint Water Supply		Joint waste treatment		Joint Security		Joint telecomm		Joint port & shipping		Access to financial institution	
	No.	%	No	%	No	%	No.	%	No.	%	No.	%	No	%	No	%	No	%	No.	%	No.	%
<10	26	25.2	44	42.7	30	29.1	35	34	30	29.1	59	57.3	31	30	49	47.6	81	78.6	42	40.8	14	13.6
11-20	17	16.5	12	11.7	04	3.9	12	11.7	12	11.7	12	11.7	20	19	21	20.4	12	11.7	21	20.4	10	9.71
21-30	12	11.7	18	17.5	01	0.97	7	6.8	11	10.7	19	18	10	9.71	10	9.71	7	6.8	13	12.6	18	17.5
31-40	16	15.5	8	7.8	10	9.71	10	9.7	10	9.71	8	7.8	19	18	15	14.6	2	1.94	9	8.7	12	11.7
41-50	10	9.71	7	6.8	6	5.8	15	14.6	15	14.6	2	1.94	10	9.71	05	4.9	1	0.97	6	5.8	20	19
51-60	09	8.7	5	4.9	16	15.5	12	11.7	11	10.7	2	1.94	7	6.8	02	1.94	-	-	8	7.8	6	5.8
61-70	06	5.8	8	7.8	15	14.6	05	4.9	6	5.8	1	0.97	2	1.94	01	0.97	-	-	-	-	7	6.8
71-80	05	4.9	1	0.97	15	14.6	05	4.9	7	6.8	-	-	3	2.9	-	-	-	-	4	3.9	6	5.8
81-90	02	1.94	-	-	4	3.9	02	1.94	-	-	-	-	1	0.97	-	-	-	-	-	-	5	4.9
91-100	-	-	-	-	2	1.94	-	-	1	-	-	-	1	0.97	-	-	-	-	-	-	5	4.9
Total	103	100	103	100	103	100	103	100	103	100	100	100	103	100	103	100	103	100	103	100	103	100

Source: Author's Analysis, 2011

Table 5.8: The Benefits (savings) Enjoyed by Firms in 2008

% Savings	Joints Transport ation		Joint Power Supply		Joint Raw Material Purchase/S upply		Collabora tion in R & D		Joint labour		Joint Water Supply		Joint waste treatment		Joint Security		Joint telecomm		Joint port & shipping		Access to financial institutio n	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No	%
<10	29	28.2	38	36.9	24	23.3	42	40.7	43	41.7	60	58	53	51.5	55	53	79	76.7	51	49.5	20	19.4
11-20	10	9.71	18	17.5	26	25.2	12	11.7	18	17.5	19	18	06	5.8	16	15.5	15	14.6	7	6.8	17	16.5
21-30	20	19	9	8.7	9	8.7	3	2.9	17	16.5	9	9	12	11.7	12	11.7	8	7.8	13	12.6	12	11.7
31-40	10	9.71	1	0.97	6	5.8	10	9.71	4	3.9	10	10	11	10.7	7	6.8	1	0.97	10	9.71	07	6.8
41-50	14	13.6	19	18.4	12	11.7	17	16.5	15	14.6	3	3	8	7.8	5	4.9	-	-	5	4.9	25	24.3
51-60	10	9.71	9	8.7	17	16.5	9	8.7	06	5.8	2	1.94	10	9.71	5	4.9	-	-	12	11.7	9	8.7
61-70	05	4.9	7	6.8	8	7.8	8	7.8	-	-	-	-	1	0.97	2	1.94	-	-	5	4.9	5	4.9
71-80	1	0.97	2	1.94	1	0.97	2	1.94	-	-	-	-	1	0.97	1	0.9	-	-	-	-	3	2.9
81-90	2	1.94	-	-	-	-	-	-	-	-	-	-	1	0.97	-	-	-	-	-	-	5	4.9
91-100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	103	100	103	100	103	100	103	100	103	100	103	100	103	100			103	100	103	100	103	100

Source: Author's Analysis, 2011.

Table 5.9: The Benefits (savings) Enjoyed by Firms in 2009

% Savings	Joint transport		Joint power supply		Joint raw materials P/S		Collaboration R & D		Joint labour		Joint Water Supply		Joint waste treatment		Joint Security		Joint telecomm		Joint port & shipping		Access to financial institution	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<10	40	38.8	28	27.2	31	30.1	36	35	38	36.9	69	67	20	19.4	42	41	55	53.4	32	31.1	08	7.8
11-20	19	18.4	08	7.6	14	13.6	23	22.3	9	8.7	21	20	25	24.3	14	13.6	31	30.1	18	17.5	19	18.4
21-30	4	3.9	21	20.4	10	9.71	12	11.7	15	14.6	5	4.9	18	17.5	12	11.7	15	14.6	16	15.5	18	17.5
31-40	9	8.7	13	12.6	12	11.7	10	9.71	20	19	3	2.9	16	15.5	19	18.4	2	1.94	10	9.71	5	4.9
41-50	12	11.7	15	14.6	11	10.7	16	15.5	7	6.8	2	1.94	13	12.6	06	5.8	-	-	10	9.71	32	31.1
51-60	8	7.8	6	5.8	09	8.7	4	3.9	7	6.8	2	1.94	6	5.8	05	4.9	-	-	8	7.8	8	7.8
61-70	5	4.9	7	6.8	8	7.8	2	1.94	3	2.9	-	-	4	3.9	03	2.9	-	-	5	4.9	6	5.8
71-80	4	3.9	4	3.9	5	4.9	-	-	4	3.9	1	0.97	1	0.97	02	1.94	-	-	4	3.9	3	2.9
81-90	2	1.94	1	0.97	3	2.9	-	-	-	-	-	-	1	0.97	-	-	-	-	-	-	2	1.94
91-100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.94
Total	103	100	103	100	103	100	103	100	103	100	103	100	103	100	103	100	103	100	103	100	103	100

Source: Author's Analysis, 2011

5.3.2 Agglomeration Economies among Industry Group

5.3.2.1 Transport Economies among Industry Groups for Year 2005

Fig 5.2 shows the transport gains in year 2005, by each industry group. Out of the 100% firms in each of the industry group, 67% firms in food beverages and tobacco group realized <11% gains, whereas 19% firms in the chemical and pharmaceuticals realized <11% gains. Also, 17% firms in the food beverages and tobacco realized between 51 and 60% gains, while 6% firms realized between 51 and 60% gains in chemical and pharmaceuticals. Thirteen percent firms in the chemical and pharmaceuticals realized between 81 and 90% gains, while none of the firms in the food beverages and tobacco realized between 81 and 90% gains. Out of the 100% firms in domestic and industrial plastic rubber, 33% firms gained between 21 and 30%, while 22% firms in domestic and industrial plastic rubber gained between 61 and 70%, there was none in Basic metal. 50% firms in the pulp and paper products gained between 21 and 30%, while 33% firms in the textile and leather products gained between 21 and 30%. Also, six percent firms in the pulp and paper products gained between 51 and 60%, whereas none of the firms in the Textile and leather products realized such gains. Out of the 100% firms in the wood and wood products, 50% firms gained between 51 and 60%, whereas 25% firms in the Non-metallic products gained between 51 and 60%. Another 50% firms in motor vehicle and miscellaneous gained between 11 and 20%, whereas there was none in the electrical and electronic group. 17% firms in the motor vehicle miscellaneous gained between 51 and 60, whereas 25% firms gained between 51 and 60 %.

5.3.2.2 Transport Economies among Industry Groups for Year 2006

Fig 5.2 shows the transport gains in the year 2006 by each industry group. Out of the 100% firms, 50% firms in food beverages and Tobacco realized <11% gains, whereas 19% firms in the chemical and pharmaceuticals gained <11%. 6% firms in the chemical and pharmaceuticals realized between 61 and 70% gained whereas there was none in the food beverages and tobacco group. Also, 22% firms in Domestic and industrial plastics gained between 11 and 20%, while eight percent firms in the Basic metal gained between 11 and 20%. 11% firms in the Domestic and industrial plastic gained between 61 and 70%, whereas 15% firms in the Basic metal gained between 61 and 70%. 44% firms in the pulp and paper products gained between 21 and 30%, while

48% in the Textile and leather products gained between 21 and 30%. Six percent firms in the pulp and paper products, gained between 71 and 80%, while there was none in the Textile and leather products. 50% firms in wood and wood products gained between 11 and 20%, whereas 25% firms in the non-metallic products gained between 11 and 20%. 33% firms in the motor vehicle group gained between 41 and 50%, while 33% firms in the electrical/electronic group also gained between 41 and 50%.

5.3.2.3 Transport Economies among Industry Groups for Year 2007

Fig 5.2 shows the percentage transport gains in year 2007 by each industry group. Out of the 100% firms in the food beverages and tobacco group, 68% firms realized <11% gains, whereas 38% firms in the chemical and pharmaceuticals realized <11% gains. 8% firms in the food beverages and tobacco group realized between 61 and 70%, while 19% firms in the chemical and pharmaceuticals realized between 61 and 70% gains. 22% firms in the Domestic and industrial plastics realized between 31 and 40% gains, whereas 31% firms in the basic metal realized between 31 and 40% gains. 22% firms in the Domestic and industrial plastic gained between 71 and 80% , while there was none in the basic metal industry group. Another 25% firms in the pulp and paper products gained between 41 and 50%, whereas 10% firms in the textile and leather products gained between 41 and 50%. 6% firms gained between 71 and 80%, while there was none in the Textile wearing and leather products. Another 50% firms in the wood and wood products gained between 21 and 30%, whereas it was none in the non-metallic group. Also, 33% firms in the motor vehicle gained between 21 and 30%, whereas it was none in the electrical/electronic group. Seventeen percent firms gained between 51 and 60% in the motor vehicle group, whereas 25% firms realized such gain in electrical and electronic group.

5.3.2.4 Transport Economies among Industry Groups for Year 2008

Fig. 5.2 show the percentage transport gains in year 2008 by each industry group. Out of the 100% firms in the food beverages and Tobacco group, 75% firms gains <11%, whereas 49% firms in the chemical and pharmaceuticals realized <11% gains. 8% firms in the food beverages and Tobacco gained between 51 and 60%, while 6% firms in chemical and pharmaceutical gained between 51 and 60%. 33% firms in the domestic and industrial plastics gained between 21 and 30%, whereas 31% firms in the basic metal gained between 21 and 30%. 11% firms in the Domestic and industrial

plastic gained between 61 and 70%, while 15% firms in the basic metal gained between 51 and 60%. 50% firms in the wood and wood products gained between 51 and 60%, whereas 25% firms in the non-metallic group realized same. 50% firms each in the motor vehicle and electrical/electronic group realized between 41 and 50% gains. Seventeen percent firms in the motor vehicle realized 51 and 60% gains, while there was none in the Electrical/Electronic group.

5.3.2.5 Transport Economies among Industry Groups for Year 2009

Fig. 5.2 shows the percentage transport gains in year 2009 by each industry group. 75% firms in food beverage and tobacco gains <11%, while 38% firms in the chemical and pharmaceutical gained <11%. Six percent firms in the chemical and pharmaceutical gained between 71 and 80%, whereas there was none in the food beverage and tobacco group. Twenty two percent firms in the domestic and industrial plastics gained <11%, while 54% firms in the in the basic metal realised <11% gains. Also, 22% firms in domestic and industrial plastics gained between 51 and 60%, no gain was realized in the Basic metal. Forty four percent firms realized <11% gains in the pulp and paper products, whereas 29% firms in the textile and leather products realized <11% gains. Also, 13% firms in the pulp and paper products group realized between 71 and 80%, while no gain was realized in the textile and leather products. Another 50% firms in the wood and wood products realized between 41 and 50% gains.

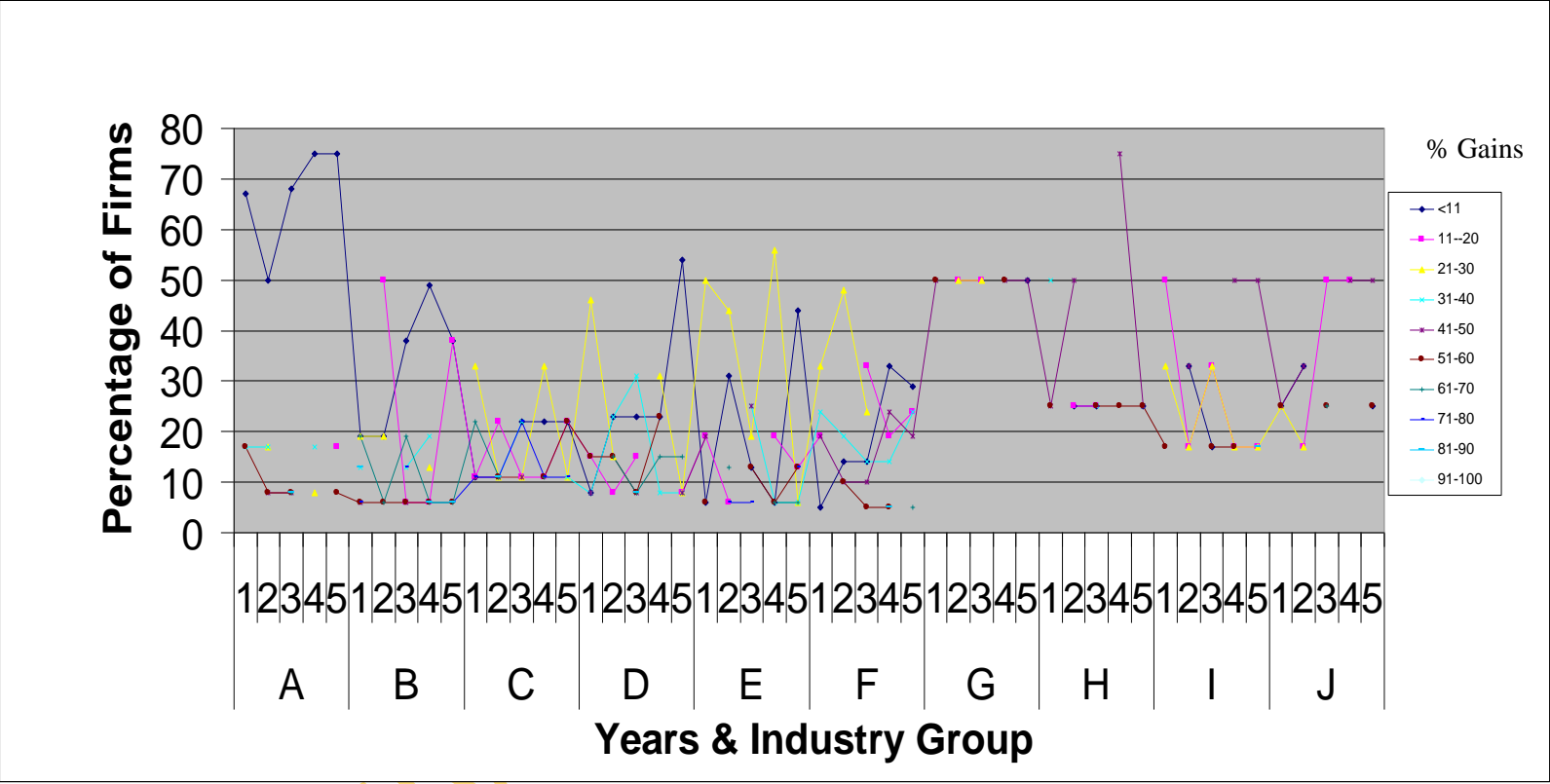


Fig. 5.2: Pattern of Transportation Economies among Industry Groups

Industry Group Legend

- A = Food Beverages and Tobacco Industry Group
- B = Chemical and Pharmaceutical Industry Group
- C = Domestic and Industrial Plastic Rubber Industry Group
- D = Basic Metal Iron and Steel Fabricated Metals Industry Group
- E = Pulp, Paper and Paper Products Printing and Publishing Industry Group
- F = Textile, Wearing Apparel and Leather Products
- G = Wood and Wood Products Including Furniture Industry Group
- H = Non-Metallic Mineral Products Industry Group
- I = Motor Vehicle and Miscellaneous Industry Group
- J = Electrical/ Electronic

Legend for Years

1 = 2005; 2 = 2006; 3 = 2007; 4 = 2008; 5 = 2009.

5.3.2.6 Power Economies among Industry Groups for Year 2005

Fig 5.3 shows the percentage gains in power supply in year 2005 by each industry group. Out of the 100% firms in food beverages and tobacco, 58% firms realized <11% gains, whereas 19% firms in the chemical and pharmaceutical realized <11% gains. 10% firms in the food beverages and tobacco realized between 51 and 60% gains, while six percent firms in chemical and pharmaceutical realized between 51 and 60% gains. 57% firms in domestic and Industrial plastic gained <11%, while 31% firms in the Basic metal realized <11% gains. 11% firms in the domestic and industrial plastic gained between 61 and 70%, whereas there was none in the basic metal industry groups. 56% firms in the pulp and paper products gained <11%, while 52% in the textile and leather products realized between 51 and 60% gains. Whereas 5% firms in the textile and leather products realized between 51 and 60%. Another, 50% firms realized between 71 and 80% gains in the wood and wood products group, whereas 25% firms in the non-metallic group realized same. Also, 50% firms in motor vehicle and miscellaneous group realized between 11 and 20% gains, while 25% firms in the electrical/electronic realized same. 17% firms in the motor vehicle group realized between 31 and 40% gains, whereas none of the firms in the Electrical/Electronic industry group realized between 31 and 40% gains.

5.3.2.7 Power Economies among Industry Groups for Year 2006

Fig 5.3 shows the percentage gains in power supply in year 2006 by each industry group. 50% firms in the food beverages and Tobacco realized <11% gains, whereas 19% firms in chemical and pharmaceutical gained <11%. 13% firms in the chemical and pharmaceutical between 81 and 90%, while there was none in the food beverages and tobacco industry group. 57% firms in the Domestic and industrial plastic rubber realized between 21 and 30% gains, while 39% firms in the Basic metal gained between 21 and 30%. 11% firms in Domestic and industrial plastic gained between 61 and 70%, whereas none of the firms in basic metal realized between 61 and 70%. 19% firms in the pulp and paper products group gained <11%, whereas 52% firms in textile and leather products gained <11%. Also, six percent firms in the pulp and paper products gained between 81 and 90%, while none of the firm textile and leather products group realized between 81 and 90% gains. 50% firms in the wood and wood products group realised between 31 and 40% gains, whereas 25% firms in the non-metallic group realised between 31 and 40% gains. 50% firms in the motor vehicle and miscellaneous group gained <11%, while 75% firms in the electrical/electronic gained <11%. Also 17% firms in the motor vehicle and miscellaneous group gained between 21 and 30%, while none of the firm in the electrical/electronic group gained between 21 and 30%.

5.3.2.8 Power Economies among Industry Groups for Year 2007

Fig 5.3 shows the percentage gains in power supply in year 2007 by each industry group. Out of the 100% firms in food beverages and tobacco industry group, 58% realized <11% gains, whereas 50% firms in chemical and pharmaceutical gained <11%. 8% firms in food beverages and tobacco gained between 51 and 60%, while 6% firms in chemical and pharmaceutical gained between 51 and 60%. Also 44% firms in domestic and industrial plastic gained <11%, while 31% firms in Basic metal realized <11% gains. 11% firms in domestic and industrial plastic gained between 61 and 70%, while 8% firms in basic metal gained between 61 and 70%. Also 44% firms in pulp and paper products group gained between 21 and 30%, whereas 19% firms in textile and leather products gained between 61 and 70%. Furthermore, 50% firms in wood and wood products industry group gained between 21 and 30%, while 25% firms in non-metallic group gained between 21 and 30%. 67% firms in the motor vehicle and miscellaneous group gained between 11 and 20%, whereas no gain was realized in the electrical/electronic group.

5.3.2.9 Power Economies among Industry Groups for year 2008

Fig 5.3 shows the percentage gains in power supply in year 2008 by industry group. 58% firms in the food beverages and tobacco group realized <11% gains, whereas 25% firms gained <11% in chemical and pharmaceuticals industry group. Also, 7% firms in the chemical and pharmaceuticals gained between 61 and 70%, while no gain was realized in the food beverage and tobacco group. Another, 44% firms in Domestic and industrial plastic realized <11% gains, while 31% firms in the Basic metal group realized <11% gains. 23% firms in domestic and Industrial plastics gained between 61 and 70%, while 8% firms in Basic metal group gained between 61 and 70%. 19% firms in pulp and paper products gained between 11 and 20%, whereas there was none in textile and leather products. 19% firms in pulp and paper products gained between 61 and 70%, while there was no gain between 61 and 70% in Textile and leather products. Furthermore, 50% firms in wood and wood products gained 31 and 40%, while it was nil for the firm in non-metallic industry group. Also, 33% firms in the motor vehicle and miscellaneous industry group gained between 11 and 20%, whereas 25% firms in the Electrical Electronic industry group realized between 11 and 20% gains. 17% firms in the motor vehicle and miscellaneous industry group gained between 21 and 30%, while none of the firms in the electrical/electronic industry group realized between 21 and 20% .

5.3.2.10 Power Economies among Industry Groups for Year 2009

Fig 5.3 shows the percentage power supply gains in 2009 by each industry group. Out of the 100% firms in the food beverage and tobacco group, 58% firms gains <11%, whereas 37% firms gains <11% in the chemical and pharmaceuticals industry group. Also, 10% firms in the food beverage and tobacco group gained between 51 and 60%, while 13% firms gained between 51 and 60%. Furthermore, 33% firms in domestic and industrial plastic gains between 31 and 40%, while eight percent firms in basic metals gains between 31 and 40%. 22% firms in domestic and industrial plastic gains between 61 and 70%, whereas none of the firms in the Basic metal realized such gain. Another 31% firms in the pulp and paper products gained <11%, while 14% firms in textile and leather products gained <11%. 13% firms gained between 71 and 80% in pulp and paper products, while 5% firms gained between 71 and 80% in Textile and leather products. 50% firms in wood and wood products gained between

41 and 50%, while 50% firms in the non-metallic group also realized between 41 and 50% gains. 50% firms in motor vehicle and miscellaneous group gained between 11 and 20%, whereas none of the firms in the electrical/electronic realized between 11 and 20% gains. Another 17% in the motor vehicle and miscellaneous group realized between 51 and 60%, whereas 25% firms in the electrical/electronic industry group realized between 51 and 60% gains.

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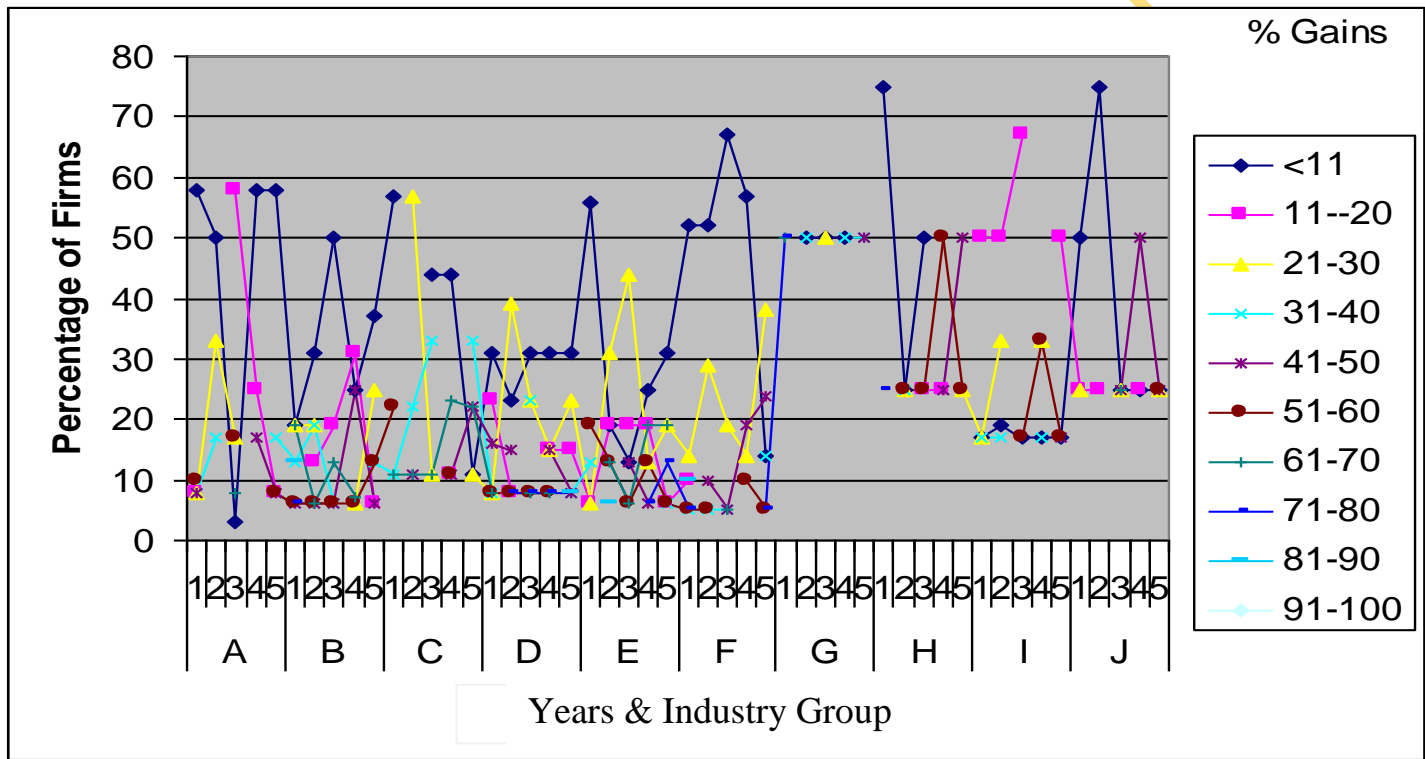


Fig.5.3: Pattern of Power Economies among Industry Group

Industry Group Legend

- A = Food Beverages and Tobacco Industry Group
- B = Chemical and Pharmaceutical Industry Group
- C = Domestic and Industrial Plastic Rubber Industry Group
- D = Basic Metal Iron and Steel Fabricated Metals Industry Group
- E = Pulp, Paper and Paper Products Printing and Publishing Industry Group
- F = Textile, Wearing Apparel and Leather Products
- G = Wood and Wood Products Including Furniture Industry Group
- H = Non-Metallic Mineral Products Industry Group
- I = Motor Vehicle and Miscellaneous Industry Group
- J = Electrical/ Electronic

Legend for Years

1 = 2005; 2 = 2006; 3 = 2007; 4 = 2008; 5 = 2009.

5.3.2.11 Raw Material Purchase/Supply Economies among Industry Groups for Year 2005

Fig 5.4 shows the percentage gains in raw materials purchase/supply in year 2005 by each industry group. Out of 100% firms in food beverage and tobacco industry group, 33% firms realized <11% gains, whereas 6% firms in chemical and pharmaceutical realized <11% gains. Another 8% firms gained between 51 and 60%, while 13% firms in chemical and pharmaceutical gained between 51 and 60%. Also, 11% firms in domestic and industrial plastic gained between 51 and 60%, while 39% firms in basic metal realized between 51 and 60% gains. 22% firms in domestic and industrial plastic realized between 71 and 80% gains, whereas none of the firms in the basic metal realized between 71 and 80%. 31% firms in pulp and paper products realized between 31 and 40% gains, while 14% firms in textile and leather products realized between 31 and 40% gain. 13% firms in pulp and paper products group realized between 61 and 70% gains, while five percent firms in Textile and leather products gained between 61 and 70% gains. Furthermore, 50% firms in wood and wood products gained between 41 and 50%, while 25% in non-metallic products industry group realized between 41 and 50%. Also 33% firms in motor vehicle and miscellaneous products gained between 31 and 40%, whereas none of the firms in

electrical/electronic industry group realized between 31 and 40%. 17% firms in motor vehicle and miscellaneous group realized between 71 and 80%, whereas none of the firms in electrical/electronic group realized between 71 and 80%.

5.3.2.12 Raw Material Purchase/Supply Economies among Industry Groups for Year 2006

Fig 5.4 shows the percentage gain in Raw material purchase/ supply in year 2006 by each industry group. Out of 100% firms in the food beverage and tobacco industry group, 33% firms realized <11% gains, whereas 13% firms in chemical and pharmaceuticals realized <11% gains. Eight percent firms in food beverage and tobacco group gained between 51 and 60%, while six percent firms in chemical and pharmaceuticals gained between 51 and 60%. 33% firms in domestic and industrial plastic realized <11% gains while 39% firms in basic metal gained <11%. Also 22% firms in Domestic and industrial plastic realized between 41 and 50% gains, while 15% firms gained between 41 and 50%. Another, 81% firms in pulp and paper products group gained <11%, whereas 14% firms in textile and leather products gained <11%. Sixty percent firms in pulp and paper products gained between 51 and 60%, while none of the firms in textile and leather product realized between 51 and 60%. Also, 50% firms in wood and wood products gained between 61 and 70%, whereas 25% firms in non-metallic group realized between 61 and 70% gains. Furthermore, 50% firms in motor vehicle and miscellaneous group realized between 51 and 60% gain, while none in the electrical//Electronic group realised between 71 and 80%.

5.3.2.13 Raw Material Purchase/Supply Economies among Industry Groups for Year 2007

Fig 5.4 shows the percentage gains in Raw materials purchase/supply in year 2007. Fifty percent in food beverage and tobacco group realised <11% gains, while 38% firms in chemical and pharmaceutical gained <11%. 8% firms in food beverages and tobacco group realized between 71 and 80% gains, whereas 6% firms in chemical and pharmaceuticals gained between 71 and 80%.

Also, 33% firms in domestic and industrial plastic gained between 51 and 60%, whereas 8% firms in basic metal gained between 51 and 60%. 22% firms in domestic and industrial plastic gained between 71 and 80%, whereas 23% firms in basic metal gained same. 44% firms in pulp and paper industry realized <11% gains, while 14%

firms in textile and leather products realized 11% gains. Also, 31% firms in pulp and paper products gained 71 and 80%, whereas only five percent in textile and leather products gained 71 and 80%. Another 100% firms in wood and wood products gained between 51 and 60%, while 25% firms in non-metallic group gained between 51 and 60%. Also, 50% firms in motor vehicle and miscellaneous industry group gained between 51 and 60%, whereas 50% firms in electrical/electronic also gained 50%. 33% firms in motor vehicle gained between 71 and 80%, while none of the firms in electrical/electronic realized between 71 and 80% gains.

5.3.2.14 Raw Material Purchase/Supply Economies among Industry Groups for Year 2008

Fig 5.4 shows the percentage gains in raw material purchase/supply in year 2008 in each of the industry group. Out of 100% firms in food beverages and tobacco, 42% firms realized <11% gains, while 25% firms gained <11%. Another eight percent firms in food beverage and tobacco realized between 51 and 60% in the chemical and pharmaceutical industry group. Twenty two percent firms in domestic and industrial plastic gained between 51 and 60%, while none of the firms in the Basic metal realized between 51 and 60% gains. 11% firms realized between 71 and 80% gains in domestic and industrial plastic, whereas none of the firm in basic metal realized between 71 and 80%. Also, 38% firms in pulp and paper products realized <11% gains, while 14% firms in Textile and leather products realized <11% gains. Furthermore, 25% firms in pulp and paper products realized between 51 and 60%, while 14% firms in textile and leather products realized between 51 and 60%. 100% firms in the wood and wood products gained between 51 and 60%, while 50% firms in the non-metallic products gained 51 and 60%. Another 83% firms in motor vehicle and miscellaneous industry group gained between 61 and 70%, whereas none of the firms in electrical and electronics realized any gain.

5.3.2.15 Raw Material Purchase/Supply Economies among Industry Groups for Year 2009

Fig 5.4 shows the percentage gains in raw material purchase/supply in year 2009 by each of the industry group. Out of the 100% firms in food beverages and tobacco industry group, 25% firms gained <11%, whereas 38% in the chemical and pharmaceuticals industry group gained <11%. Also 8% firms gained between 61 and 70%, while there was none that gained between 61 and 70% in the chemical and pharmaceutical group. Furthermore, 33% firms in the domestic and industrial plastic realized between 31 and 40% gains, whereas 15% firms in the basic metal realized between 31 and 40% gains. 11% firms in the domestic and industrial plastic gained between 51 and 60%, while there was none that gained between 51 and 60% in the basic metal. Also, 31% firms realized between 61 and 70% gains in pulp and paper product group, whereas only five percent firms realized between 61 and 70% in textile and leather products. 13% firms realized between 71 and 80% gains in pulp and paper products, while five percent firms in the textile and leather products realized between 71 and 80%. Another 100% firms in the wood and wood products realized <11% gains, whereas 50% firms in non-metallic group realized <11%. Also, 50% firms in motor vehicle and miscellaneous group realized between 51 and 60% gains, while 25% firms realized between 51 and 60% gains.

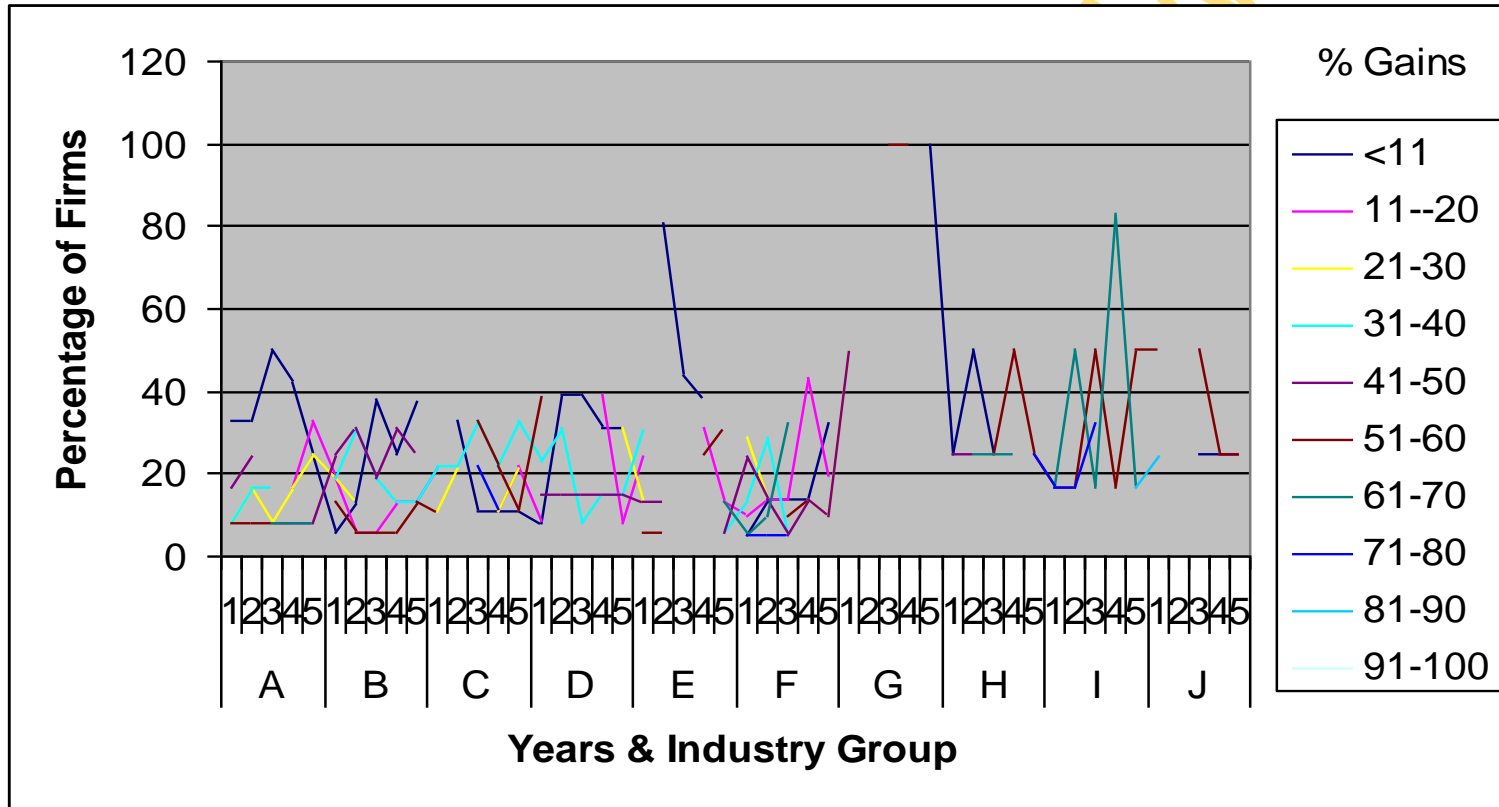


Fig 5.4 Pattern of Raw material Purchase/ Supply Economies among Industry Groups

Industry Group Legend

- A = Food Beverages and Tobacco Industry Group
- B = Chemical and Pharmaceutical Industry Group
- C = Domestic and Industrial Plastic Rubber Industry Group
- D = Basic Metal Iron and Steel Fabricated Metals Industry Group
- E = Pulp, Paper and Paper Products Printing and Publishing Industry Group
- F = Textile, Wearing Apparel and Leather Products
- G = Wood and Wood Products Including Furniture Industry Group
- H = Non-Metallic Mineral Products Industry Group
- I = Motor Vehicle and Miscellaneous Industry Group
- J = Electrical/ Electronic

Legend for Years

1 = 2005; 2 = 2006; 3 = 2007; 4 = 2008; 5 = 2009.

5.3.2.16 Collaboration in Research and Development Economies among Industry Groups for Year 2005

Fig 5.5 shows the percentage gains in collaboration in research and development for year 2005 by each industry group. Out of 100% firms in food beverage and tobacco group, 58% firms realized <11%, whereas it is 62% firms in the chemical and pharmaceutical that realized <11% gains. 8% firms in food beverage and tobacco group gained between 61 and 70%, whereas it was 6% firms in the chemical and pharmaceutical that realized 61 and 70% gains. Furthermore, 44% firms in domestic and industrial plastic group realized <11% gains, while 62% firms in basic metal realized <11% gains. Also 11% firms in domestic plastic realized between 71 and 80% gains, whereas there was none in the Basic metal group that realised between 71 and 80% gains. 38% firms in the pulp and paper products group realized <11% gains, while 38% firms in textile group also realized <11% gains. Another 31% firms in pulp and paper product realized between 41 and 50% gains, whereas 10% firms in textile and leather products gained between 41 and 50%. Furthermore, 50% firms in wood and wood products realized 41 and 50% gains, while there was none in the non-metallic group. Also, 33% firms in the motor vehicle and miscellaneous group realized between 51 and 60% gains, while 25% firms in electrical/electronic gained between 51 and 60%. 17% firms in motor

vehicle and miscellaneous group realized <11% gains, whereas 50% firms in electrical/electronic group realized <11% gains.

5.3.2.17 Collaboration in Research and Development Economies among Industry

Groups for Year 2006

Fig 5.5 shows the percentage gains in collaboration in Research and Development by each industry group for year 2006. Out of 100% firms in food beverage and tobacco industry group, 58% firms realized <11% gains, whereas 50% firms in chemical and pharmaceutical realized <11% gains. 8% firms in food beverage and tobacco group gained between 71 and 80%, while there was none that gained between 71 and 80% in the chemical and pharmaceutical industry group. Furthermore, 33% firms in Domestic and industrial plastic realized between 71 and 80% gains, while there were eight percent firms in basic metal that realized between 71 and 80% gains. Also 11% firms in domestic plastic gained <11%, while 54% firms in basic metal realized <11% gains. Another 38% firms gained <11% in pulp and paper product group, while 33% firms gained <11% in textile and leather product group. 19% firms in pulp and paper product group realized between 41 and 50% gains, whereas 33% firms in Textile and leather products gained between 41 and 50%. Also, 50% firms in wood and wood products group gained between 31 and 40%, while 25% firms in non-metallic group realized between 31 and 40% gains. 33% firms in motor vehicle and miscellaneous group gained between 41 and 50%, while 25% firms in the electrical/electronic gains between 41 and 50%. Another 33% firms in motor vehicle and miscellaneous group realized between 11 and 20% gains, whereas 25% firms in electrical/electronic gained between 11 and 20%.

5.3.2.18 Collaboration in Research and Development Economies among

Industry Groups for Year 2007

Fig 5.5 shows the percentage gains in collaboration in research and Development by each industry group for year 2007. Out of 100% firms in food beverage and tobacco group, 67% firms realized <11% gains, whereas 31% firms realized <11% gains in chemical and pharmaceutical group. Eight percent firms in the food beverage and tobacco group realized between 51 and 60% gains, while 13% firms in chemical and pharmaceutical group realized between 51 and 60% gains. Also, 22% firms in domestic and industry plastic group realized between 51 and 60% gains, whereas 8% firms in basic metal realized same gain. 11% firms in

domestic plastic gained between 71 and 80%, while 8% firms in basic metal realized between 71 and 80%. Furthermore, 38% firms in pulp and paper products realized between 41 and 50% gains, while 10% firms in textile and leather product gained between 41 and 50%. 25% firms in pulp and paper product group gained between 51 and 60%, while there was none in textile and leather products group that gained between 51 and 60%. Another, 50% firms gained between 41 and 50% in the wood and wood products group, while there was none in the non-metallic group that gained between 41 and 50%. Also, 33% firms in motor vehicle and miscellaneous group realized between 51 and 60% gains, while there was none in the electrical/electronic industry group that realised between 51 and 60%. Seventeen percent firms in motor vehicle and miscellaneous group realized <11% gains, whereas there was none in the electrical/electronic industry group that gained <11%.

5.3.2.19 Collaboration in Research and Development Economies among Industry Groups for Year 2008

Fig 5.5 shows the percentage gains in collaboration in research and development by each industry group for year 2008. Out of the 100% firms in food beverage and Tobacco industry group, 75% firms realized <11% gains, whereas 44% firms in chemical and pharmaceuticals realized <11% gains. Eight percent firms in food beverage and tobacco realized between 51 and 60% gains, while 7% firms in chemical and pharmaceuticals realized between 51 and 60% gains. Also, 33% firms in domestic and industrial plastic realized between 41 and 50% gains, while 15% firms in basic metal realized between 41 and 50% gains. 22% firms in domestic and industrial plastic group realized <11% gains, while 31% firms in basic metal realised <11% gains. Another 31% firms in pulp and paper products gained between 11 and 20%, whereas 19% firms in Textile and leather products realized between 11 and 20% gains. 25% firms in pulp and paper products realized between 41 and 50% gains, while 14 firms in Textile and leather products realized between 41 and 50% gains. Furthermore, 50% firms in wood and wood products group realized between 31 and 40% gains, whereas there was none in non-metallic group that realised between 31 and 40% gains. 50% firms in wood and wood products gained <11%, while 75% firms in non-metallic industry group gained <11%. Another 67% firms in motor vehicle and miscellaneous group gained <11%, while 25% firms in electrical/electronic industry group gained <11%.

5.3.2.20 Collaboration in Research and Development Economies among Industry Groups for Year 2009

Fig 5.5 shows the percentage gains in collaboration in research and development for year 2009. Out of 100 % firms in food beverage and tobacco industry group, 58% firms realised <11% gains, while 25% firms in chemical and pharmaceutical industry group realised <11% gains. 8% firms in food beverage and tobacco industry group gained between 51 and 60% gains, whereas seven percent firms in chemical and pharmaceutical gained between 51 and 60%. Also, 22% firms in domestic and industrial plastic group <11%, whereas 31% firms in basic metal gained <11%. Thirty three percent firms in domestic and industrial plastic realised between 41 and 50% gains, while 15% firms in basic metal gained between 41 and 50%. Another, 13% firms in the pulp and paper product industry group realised <11% gains, while 38% firms in the textile and leather product industry group gained <11%. 25% firms in pulp and paper industry group realised between 41 and 50% gains, while 14% firms in textile and leather product industry group gained between 41 and 50%. Also 50% firms in the wood and wood industry group gained <11%, whereas 75% firms in non-metallic industry group realised <11% gains. 25% firms in non-metallic realised between 41 and 50% gains, whereas none of the firms in wood and wood industry group realised between 41 and 50% gains. Furthermore, 67% firms in motor vehicle and miscellaneous industry group gained <11%, while 25% firms in electrical /electronic gained <11%. 17% firms in motor vehicle and miscellaneous industry group realised between 11 and 20% gains, whereas 25% firms in electrical/electronic industry group realised between 11 and 20% gains.

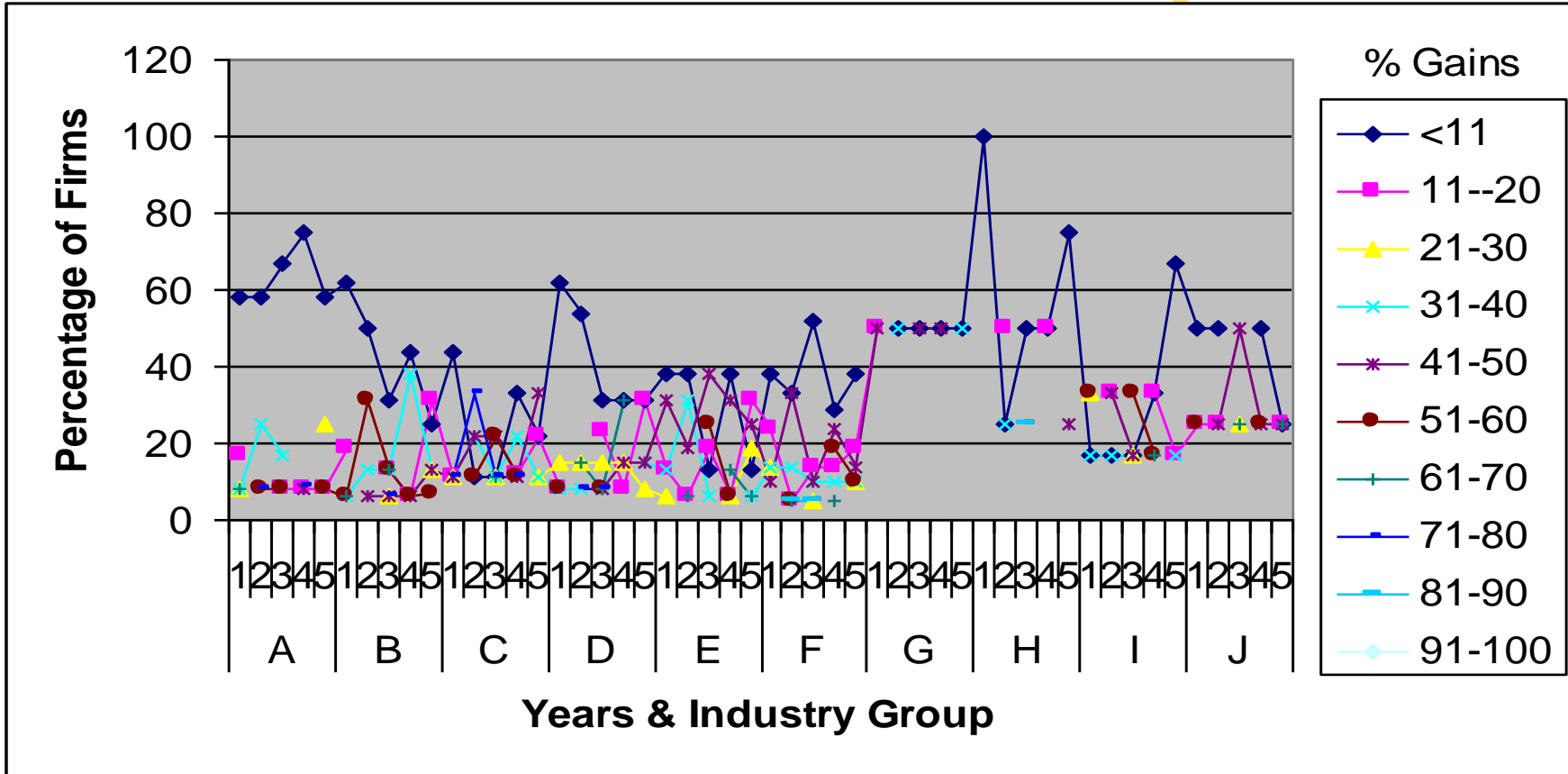


Fig. 5.5 Pattern of Collaboration in Research and Development Economies among Industry Groups

Industry Group Legend

- A = Food Beverages and Tobacco Industry Group
- B = Chemical and Pharmaceutical Industry Group
- C = Domestic and Industrial Plastic Rubber Industry Group
- D = Basic Metal Iron and Steel Fabricated Metals Industry Group
- E = Pulp, Paper and Paper Products Printing and Publishing Industry Group
- F = Textile, Wearing Apparel and Leather Products
- G = Wood and Wood Products Including Furniture Industry Group
- H = Non-Metallic Mineral Products Industry Group
- I = Motor Vehicle and Miscellaneous Industry Group
- J = Electrical/ Electronic

Legend or Years

1 = 2005; 2 = 2006; 3 = 2007; 4 = 2008; 5 = 2009.

5.3.2.21 Labour Economies among Industry Groups for Year 2005

Fig 5.6 shows the percentage gains in labour by each industry group for year 2005. Out of 100% firms in food beverage and Tobacco industry group, 75% firms realized <11% gains, whereas 19% firms in chemical and pharmaceuticals realized <11% gains. 8% firms in food beverage and tobacco group realized between 41 and 50% gains, while 13% firms in chemical and pharmaceuticals realized between 41 and 50% gains. Also, 22% firms in Domestic and industrial plastic group gained between 61 and 70%, whereas 15% firms in basic metal realized between 61 and 70% gains. 22% firms in domestic and industrial plastic group realized between 21 and 30% gains, while 8% firms in basic metal group realized between 21 and 30% gains. Furthermore, 38% firms in pulp and paper products gained between 11 and 20%, while 19% firms in Textile and leather products gained between 11 and 20%. 13% firms in pulp and paper products gained between 51 and 60%, while five percent firms in Textile and leather products realized between 51 and 60% gains. Another 75% firms in non-metallic industry realized <11% gains, whereas none in the wood and wood products group realized <11% gains. Furthermore, 17% firms in motor vehicle and miscellaneous industry group realized between 31 and 40% gains, while 25% firms in electrical/electronic industry realized 31 and 40%.

5.3.2.22 Labour Economies among Industry Groups for Year 2006

Fig 5.6 shows the percentage gains in labour each industry group for year 2006. Out of the 100% firms in food beverage and tobacco industry group, 75% firms realized <11% savings, whereas 13% firms in chemical and pharmaceutical industry group realized <11% gains. Also, 33% firms in domestic and industrial plastic group realized between 61 and 70% gains, there was none in the basic metal group. 11% firms in domestic and industrial plastic realized between 51 and 60% gains, whereas 15% firms in basic metal realized between 51 and 60% gains. Furthermore, 50% firms in pulp and paper products gained <11%, while 62% firms in textile and leather products realized <11% gains. 25% firms in pulp and paper product realized between 71 and 80% gains, while there was none in the textile and leather products industry group. Another 50% firms in wood and wood products group realized between 31 and 40% gains, while there was none in the non-metallic group that realised between 31 and 40%. 75% firms in the non-metallic group gained between 11 and 20%, while there was none in wood and wood products group that realised between 11 and 20%. Also, 67% firms in motor vehicle and miscellaneous industry group realized between 51 and 60% gains, while there was none in electrical/electronic industry group that realised between 51 and 60% gains.

5.3.2.23 Labour Economies among Industry Groups for Year 2007

Fig 5.6 shows the percentage gains in labour by each industry group for year 2007. Out of the 100% firms in food beverage and tobacco industry group, 75% firms realized <11% gains, while 63% firms in chemical and pharmaceuticals realized <11% gains. 6% firms in chemical and pharmaceuticals realized between 71 and 80%, whereas none of the firms in food beverage and tobacco that realised between 71 and 80% gains.

Also, 22% firms in domestic and industrial plastic realized, 11% gains, whereas 23% in basic metal realized <11% gains. 22% firms in domestic and plastic group realized between 61 and 70% gains, whereas 8% firms in basic metal realized between 61 and 70% gains. Another 31% firms in pulp and paper products gained between 41 and 50%, while 24% firms in textile and leather products gained between 41 and 50%. 18% firms in pulp and paper products realized between 51 and 60% gains, whereas 5% firms in textile and leather products gained between 51 and 60%.

Furthermore, 50% firms in wood and wood products gained between 21 and 30%, while 25% firms in non-metallic group realized between 21 and 30% gains. Moreover, 67% firms in motor vehicle and miscellaneous group gained between 51 and 60%, while there was none in electrical electronic industry group that realised between 11 and 20%. 33% firms in motor vehicle and miscellaneous group gained between 31 and 40%, whereas 25% firms in electrical/electronic gained between 31 and 40%.

5.3.2.24 Labour Economies among Industry Groups for Year 2008

Fig 5.6 shows the percentage gains in labour by each industry group for year 2008. Out of the 100% firms in food beverages and tobacco industry group, 50% firms realized <11% gains, whereas 13% firms realized <11% gains in the chemical and pharmaceutical. 9% firms in food beverage and tobacco group realized between 41 and 50% gains, while 31% firms in chemical and pharmaceutical realized 41 and 50% gains. Also, 44% firms in domestic and industrial plastic group gained <11%, while 39% firms in basic metal group gained <11%. 33% firms in domestic and industrial plastic group gained between 21 and 30%, whereas 23% firms in basic metal gained between 21 and 30%. Furthermore, 63% firms in pulp and paper product group realized <11% gains, while, 33% firms in textile and leather product realized <11% gains. 31% firms in pulp and paper product group gained between 41 and 50%, whereas 10% firms in textile and leather products gained between 41 and 50%. Another 100% firms in wood and wood products realized between 21 and 30% gains, whereas, none realized any gain between 21 and 30% in non-metallic group. Moreover, 83% firms realized <11% gains in motor vehicle and miscellaneous industry group, whereas 24% firms in electrical/electronic industry group realized <11% gains.

5.3.2.25 Labour Economies among Industry Groups for Year 2009

Fig 5.6 shows the percentage gains in labour in each industry group for year 2009. Out of the 100% firms in food beverage and tobacco, 75% firms realized <11% gains, while 13% firms in chemical and pharmaceutical realized <11% gains. Also, 33% firms in domestic and industrial plastic group realized <11% gains, whereas 46% firms in basic metal realized <11% gains. 12% firms in domestic and industrial plastic gained between 61 and 70%, while none realized any gain between 61 and 70% in the

basic metal. Furthermore, 38% firms in pulp and paper products gained between 31 and 40%, while 24% firms in textile and leather products gained between 31 and 40%. 19% firms in the pulp and paper products realized 11% gains, whereas 48% firms in textile and leather products realized <11% gains. Another 100% firms in wood and wood products industry group realized between 21 and 30% gains, whereas 25% firms in non-metallic group gained between 21 and 30%. Moreover, 33% firms in motor vehicle and miscellaneous industry group realized <11% gains, while 50% firms in electrical/electronic group realized <11% gains.

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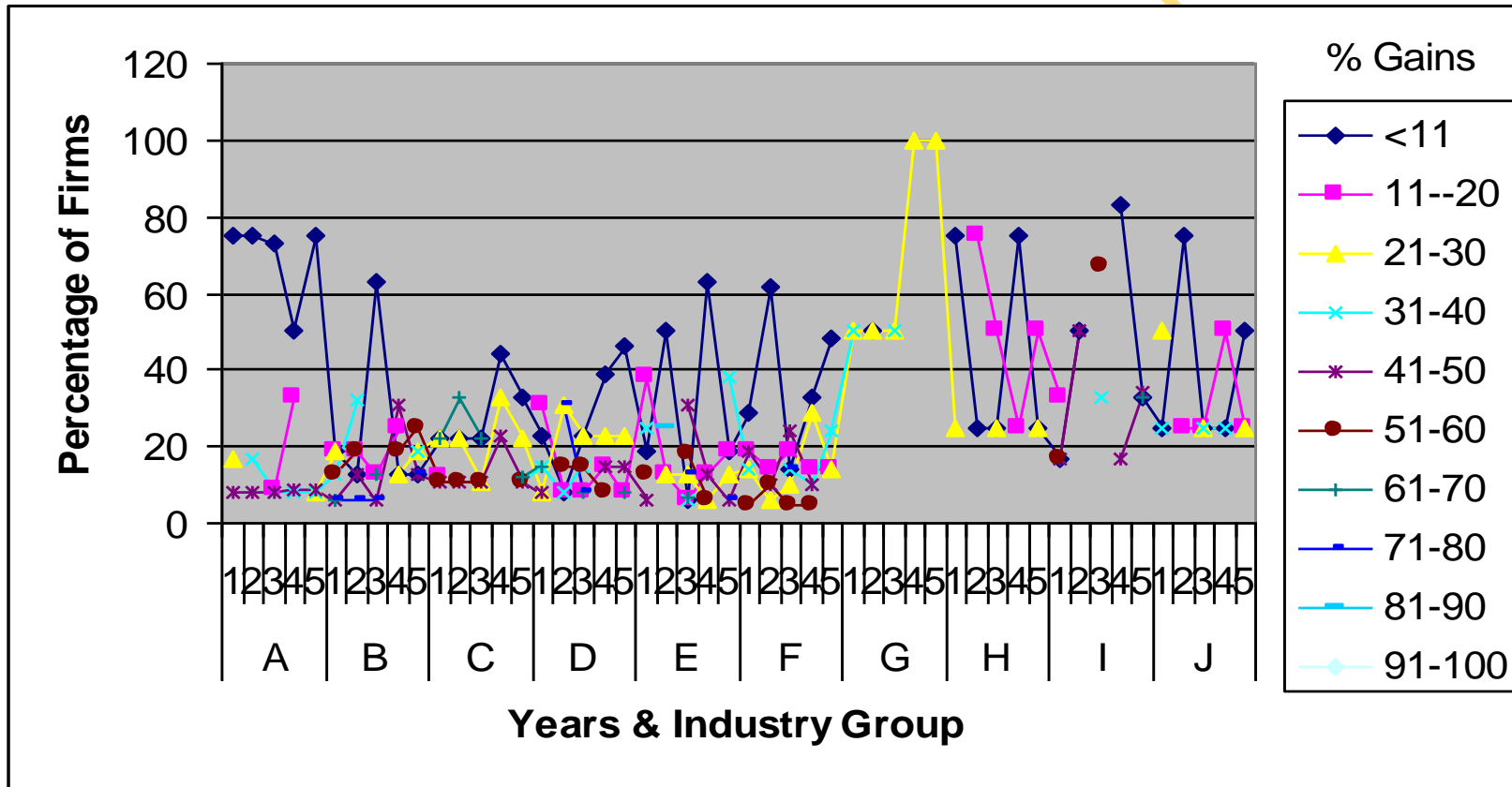


Fig. 5.6 Pattern of Labour Economies among Industry Groups

Industry Group Legend

- A = Food Beverages and Tobacco Industry Group
- B = Chemical and Pharmaceutical Industry Group
- C = Domestic and Industrial Plastic Rubber Industry Group
- D = Basic Metal Iron and Steel Fabricated Metals Industry Group
- E = Pulp, Paper and Paper Products Printing and Publishing Industry Group
- F = Textile, Wearing Apparel and Leather Products
- G = Wood and Wood Products Including Furniture Industry Group
- H = Non-Metallic Mineral Products Industry Group
- I = Motor Vehicle and Miscellaneous Industry Group
- J = Electrical/ Electronic

Legend for Years

1 = 2005; 2 = 2006; 3 = 2007; 4 = 2008; 5 = 2009.

5.3.2.26 Water Supply Economies among Industry Groups for Year 2005

Fig 5.7 shows the percentage gains in water supply in each industry group for year 2005. Out of 100% firms in food beverage and tobacco industry group, 83% gained <11%, whereas, 81% firms in chemical and pharmaceutical industry group gained <11%. Another 57% firms in domestic and industrial plastic realized <11% gains, whereas 92% firms in basic metal realized <11% gains. Furthermore 69% firms in pulp and paper products realized <11% gains, whereas 68% firms in textile and leather products realized <11% gains. 19% firms in pulp and paper products gained between 21 and 30%, while none of the firms in textile and leather products realized any gain between 21 and 30%. Also, 50% firms in wood and wood products gained between 41 and 50%, whereas 25% firms in non-metallic group gained between 41 and 50%. Moreover, 68% firms in motor vehicle and miscellaneous group realized <11% gains, while 75% firms in electrical/ electronic industry group realized <11% gains. 17% firms in motor vehicle and miscellaneous group gained between 41 and 50%, while 25% firms in electrical/electronic industry group gained between 41 and 50%.

5.3.2.27 Water Supply Economies among Industry Groups for Year 2006

Fig 5.7 shows the percentage gain in water supply by each industry group for year 2006. out of the 100% firms in food beverage and tobacco industry group, 92% realized 11% gains, while 38% firms in chemical and pharmaceutical industry group realized <11% gains. Also, 68% firms in domestic and industrial plastic gained <11%, whereas 62% firms in basic metal industry group gained <11%. 8% firms in basic metal gained between 41 and 50%, whereas none of the firms in domestic and industrial plastic realized any gain between 41 and 50%. Another 81% firms in the pulp and paper products industry group realized <11% gains, whereas 57% firms in textile and leather products industry group realized <11% gains. 19% firms in pulp and paper product gained between 21 and 30% while 33% firms in textile and leather product group realized between 21 and 30% gains. Also, 100% firms in non-metallic industry group realized <11% gains, while none of the firms in wood and wood products realized <11% gains. Furthermore, 100% firms in electrical/electronic industry group realised <11% gains, whereas 17% firms in motor vehicle and miscellaneous industry group realized <11% gains.

5.3.1.28 Water Supply Economies among Industry Groups for Year 2007

Fig 5.7 shows the percentage gains in water supply by each industry group for year 2007. Out of 100% firms in food beverages and tobacco industry group, 67% realised <11% gains, whereas 81 % firms in chemical and pharmaceutical industry group realised <11% gains. 17% firms in food beverage and tobacco realized between 31 and 40% gains, while 6% firms in chemical and pharmaceutical realised between 31 and 40 % gains. Another 100% firms in basic metal industry group realised <11% gains, only 11% firms in domestic and industrial plastics realised 11% gains. Also, 19% firms in pulp & paper products group realised between 21 and 30% gains, while 24% firms in textile and leather products realised between 21 and 30% gains. 6% firms in pulp and paper products group realised between 41 and 50% gains, while none of the firms in textile and leather products realised between 41 and 50%. Furthermore, 100% firms in wood and wood products realised <11% gains, while 100% firms in non-metallic industry group also realised <11% gains. Moreover, 75% firms in electrical/electronics industry group realised <11% gains, while 17% firms in motor vehicle and miscellaneous industry group realised <11% gains.

5.3.2.29 Water Supply Economies among Industry Groups for Year 2008

Fig 5.7 shows that percentage gains in water supply by each industry group for year 2008. Out of the 100% firms in food beverage and tobacco industry group, 58% firms realised <11%, whereas 81% firms in chemicals and pharmaceutical industry group realised <11% gains. Forty two percent firms in food beverage and tobacco group realized between 11 and 20% gains, while 19% firms in chemical and pharmaceutical gained between 11 and 20%. Also 89% firms in domestic and industrial plastic group realised <11% gains, while 62% firms in basic metal industry group realised <11% gains. 11% firms in domestic and industrial plastic gained between 11 and 20%, while 31% firms in basic metal gained between 11 and 20%. Another 69% firms in pulp and paper products gained <11%, whereas 38% firms in textile and leather products gained <11%. 5% firms in textile and leather products gained between 41 and 50%, while none of the firms in pulp and paper products gained between 41 and 50%. Furthermore, 50% firms each in wood and wood products, and non-metallic products gained <11%. 50% firms in wood and wood products group gained between 41 and 50%, while none of the firms in non-metallic industry group realised between 41 and 50%. Another 50% firms in motor vehicle and miscellaneous industry group realised between 21 and 30% gains, whereas 25% firms in electrical/electronic gained between 21 and 30%. 16% firms in motor vehicle and miscellaneous industry group gained between 51 and 60%, whereas 25% firms electrical and electronic gained between 51 and 60%.

5.3.2.30 Water Supply Economies among Industry Groups for Year 2009

Fig 5.7 shows the percentage gains in water supply by each industry group for year 2009. Out of the 100% firms in the food beverage and tobacco industry group, 50% realised <11% gains, whereas 56% firms in chemical and pharmaceutical realised <11% gains. 25% firms in food beverage and tobacco industry group gains between 21 and 30%, whereas six percent firms in chemical and pharmaceutical realised between 21 and 30% gains. Also, 57 % firms in domestic and industrial plastic gains <11%, while 69% firms in basic metal realised <11% gains. 22% firms in domestic and industrial plastic gains between 11 and 20%, while 35% firms in basic metal realised between 11 and 20% . Also 81% firms in pulp and paper products realised <11% gains, while 71% firms in textile and leather products realised <11% gains. Five percent firms in textile and leather products realised between 31 and 40 % gains, while none of the firms in pulp and paper products realised between 31 and 40% gains.

Furthermore, 50 % firms in wood and wood products realised <11% gains, while 75% firms in non-metallic industry group realised <11% gains. Also, 100% firms in motor vehicle and miscellaneous industry group realised <11% gains, whereas 50% firms in electrical/electronic industry group realised <11% gains.

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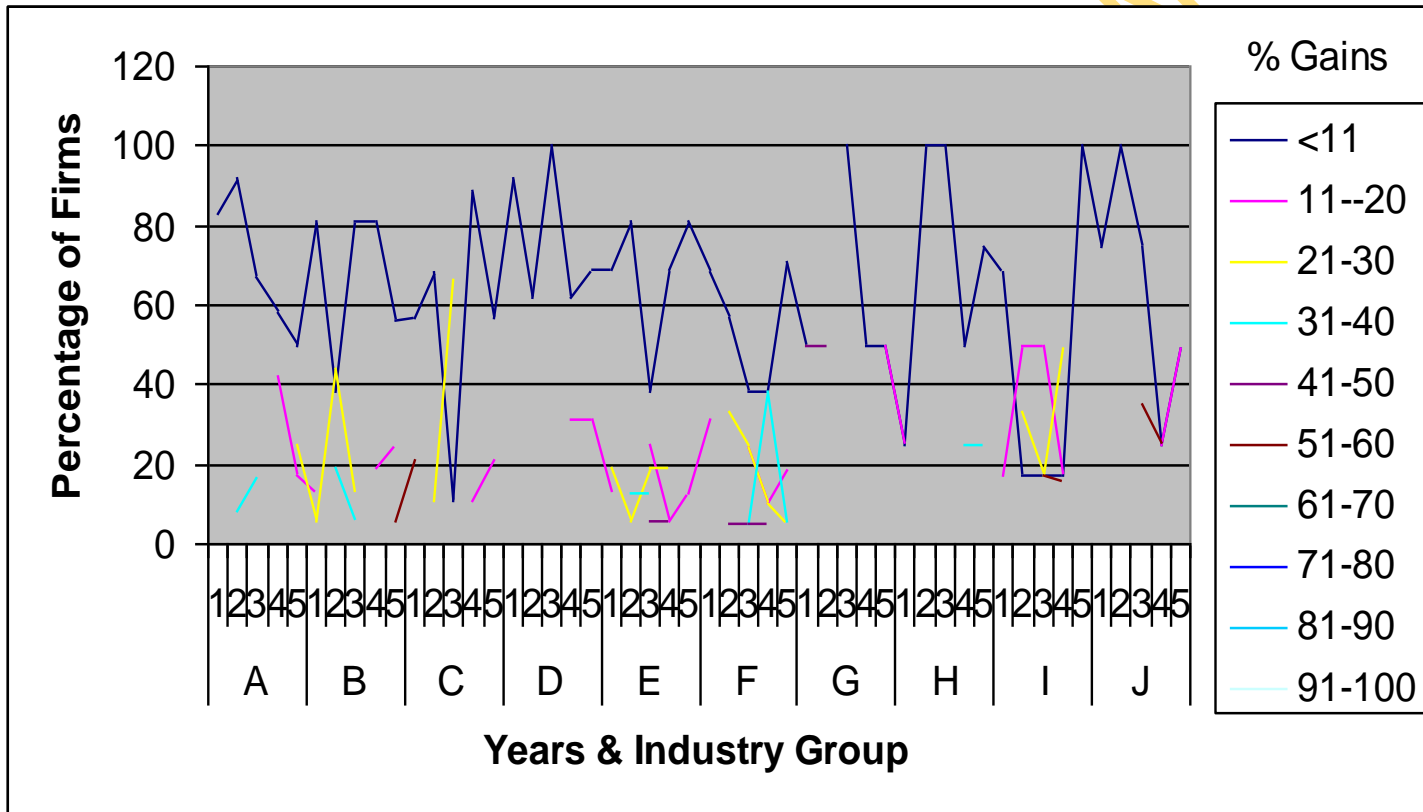


Fig. 5.7: Pattern of Water Economies among Industry Groups

Industry Group Legend

- A = Food Beverages and Tobacco Industry Group
- B = Chemical and Pharmaceutical Industry Group
- C = Domestic and Industrial Plastic Rubber Industry Group
- D = Basic Metal Iron and Steel Fabricated Metals Industry Group
- E = Pulp, Paper and Paper Products Printing and Publishing Industry Group
- F = Textile, Wearing Apparel and Leather Products
- G = Wood and Wood Products Including Furniture Industry Group
- H = Non-Metallic Mineral Products Industry Group
- I = Motor Vehicle and Miscellaneous Industry Group
- J = Electrical/ Electronic

Legend for Years

1 = 2005; 2 = 2006; 3 = 2007; 4 = 2008; 5 = 2009.

5.3.2.31 Waste Treatment Economies among Industry Groups for Year 2005

Fig. 5.8 shows the percentage gains in waste treatment by each industry group for year 2005. Out of 100% firms in food beverage and tobacco industry group, 68% realised <11% gains, while 44% firms in chemical and pharmaceuticals realised <11% gains. Eight percent firms in food beverage and tobacco industry group realised between 51 and 60% gains, while none of the firms in chemical and pharmaceutical industry group gained between 51 and 60%. Also 33% firms in domestic and industrial plastic realised <11% gains, while 31% firms in basic metal realised <11% gains. 23% firms in domestic and Industrial Plastic realised between 61 and 70% gains, while 8% firms in basic metal group realised between 61 and 70% gains. Furthermore 44% firms in pulp and paper products group gained <11%, while 38% firms in textile and pharmaceutical gained <11%, while 38% firms in textile and pharmaceutical gained <11% . 19% firms in pulp and paper products group realised between 31 and 40% gains, while 29% firms in textile and leather product realised between 31 and 40%. Another 50% firms in wood and wood products gained between 21 and 30%, whereas 50% firms in non- metallic industry group also gained between 21 and 30%. 50% firms in wood and wood products gained between 31 and 40% while none of the firms in the non-metallic industry group gained between 31 and 40%. Moreover, 33% firms in motor vehicle and miscellaneous group gained between

51 and 60%, while none of the firms in electrical electronic industry group gained between 51 and 60%.

5.3.2.32 Waste Treatment Economies among Industry Groups for Year 2006

Fig. 5.8 shows the percentage gains in waste treatment by each industry group for 2006. Out of 100% firms in food beverage and tobacco group, 92% firms gained <11% , whereas 75% firms in chemical and pharmaceutical gained <11%. Also, 57% firms in domestic and industrial plastics gained <11% , while 31% firms in basic metal group realised <11% gain. 11% firms in domestic and industrial plastic gained between 71 and 80%, while none of the firms in basic metal gained between 71 and 80%. Furthermore, 63% firms in pulp and paper product gained <11%, while 29% firms in textile and leather gained <11%. Six percent firms firms in pulp and paper products gained between 41band 50%, whereas 29% firms in textile and leather products between 41 and 50%. Another 50% firms realised between 21 and 30% gains in wood and wood products, while 25% firms in non-metallic product group gained between 21 and 30%. Moreover, 17% firms in motor vehicle and miscellaneous group gained between 11 and 20% while 25% firms in electrical/electronic gained between 11 and 20%. 33% firms gained between 51 and 60% in motor vehicle and miscellaneous group, while none of the firms in Electrical/Electronics group gained between 51 and 60%.

5.3.2.33 Waste Treatment Economies among Industry Groups for Year 2007

Fig. 5.8 shows the percentage gains in waste treatment by each industry group for year 2007. Out of 100% firms in food beverage and tobacco industry group, 67% realised <11% gains whereas 31% firms in chemical and pharmaceuticals realised <11% gains. 8% firms in food beverage and tobacco group gained between 51 and 60%, while 25% firms in chemical and pharmaceutical group gained between 51 and 60%. Also 44% firms in Domestic and industrial plastic realised <11% gains. 23% firms in Domestic and Industrial Plastic realised between 31 and 40 gains, while 15% firms in Basic metal group between 31 and 40%. Another 44% firms in pulp and paper products group gained between 31 and 40% while 29% firms in textile and leather products group realised 51 and 60% gains. 50% firms in each wood and wood products group; and non-metallic group realised between 21 and 30% gains. Furthermore, 68% firms in motor vehicle and miscellaneous group realised between 41 and 50% gains, while none of the firms in electrical/electronic realised any gain between 41 and 50% 17% firms in motor vehicle

and miscellaneous gained between 21 and 30%, whereas 75% firms electrical/electronic industry group gained between 21 and 30%.

5.3.2.34 Waste Treatment Economies among Industry Groups for Year 2008

Fig. 5.8 shows the percentage gains in waste treatment by each industry group for year 2008. Out of 100% firms in food beverage and tobacco industry group, 75% realised <11% gains, while 56% firms in chemical and pharmaceuticals realised <11% gains. 25% firms in food beverage and tobacco group realised between 21 and 30% gains, whereas 6% firms in chemical and pharmaceutical group gained between 21 and 30%. Also, 33% firms in domestic and industrial plastic realised between 31 and 40% gains, while 8% firms in basic metal group between 31 and 40%. 22% firms in domestic and industrial plastic realised <11% gains, whereas 54% firms in basic metal realised <11% gained. Furthermore, 63% firms in pulp and paper products realised <11% gains, while 52% firms in textile and leather products realised <11% gains. 19% firms in pulp and paper products realised between 51 and 60% gains, while none of the firms in textile and leather products realised any gain between 51 and 60%. Another 100% firms in wood and wood products industry group realised <11% gains, whereas 50% firms in non-metallic industry group realised <11% gains. Moreover, 33% firms in motor vehicle and miscellaneous industry group realised between 41 and 50% gains, while none of the firms in the electrical/ electronic group realised between 41 and 50% gains. 17% firms in motor vehicle and miscellaneous group realised between 11 and 20% gains, while 50% firms in electrical/electronic realised between 11 and 20% gains.

5.3.2.35 Waste Treatment Economies among Industry Groups for Year 2009

Fig.5.8 shows the percentage gains in waste treatment by each industry group for year 2009. Out of 100% firms in food beverage and tobacco industry group, 58% realised <11% gains, whereas 19% firms in chemical and pharmaceuticals realised <11% gains. 17% firms in food beverage and tobacco group realised between 31 and 40% gains, while 13% firms in chemical and pharmaceutical group realised between 31 and 40% gains. Another, 33% firms in Domestic and industrial plastic gained between 31 and 40%, while 15% firms in basic metal gained 31 and 40%. 11% firms in domestic and industrial Plastic group realised between 61 and 70 gains, while there was none that gained between 61 and 70% in basic metal group. Also, 44% firms in pulp and paper products group realised between 11 and 20% gains, while 19% firms in textile and leather products group realised

between 11 and 20% gains. 19% firms in pulp and paper product group realised between 31 and 40% gains, while 10% firms in textile and leather products group realised between 31 and 40% gains. Furthermore, 50% firms each in wood and wood products group; and non-metallic product group realised between 11 and 20% gains. Moreover, 17% firms in motor vehicle and miscellaneous group realised between 11 and 20% gains, while 25% firms in electrical/electronic realised between 11 and 20% gains. 50% firms in motor vehicle and miscellaneous realised between 41 and 50%, while there was none in Electrical/Electronic that realised between 41 and 50% gains.

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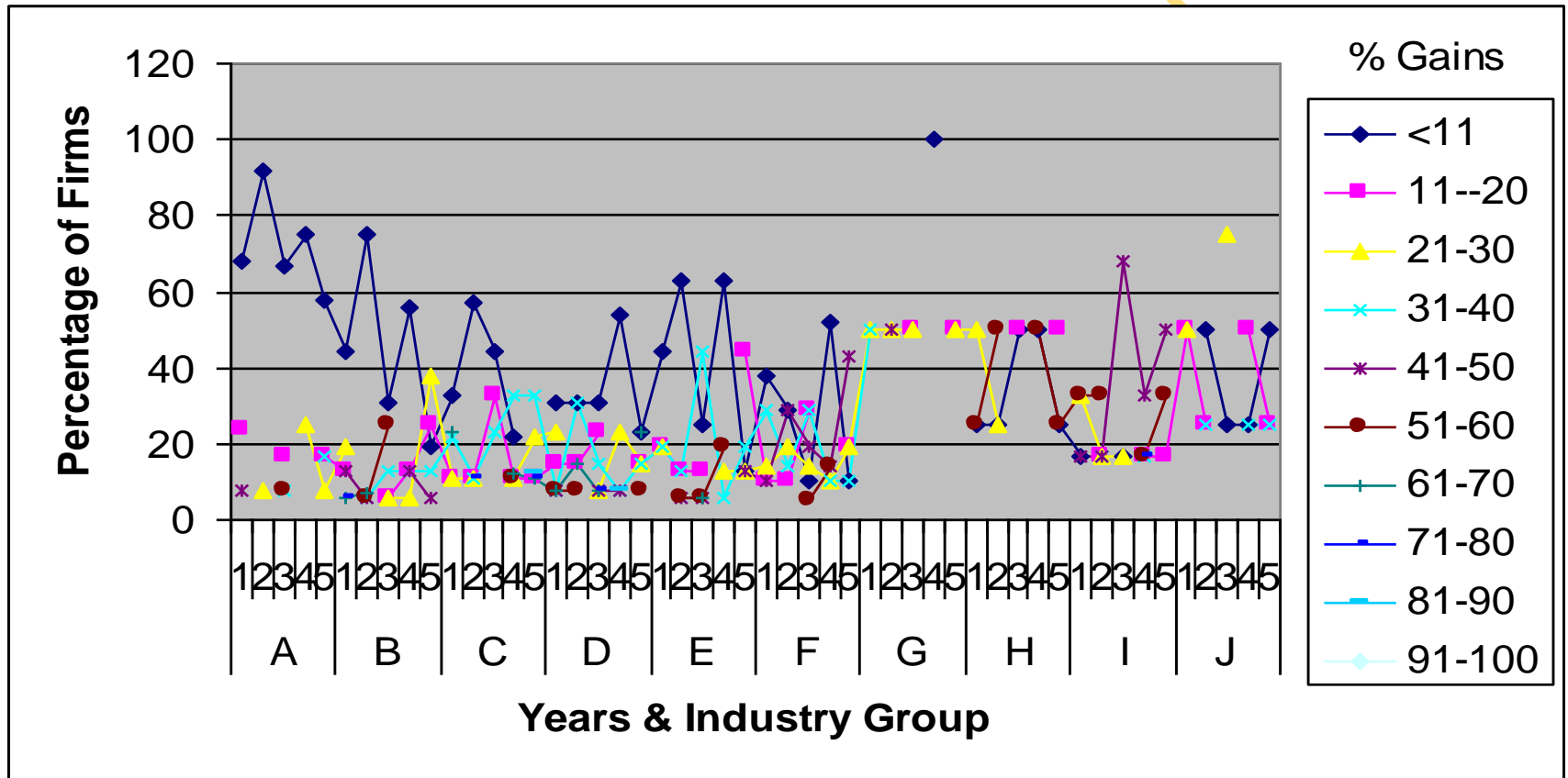


Fig. 5.8: Pattern of Waste Treatment Economies among Industry Groups

Industry Group Legend

- A = Food Beverages and Tobacco Industry Group
- B = Chemical and Pharmaceutical Industry Group
- C = Domestic and Industrial Plastic Rubber Industry Group
- D = Basic Metal Iron and Steel Fabricated Metals Industry Group
- E = Pulp, Paper and Paper Products Printing and Publishing Industry Group
- F = Textile, Wearing Apparel and Leather Products
- G = Wood and Wood Products Including Furniture Industry Group
- H = Non-Metallic Mineral Products Industry Group
- I = Motor Vehicle and Miscellaneous Industry Group
- J = Electrical/ Electronic

Legend for Years

1 = 2005; 2 = 2006; 3 = 2007; 4 = 2008; 5 = 2009.

5.3.2.36 Security Economies among Industry Groups for year 2005

Fig. 5.9 shows the percentage gains in security by each industry group for year 2005. Out of the 100% firms in food beverages and tobacco industry group, 83% realised <11% gains, whereas 50% firms in chemical and pharmaceutical industry group realised <11% gains. Also, 22% firms in domestic and industrial plastic realised <11% gains, while 31% firms in basic metal realised <11% gains. 33% firms in domestic and industrial plastic gained between 31 and 40%, while 8% firms in basic metal industry group gained between 31 and 40%. Furthermore, 38% firms in pulp and paper products realised <11% gains, while 62% firms in textile and leather product realised <11% gains. 56% firms in pulp and paper products realised between 11 and 20% gains, only 10% firms in textile and leather product group gained between 11 and 20%. Another 50% firms each in wood and wood products; non-metallic industry group gained between 11 and 20%. Also, 83% firms in motor vehicle and miscellaneous industry group realised between 11 and 20% gains, while 25% firms in electrical/electronic group gained between 11 and 20%. 17% firms in motor vehicle and miscellaneous group realised <11% gains while 75% firms in electrical/electronic realised <11% gains.

5.3.2.37 Security Economies among Industry Groups for Year 2006

Fig. 5.9 shows the percentage gains in Security by each industry group for year 2006. Out of 100% firms in food beverage and tobacco industry group, 50% firms realised between 11 and 20% gains, while 13% firms in chemical and pharmaceuticals realised 11 and 20% gains. 17% firms in food beverage and tobacco industry group gained between 51 and 60%, while 6% firms in chemical and pharmaceuticals gained between 51 and 60%. Also, 22% firms in domestic and industrial plastic group gained between 41 and 50% whereas 54% firms in basic metal gained between 41 and 50%. 22% firms in domestic and industrial plastic realised between 31 and 40% gains, while 8% firms in basic metal industry group realised between 31 and 40% gains. Furthermore, 63% firms in pulp and paper products realised 41% gains, while 62% firms in textile and leather products realised <11% gains, 13% firms in pulp and paper products realised between 51 and 60% gains, while 5% firms realised between 51 and 60% gains. Another 50% firms in wood and wood products group realised between 21 and 30% gains, while 25% firms gained between 21 and 30% in the non-metallic group. Also 50% firms in motor vehicle and miscellaneous industry group gained <11%, whereas 75% firms in electrical /electronic group gained <11%.

5.3.2.38 Security Economies among Industry Groups for Year 2007

Fig. 5.9 shows the percentage gains in Security by each industry group for year 2007. Out of 100% firms in food beverage and tobacco industry group, 58% realised <11% gains, whereas 44% firms in chemical and pharmaceuticals realised <11% gains. 25% firms in chemical and pharmaceuticals group realised between 31 and 40% gains, while none of the firms in food beverage and tobacco industry group realised between 31 and 40% gains. Also, 44% firms in Domestic and industrial plastic realised <11% gains, while 54% firms in basic metal group realised <11% gains. 12% firms in domestic and industrial plastic realised between 71 and 80% gains, whereas 8% firms in basic metal realised between 71 and 80% gains. Also, 44% firms in pulp and paper products group realised between 31 and 40% gains, while 5% firms in textile and leather products group realised between 31 and 40% gains. 44% firms in pulp and paper products group realised <11% gains, while 62% firms in textile and leather products group realised <11% gains. Furthermore, 75% in non-metallic industry group realised between 21 and 30% gains, while none in the wood and wood products realised between 21 and 30% gains. Another 33% firms in Motor vehicle and miscellaneous industry group realised between 21 and

30% gains, while 25% firms in electrical/electronic industry group realised between 21 and 30%.

5.3.2.39 Security Economies among Industry Groups for Year 2008

Fig. 5.9 shows the percentage gains in Security by each industry group for year 2008. Out of 100% firms in food beverage and tobacco industry group, 83% realised <11% gains, whereas 56% firms in chemical and pharmaceuticals realised <11% gains. Also 56% firms in domestic and industrial plastic gained <11%, while 46% firms in basic metal gained <11%. 11% firms in domestic and industrial plastics gained between 41 and 50%, whereas 8% firms in Basic metal group gained between 41 and 50%. 44% firms in pulp and paper products group gained <11%, while 57% firms in textile and leather products group gained <11%. 13% firms in pulp and paper product realised between 31 and 40% gain, while 14% in textile and leather product gained between 31 and 40%. Moreover, 50% firms in wood and wood products group realised between 11 and 20% gains, whereas 25% firms in non-metallic industry group realised between 11 and 20% gain. Also, 75% firms electrical/electronic gained <11%, whereas 17% firms gained <11% in Motor vehicle and miscellaneous industry group. 17% firms in motor vehicle and miscellaneous industry group realised between 61 and 70% gains, whereas none of the firms in electrical/electronic industry group realised between 61 and 70% gains.

5.3.2.40 Security Economies among Industry Groups for Year 2009

Fig. 5.9 shows the percentage gains in Security by each industry group for year 2009. Out of 100% firms in food beverage and tobacco industry group, 58% firms gained <11%, whereas 50% firms in chemical and pharmaceuticals realised <11% gains. 13% firms in chemical and pharmaceuticals group realised between 61 and 70% gains, while there was none in the food beverage and tobacco industry group that realised between 61 and 70% gains. Also 67% firms in domestic and industrial plastic group realised <11% gains, 46% firms in basic metal group realised <11% gains. 23% firms in basic metal industry group realised between 41 and 50%, whereas none of the firms in domestic and industrial plastic realised between 41 and 50% gains. Furthermore, 38% firms in pulp and paper products group gained <11%, whereas 43% firms in textile and leather products group realised <11%, gains. 44% firms in pulp and paper products group gained between 31 and 40%, whereas 19% firms in textile and leather products realised 31 and 40%, gains. Another, 50% firms in wood and wood products group realised between 21

and 30% gains, while 25% firms in non-metallic industry group realised between 21 and 30% gains. Also, 17% firms in Motor vehicle and miscellaneous industry group realised between 31 and 40% gains, whereas 50% firms in electrical/electronic group realised same. 33% firms in Motor vehicle and miscellaneous group gained between 51 and 60%, while 50% firms in electrical/electronic industry group realised between 51 and 60%.

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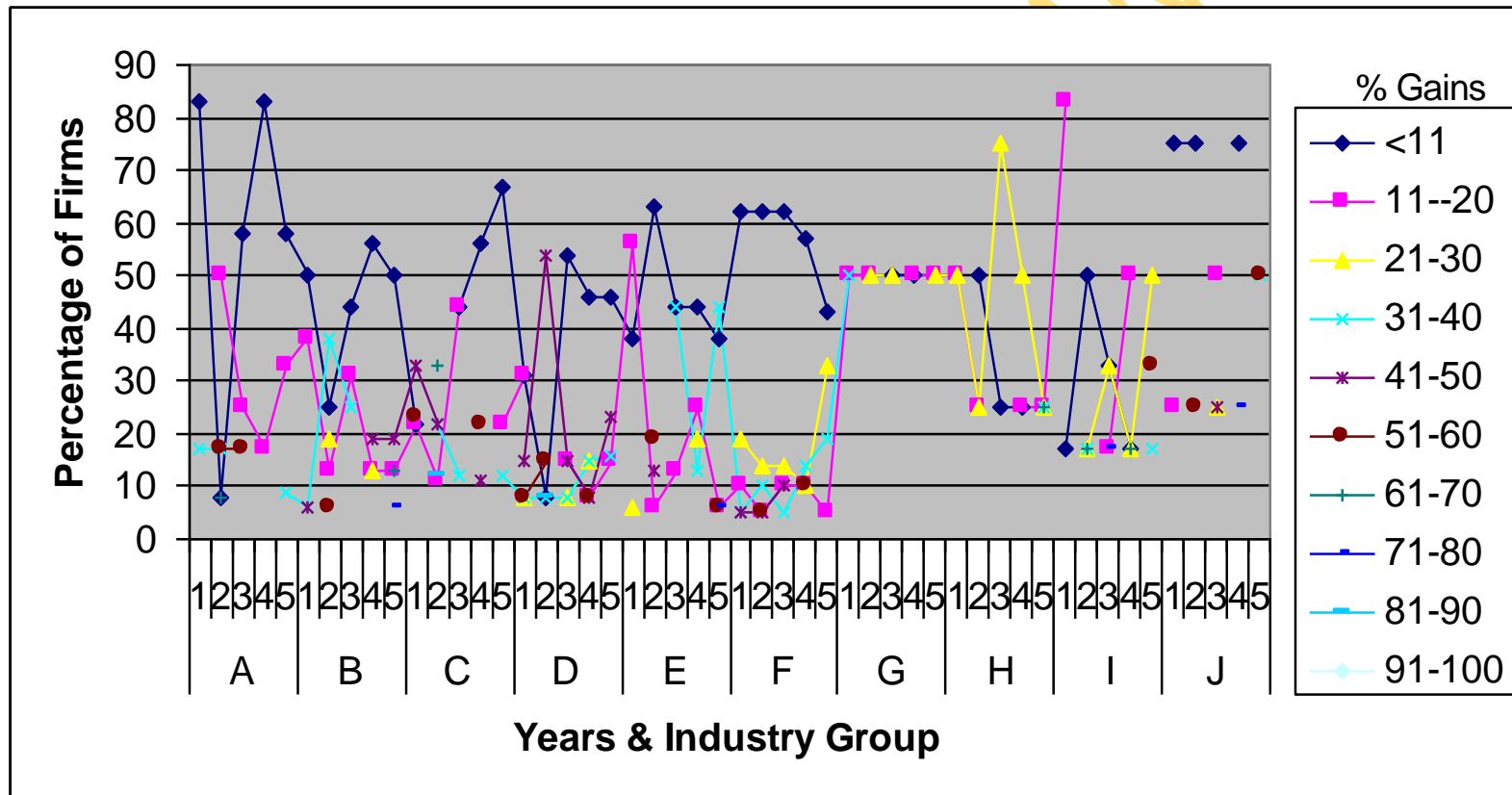


Fig. 5.9 Pattern of Security Economies among Industry Groups

Industry Group Legend

- A = Food Beverages and Tobacco Industry Group
- B = Chemical and Pharmaceutical Industry Group
- C = Domestic and Industrial Plastic Rubber Industry Group
- D = Basic Metal Iron and Steel Fabricated Metals Industry Group
- E = Pulp, Paper and Paper Products Printing and Publishing Industry Group
- F = Textile, Wearing Apparel and Leather Products
- G = Wood and Wood Products Including Furniture Industry Group
- H = Non-Metallic Mineral Products Industry Group
- I = Motor Vehicle and Miscellaneous Industry Group
- J = Electrical/ Electronic

Legend for Years

1 = 2005; 2 = 2006; 3 = 2007; 4 = 2008; 5 = 2009.

5.3.2.41 Telecommunication Economies among Industry Groups for Year 2005

Fig. 5.10 shows the percentage gains in Telecommunication by each industry group for year 2005. Out of 100% firms in food beverage and tobacco industry group, 75% realised <11% gains, whereas 75% firms also realised <11% gains in chemical and pharmaceuticals Industry group. 8% firms in food beverage and tobacco industry group realised between 21 and 30% gains, whereas 6% firms in chemical and pharmaceuticals group realised between 21 and 30% gains. Another 67% firms in domestic and industrial plastic realised between 21 and 30% gains, whereas 39% firms in basic metal gained between 21 and 30%. 33% firms in domestic and industrial plastic realised <11% gains, 54% firms in basic metal realised <11% gains. Also, 82% firms in pulp and paper products realised <11% gains, while 71% firms in textile and leather products gained <11%. 6% firms in pulp and paper products gained between 51 and 60%, while there was none between 51 and 60% in textile and leather products group. Furthermore, 50% firms in wood and wood products group realised <11% gains, while 75% firms in non-metallic industry group realised <11% gains. 50% firms in wood and wood products realised between 21 and 30% gains, whereas 25% firms in non-metallic group gained between 21 and 30%. Moreover, 50% firms in Motor vehicle and miscellaneous industry group gained <11%, while 75% firms in electrical/electronic gained <11%.

5.3.2.42 Telecommunication Economies among Industry Groups for Year 2006

Fig. 5.10 shows the percentage gains in Telecommunication by each industry group for year 2006. 100% firms in food beverage and tobacco group realised <11% gains, whereas 94% firms in chemical and pharmaceuticals realised <11% gains. Also, 89% firms in domestic and industrial plastic gained <11%, while 77% firms in basic metal gained <11%. <11% firms in domestic and industrial plastic realised between 21 and 30% gains, while none of the firms in basic metal gained between 21 and 30%. Another 60% firms in pulp and paper products group realised <11% gains, whereas 76% firms in textile and leather product gained <11%. 19% firms in textile and leather products gained between 21 and 30%, while there was none in pulp and paper product that realised between 21 and 30% gains. Furthermore, 50% firms each in wood and wood products; non-metallic group realised <11% gains. 50% firms in wood and wood products gained between 31 and 40%, whereas there was none in the non-metallic group that gained between 31 and 40%. Moreover, 33% firms in Motor vehicle and miscellaneous industry group realised <11% gains, while 78% firms in electrical/electronic group realised <11% gains. 67% firms in Motor vehicle and miscellaneous industry group realised between 21 and 30% gains, while none of the firms in electrical/electronic realised between 21 and 30% gains.

5.3.2.43 Telecommunication Economies among Industry Groups for Year 2007

Fig. 5.10 shows the percentage gains in Telecommunication by each industry group for year 2007. Out of 100% firms in food beverage and tobacco industry group, 92% firms realised <11% gains, While 81% firms in chemical and pharmaceuticals gains <11%. 11% firms gained between 21 and 30% in chemical and pharmaceuticals Industry group, whereas none in the food beverage and tobacco realised between 21 and 30% gain. Also, 90% firms in Domestic and industrial plastic realised <11% gains, whereas 78% firms in basic metal gained <11%. 6% firms in basic metal gained 31 and 40%, whereas none of the firms in domestic and industrial plastic realised 31 and 40% gains. Another 85% firms in pulp and paper products realised <11% gains, while 64% firms in textile and leather products gained <11%. 4% firms in pulp and paper product gained between 21 and 30%, whereas 8% firms in textile and leather product gained between 21 and 30%. Furthermore, 60% firms in wood and wood products industry group realised <11% gains, while 100% firms in non-metallic industry group realised <11% gains. Moreover, 87%

firms in Motor vehicle and miscellaneous industry group gained <11%, whereas 100% firms in electrical/electronic industry realised <11% gains.

5.3.2.44 Telecommunication Economies among Industry Groups for Year 2008

Fig. 5.10 shows the percentage gains in Telecommunication by each industry group for year 2008. Out of 100% firms in food beverage and tobacco industry group, 93% firms realised <11% gains, whereas 70% firms in chemical and pharmaceuticals industry group gained <11%. Another 89% firms in domestic and industrial plastics realised <11% gains, whereas 95% firms in basic metal group realised <11% gains. Also, 98% firms in pulp and paper products realised <11% gains, while 100% firms in textile industry group gained <11%. Furthermore, 100% firms in wood and wood products group realised <11% gains, while 100% firms in non-metallic industry group realised <11% gains. Another 100% firms in Motor vehicle and miscellaneous industry group gained <11%, whereas 100% firms in electrical/electronic also realised <11% gains.

5.3.2.45 Telecommunication Economies among Industry Groups for Year 2009

Fig. 5.10 shows the percentage gains in Telecommunication by each industry group for year 2009. Out of 100% firms in food beverage and tobacco industry group, 99% firms realised <11% gains, whereas 89% firms in chemical and pharmaceuticals industry group gained <11%. Also 89% firms in domestic and industrial plastic group realised <11% gains, whereas 96% firms in basic metal realised <11% gains. Another 97% firms in pulp and paper products industry group realised <11% gains, whereas 95% firms in textile and leather products group realised <11% gains. Furthermore, 79% firms in wood and wood products group realised <11% gains, whereas 86% firms in non-metallic industry group realised <11% gains. <11% firms in wood and wood products group gained between 11 and 20%, while 14% firms in non-metallic industry group gained between 11 and 20%. Also, 92% firms in motor vehicle and miscellaneous industry group realised <11% gains, while 96% firms in electrical/electronic industry realised <11% gains. 8% firms motor vehicle and miscellaneous industry group realised between 11 and 20% gains, while 4% firms in electrical/electronic industry group realised 11 and 20% gains.

Industry Group Legend

- A = Food Beverages and Tobacco Industry Group
- B = Chemical and Pharmaceutical Industry Group
- C = Domestic and Industrial Plastic Rubber Industry Group
- D = Basic Metal Iron and Steel Fabricated Metals Industry Group
- E = Pulp, Paper and Paper Products Printing and Publishing Industry Group
- F = Textile, Wearing Apparel and Leather Products
- G = Wood and Wood Products Including Furniture Industry Group
- H = Non-Metallic Mineral Products Industry Group
- I = Motor Vehicle and Miscellaneous Industry Group
- J = Electrical/ Electronic

Legend for Years

1 = 2005; 2 = 2006; 3 = 2007; 4 = 2008; 5 = 2009.

5.3.2.46 Ports and Shipping Economies among Industry Groups for Year 2005

Fig. 5.11 shows the percentage gains in Ports and Shipping by each industry group for year 2005. Out of 100% firms in food beverage and tobacco, 17% realised <11% gains, whereas 25% firms in chemical and pharmaceuticals realised <11% gains. 50% firms in food beverage and tobacco gained between 11 and 20%, while 38% firms in chemical and pharmaceuticals gained between 11 and 20%. Also, 56% firms in domestic and industrial plastic gained <11%, whereas 77% firms in basic metal realised <11% gains. 12% firms in domestic and industrial plastic gained between 31 and 40%. Another 75% firms in pulp and paper products gained <11%, whereas 27% firms in textile and leather products gained <11%. 6% firms in pulp and paper products group gained between 51 and 60%, whereas none of the firms in textile and leather products realised between 51 and 60% gains. Furthermore, 100% firms in non-metallic industry group realised <11% gains, while 50% firms in wood and wood products realised <11% gains. Moreover, 50% firms in Motor vehicle and miscellaneous industry group realised between 21 and 30% gains, whereas 25% firms in electrical/electronic industry group gained between 21 and 30%. 17% firms in motor vehicle and miscellaneous industry group realised between 31 and 40%, while 25% firms in electrical/electronic gained between 31 and 40%.

5.3.2.47 Ports and Shipping Economies among Industry Groups for Year 2006

Fig.5.11 shows the percentage gains in Ports and Shipping by each industry group for year 2006. Out of 100% firms in food beverage and tobacco industry, 42% firms realised between 11 and 20% gains, while 13% firms in chemical and pharmaceuticals gained between 11 and 20%. 8% firms in food beverage and tobacco industry group realised between 51 and 60% gains, whereas 9% firms in chemical and pharmaceuticals group realised between 51 and 60% gains. Another 57% firms in domestic and industrial plastic realised <11% gains, while 77% firms in basic metal industry group gained <11%. 11% firms gained between 61 and 70% while there was none in the basic metal that gained between 61 and 70%. Also, 69% firms in pulp and paper product industry group gained <11%, whereas 48% firms in textile and leather product gained <11%. 13% firms in the pulp and paper product gained between 51 and 60%, whereas none of the firms in textile and leather product gained between 51 and 60%. Furthermore, 100 firms in the wood and wood products gained between 41 and 50%, while 25% firms in non-metallic group gained between 41 and 50%. Also, 33% firms in motor vehicle and miscellaneous industry group gained between 41 and 50%, whereas 25% firms in electrical/electronic gained between 41 and 50%. 33% firms in Motor vehicle and miscellaneous industry group gained between 61 and 70%, whereas none of the firms in electrical/electronic gained between 61 and 70%.

5.3.2.48 Ports and Shipping Economies among Industry Groups for Year 2007

Fig.5.11 shows the percentage gains in Ports and Shipping by each industry group for year 2007. Out of 42% firms in food beverage and tobacco industry group, 42% firms realised <11% gains, while 6% firms in chemical and pharmaceuticals realised <11% gains. 13% firms in chemical and pharmaceutical realised between 51 and 60% gains, whereas none of the firms in food beverage and tobacco industry group realised any gain between 51 and 60%. Also, 57% firms in domestic and industrial plastic group gained <11%, while 46% firms in basic metal industry group gained <11%. 11% firms in domestic and industrial plastic group gained between 51 and 60%, whereas none of the firms in basic metal realised between 51 and 60% gains. Another 44% firms in pulp and paper products industry group gained between 11 and 20%, while 29% firms in textile and leather products gained between 51 and 60%. 6% firms in pulp and paper products gained between 31 and 40%, while 5% firms in textile and leather products gained between 31 and 40%. Furthermore, 50% firms in wood and wood products gained between 11 and

20%, whereas 100% firms in non-metallic industry group realised between 11 and 20% gains. Also 50% firms each in Motor vehicle and miscellaneous industry group realised <11% gains. 33% firms in Motor vehicle and miscellaneous industry group realised between 41 and 50% gains, whereas none of the firms in electrical/electronic industry group gains between 41 and 50%.

5.3.2.49 Ports and Shipping Economies among Industry Groups for Year 2008

Fig.5.11 shows the percentage gains in Ports and Shipping by each industry group for year 2008. Out of 100% firms in food beverage and tobacco industry group, 50% firms realised <11%, while 44% firms in chemical and pharmaceutical gained <11%. 6% firms in chemical and pharmaceuticals gained between 41 and 50%, whereas none of the firms in food beverage and tobacco industry group realised between 41 and 50%. Also, 33 firms in domestic and industrial plastic group gained <11% while 77% firms in basic metal gained <11%. 8% firms in basic metal gained between 51 and 60%, whereas none of the firms in domestic and industrial plastic realised any gain between 51 and 60%. Another 31% firms in pulp and paper products industry group gained <11%, whereas 76% firms in textile and leather products gained <11%. 31% firms in pulp and paper products realised between 51 and 60% gains, whereas 14% firms in textile and leather products gained between 51 and 60%. Also, 85% firms in wood and wood products gained between 31 and 40%, whereas 50% firms in non-metallic gained between 31 and 40%. Moreover, 50% in Motor vehicle and miscellaneous industry group gained between 31 and 40%, whereas none of the firms in electrical/electronic Industry group realised between 31 and 40%. 17% firms in Motor vehicle and miscellaneous industry group realised <11% gains, whereas 50 firms in electrical/electronic firms realised <11% gains.

5.3.2.50 Ports and Shipping Economies among Industry Groups for Year 2009

Fig. 5.11 shows the percentage gains in Ports and Shipping by each industry group for year 2009. Out of 100% firms in food beverage and tobacco industry, 50% firms gained between 11 and 20% , while 13% firms in chemical and pharmaceuticals gained between 11 and 20%. 42% firms in food beverage and tobacco industry group gained <11%, while 50% firms in chemical and pharmaceutical group gained <11%. Also, 33% firms in domestic and industrial plastic gained between 31 and 40%, while 8% in basic metal gained between 31 and 40%. 11% firms in domestic and industrial plastic gained between 51 and 60%, whereas none of the firms in basic metal realised between 51 and 60% gains. Furthermore, 44% firms in pulp and paper products gained <11%, while 33%

firms in textile and leather products gained <11%. 6% firms in pulp and paper products gained between 31 and 40%, while 10% in textile and leather products gained between 31 and 40%. Moreover 50% in wood and wood products gained between 41 and 50%, whereas none of the firms in non-metallic industry group realised any gain between 41 and 50%. Also, 17% firms in motor vehicle and miscellaneous industry group realised between 31 and 40%, while 25% firms in electrical/electronic industry group gained between 31 and 40%. 50% firms in Motor vehicle and miscellaneous industry group realised between 51 and 60%, while none of the firms in electrical/electronic grouped realised any gain between 51 and 60%.

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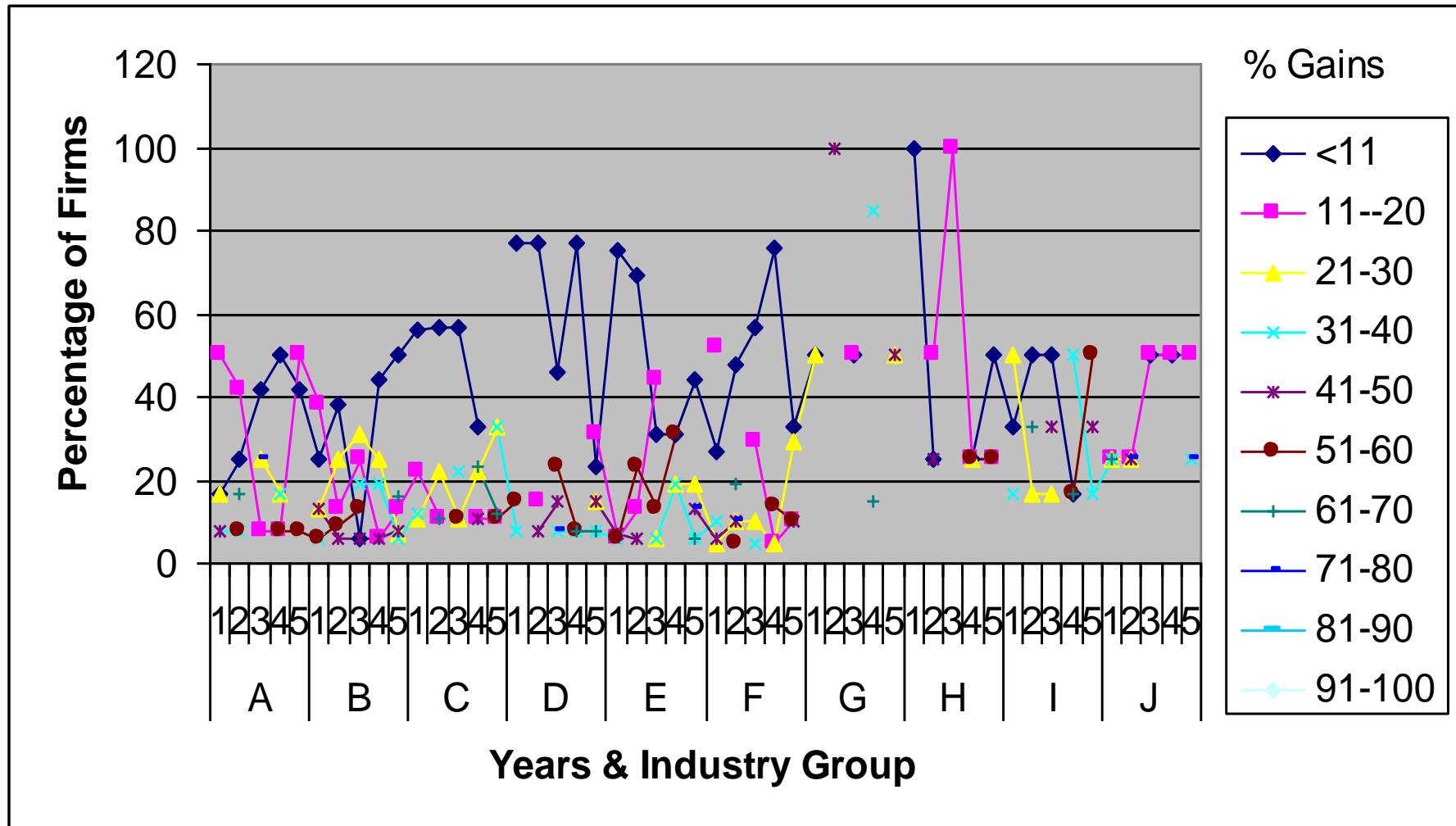


Fig. 5.11: Pattern of Ports and Shipping Economies among Industry Groups

Industry Group Legend

- A = Food Beverages and Tobacco Industry Group
- B = Chemical and Pharmaceutical Industry Group
- C = Domestic and Industrial Plastic Rubber Industry Group
- D = Basic Metal Iron and Steel Fabricated Metals Industry Group
- E = Pulp, Paper and Paper Products Printing and Publishing Industry Group
- F = Textile, Wearing Apparel and Leather Products
- G = Wood and Wood Products Including Furniture Industry Group
- H = Non-Metallic Mineral Products Industry Group
- I = Motor Vehicle and Miscellaneous Industry Group
- J = Electrical/ Electronic

Legend for Years

1 = 2005; 2 = 2006; 3 = 2007; 4 = 2008; 5 = 2009.

5.3.2.51 Access to Financial Institution Economies among Industry Groups for Year 2005

Fig. 5.12 shows the percentage gains in access to financial institution by each industry group for year 2005. Out of 100% firms in food beverage and tobacco industry group, 17% firms gained between 41 and 50%, whereas 44% firms in chemical and pharmaceuticals industry group gained between 41 and 50%. 17% firms in food beverage and tobacco industry group realised between 61 and 70% gains, whereas 13% firms in chemical and pharmaceuticals gained between 61 and 70%. Also, 40% firms in domestic and industrial plastic gained between 21 and 30%, whereas none of the firms in basic metal realised between 21 and 30%. 38% firms in domestic and industrial plastics realised between 51 and 60% gains, while 31% firms in basic metal realised between 51 and 60%. Another 31% firms in pulp and paper products realised between 51 and 60%, whereas 24% firms in textile and leather products realised between 51 and 60%. 13% firms in pulp and paper products realised between 81 and 90% gains, while 10% firms in textile and leather products gained between 81 and 90%. Also, 100% firms in wood and wood products realised between 61 and 70% gains, while 25% firms in non-metallic industry group gained between 61 and 70%. Moreover, 33% firms in motor vehicle and miscellaneous industry group gained between 61 and 70%, whereas 50% firms in electrical/electronic gained between 61 and 70%. 17% firms motor vehicle and

miscellaneous industry group gained between 71 and 80%, whereas 25% firms in electrical/electronic gained between 71 and 80%

5.3.2.51 Access to Financial Institution Economies among Industry Groups for Year 2006

Fig. 5.12 shows the percentage gains in Access to Financial Institution by each industry group for year 2006. Out of 100% firms in food beverage and tobacco industry group, 42% firms realised between 71 and 80% gains, while 44% firms realised between 71 and 80% gains. 25% firms in food beverage and tobacco gained between 51 and 60%, while 31% firms in chemical and pharmaceuticals gained between 51 and 60%. Also, 33% firms in domestic and industrial plastic gained between 51 and 60%, whereas 31% in basic metal gained between 51 and 60%. 22% firms in domestic and industrial plastics realised between 71 and 80%, whereas 31% firms in basic metal gained between 71 and 80%. Also, 19% firms in pulp and paper products group gained between 41 and 50%, whereas 25% firms in textile and leather products group gained between 71 and 80%. 13% firms in textile and leather products group realised between 71 and 80% gains, while 27% in pulp and paper product gained between 81 and 90%. Furthermore, 100% firms in wood and wood products gained between 71 and 80%, while 75% firms in non-metallic group gained between 71 and 80%. Another 33% firms in motor vehicle and miscellaneous industry group gained between 61 and 70% whereas 75% firms in electrical/electronic gained between 61 and 70%. 50% firms in motor vehicle and miscellaneous industry group gained between 51 and 60%, whereas 25% firms in electrical/electronic gained between 51 and 60%.

5.3.2.52 Access to Financial Institution Economies among Industry Groups for Year 2007

Fig. 5.12 shows the percentage gains in Access to Financial Institution by each industry group for year 2007. Out of 100% firms in food beverage and tobacco industry group, 42% firms realised between 41 and 50% gains, whereas 13% in chemical and pharmaceuticals realised between 41 and 50%. 8% firms in food beverage and tobacco industry group realised <11% gains, while six percent firms in chemical and pharmaceutical gained <11%. Another 57% firms in Domestic and industrial plastic rubber gained between 71 and 80%, whereas 23% in basic metal gained between 71 and 80%. 11% firms in Domestic and industrial plastics realised between 91 and 100% gains,

whereas none of the firms in basic metal realised any gain between 91 and 100%. Also, 31% firms in pulp and paper industry group gained between 91 and 100% , while none of the firms in textile and leather product industry group gained between 91 and 100%. 7% firms in pulp and paper industry group realised between 11 and 20% gains, whereas 14% firms in textile and leather products realised between 11 and 20%. Also, 50% firms in wood and wood product gained between 41 and 50%, while 25% firms in none- metallic gained between 41 and 50%. Moreover, 100% firms in motor vehicle and miscellaneous industry group gained between 61 and 70%, whereas 25% firms in electrical/ electronic gained between 61 and 70%.

5.3.2.53 Access to Financial Institution Economies among Industry Groups for Year 2008

Fig 5.12 shows the percentage gains in access to financial institution by each industry group for year 2008. Out of the 100% firms in food beverage and tobacco industry group 25% realised between 41 and 50% gains, whereas 62% firms gained between 41 and 50 %. 33% firms in food beverages and tobacco industry group gained between 71 and 80%, while none of the firms in chemical and pharmaceutical realised gains between 71 and 80%. Also, 22% firms in domestic and industrial plastic group realised between 41 and 50%, while 23% firms in basic metal realised between 41 and 50%. 24% firms in basic metal realised between 71 and 80% gains, whereas no one of the firms in the domestic and industrial plastic realised gains between 71 and 80%. Another 63% firms in pulp and paper products gains between 61 and 70%, only five percent firms in textile and leather product gained between 61 and 70%. 6% firms in pulp and paper product industry group realised <11% gains while five percent firms in textile and leather product gained <11%. Furthermore, 50% firms in wood and wood products group gained between 61 and 70%, while 75% firms in non-metallic industry group realised between 61 and 70% gains. Moreover, 17% firms in motor vehicle and miscellaneous industry group gained between 61 and 70%, while 75% firms in electrical/electronic industry group realised between 61 and 70% gains. 33% firms in motor vehicle and miscellaneous group realised between 81 and 90%, whereas 25% firms in electrical/ electronic gained between 81 and 90%.

5.3.2.54 Access to Financial Institution Economies Among Industry Groups for Year 2009

Fig. 5.12 shows the percentage gains in access to financial institution by each industry group for year 2009. Out of the 100% firms in food beverage and tobacco industry group, 42% firms realised between 21 and 30% gains, whereas 13% firms in chemical and pharmaceutical gained between 21 and 30%. 56% firms in chemical and pharmaceutical realised between 41 and 50% gains, while none of the firms in food beverage and tobacco industry group realised between 41 and 50% gains. Also, 45% firms in domestic and industrial plastic group realised between 51 and 60% gains, while none of the firms in basic metal realised between 51 and 60% gains. 44% firms in domestic and industrial plastic gained between 71 and 80%, whereas 39% firms in basic metal realised between 71 and 80%. Furthermore, 48% firms in pulp and paper product gained between 71 and 80%, while 25% firms in textile and leather product realised between 71 and 80% gains. 10% firms in pulp and paper product realised between 91 and 100% gains, while 15% firms in textile and leather product gained between 91 and 100%. Moreover, 100% firms in wood and wood product realised between 61 and 70% gains, while 50% in non-metallic group gained between 61 and 70%. Also, 14% firms in motor vehicle and miscellaneous industry group gained between 11 and 20%, while 25% firms in electrical/electronic industry group gained between 11 and 20%. 50% firm in electrical/electronic industry group gained between 51 and 60%, whereas none of the firms in motor vehicle and miscellaneous industry group gained between 51 and 60%. On the whole, the wood and wood products industry group benefitted the most; in 2005 (31.8%); 2006 (22.8%); 2007 (42.7%); 2008 (38.5%); and 2009 (61.4%) compared to the chemical and pharmaceutical industry group which benefitted the least: 5.2% in 2005; 8.6% in 2006; 7.9 in 2007; 9.5% in 2008; 15.6% in 2009.

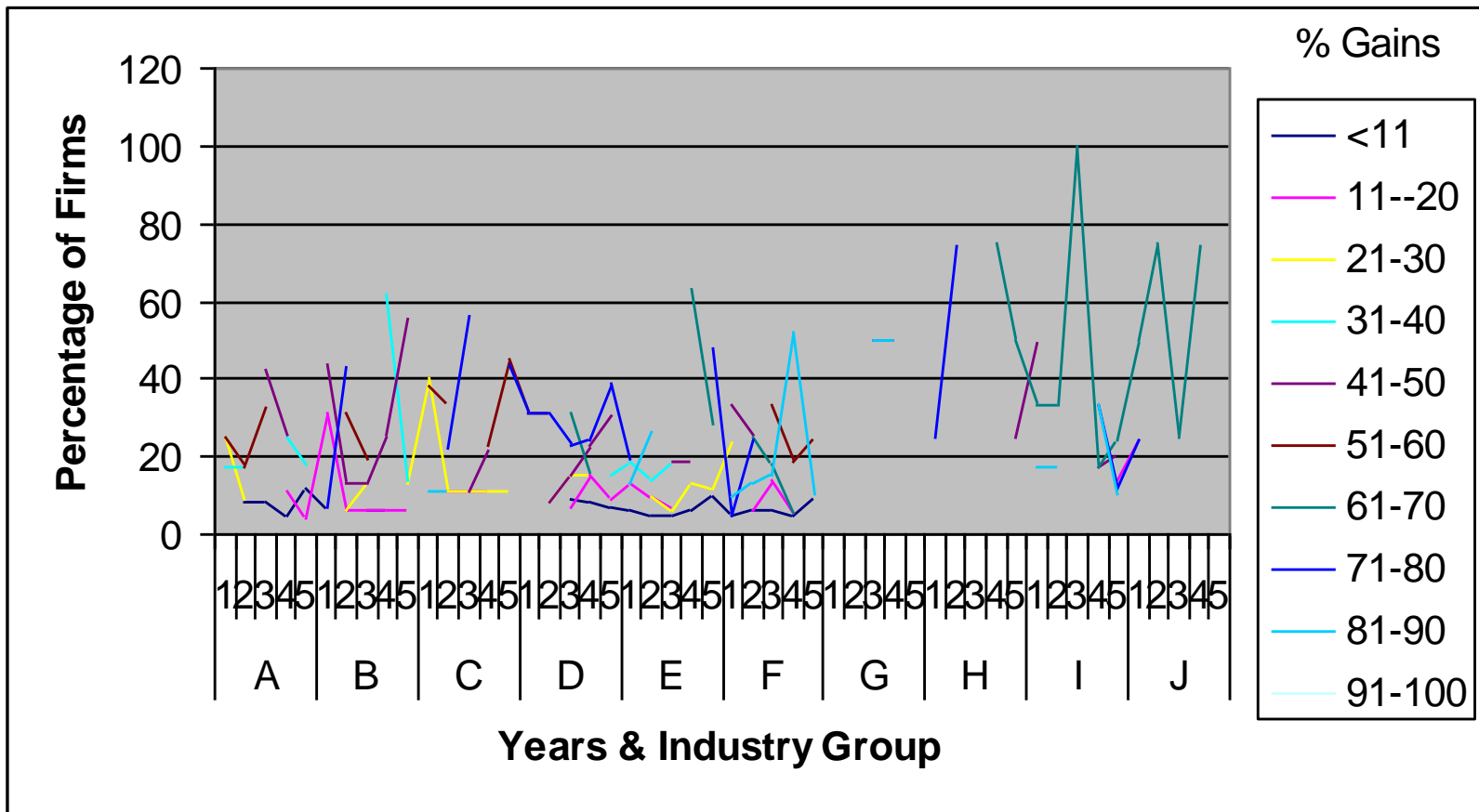


Fig. 5.12 : Access to Financial Institution Economies among Industry Groups

Industry Group Legend

- A = Food Beverages and Tobacco Industry Group
- B = Chemical and Pharmaceutical Industry Group
- C = Domestic and Industrial Plastic Rubber Industry Group
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Legend for Years

1 = 2005; 2 = 2006; 3 = 2007; 4 = 2008; 5 = 2009.

5.3.3 Temporal Trends in Agglomeration Benefits (2005-2009 Combined)

As Fig. 5.13 Shows the temporal trend in agglomeration benefits between 2005-2009, and there has been significant variation in agglomeration benefits enjoyed by firms. As a result of Joint transportation ,60(11.7%) firms enjoyed 41-50% savings, while 44(8.5%) firms enjoyed between 51and60% savings, 9(1.7%) firms enjoyed between 81-90% savings, Due to joint power supply, 53(12.6%) firms indicated 41and50% savings, 36 (7.8%) firms saved between 51and 60%, while 4(0.97%) firms indicated 81-90% savings. Also, 66(14.2%) firms indicated 41-50% savings, another 62(10.5%) firms saved between51and60% as a result of Joint raw material Purchase/supply. However, 73(14.6%) firms indicated between 41and 50% savings, due to Collaboration in Research and development, 21(4.2%) firms, saved between 61and 70%, while 12 (2.4%) firms indicated 71and 80% savings. As a result of Joint Labour 56(11.7%) firms saved between 41and50%, 39(7.8%) firms realized between 51-60% savings, another 21(4.2%) firms saved between 71and 80%. Due to joint water supply, seven (1.4%) firms saved between 51-60%, only one (0.2%) firms each saved between 71and 80%. As a result of Joint waste treatment, 49(9.8%) firms indicated 41-50% savings , another 34(6.8%) firms saved between 51and 60%, while 14(2.8%%) saved between 61and 70%. Due to Joint Security, 32(6.4%) firms indicated 41and 50% savings, while 25(5%) firms indicated 51and 60%

savings. As a result Joint Telecommunication, six (1.2%) firms saved between 41 and 50%, only one (0.2%) firms each saved between 51-60% and 61-70% savings respectively.

Also, due to Joint Ports and Shipping, 34 (6.8%) firms indicated 41-50% savings, 38 (7.6%) firms saved between 51 and 60%, while 21 (4.23%) firms saved between 61-70%, and another 11 (2.2%) firms saved between 71 and 80%. As a result of Access to financial institution, 102 (20.4%) firms indicated 41 and 50% savings, 48 (9.6%) firms saved between 51 and 60%, 22 (4.4%) firms saved between 81 and 90%, and another eight (1.6%) firms saved between 91 and 100. From the foregoing, the analysis has revealed significant variation in temporal trend in agglomeration economies, it is apparent that the firms enjoyed tremendous savings as a result of Joint Raw Materials Purchase/ Supply, Collaboration in R & D and Access to financial institution more than the other benefits arising from their co-location. This is because responses from the firms indicated greater savings from 41 and 100%.

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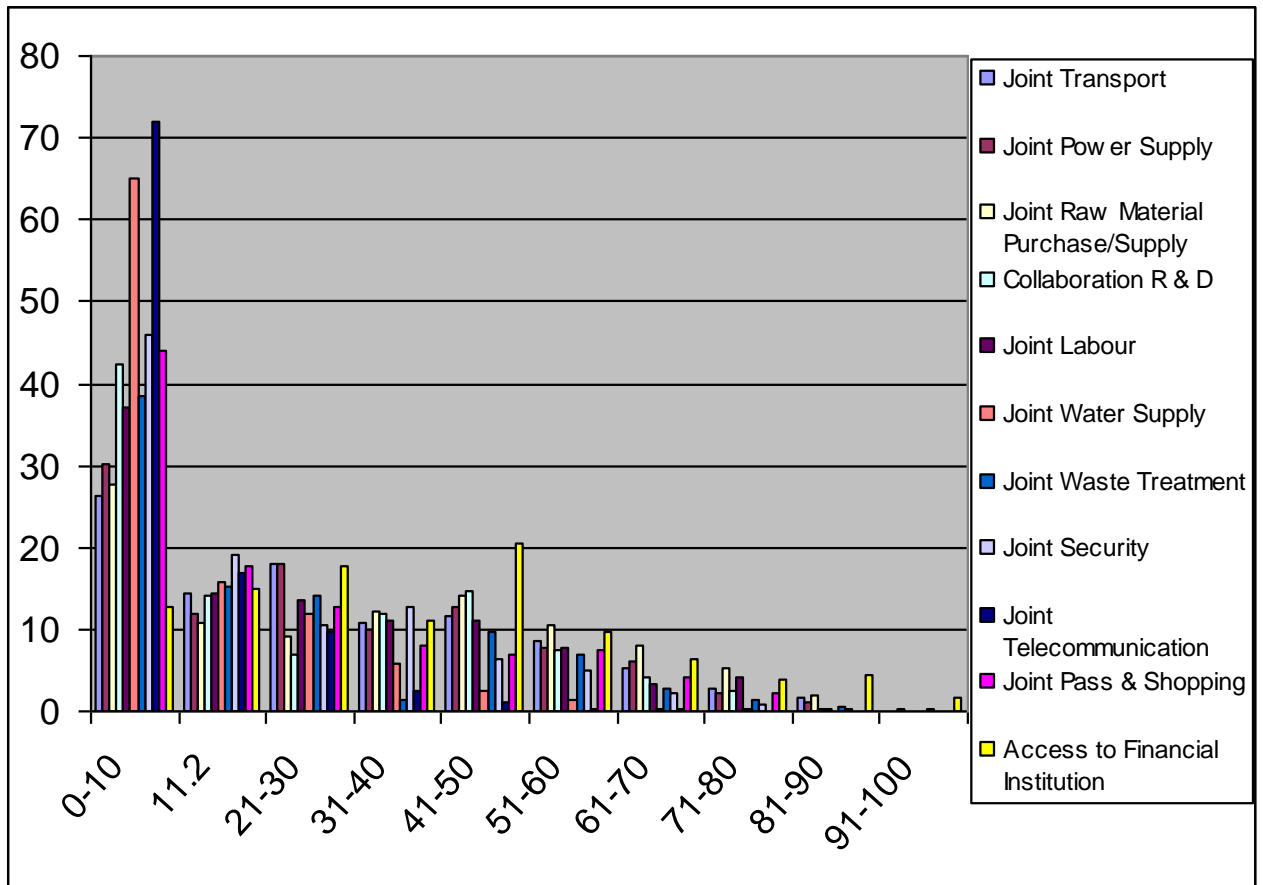


Fig. 5.13: Temporal Trends in Agglomeration Benefits, 2005-2009

Source: Author's Analysis, 2011

5.4 Structural Characteristics versus Percentage Gains in Agglomeration Economies

This section examines the cross tabulation of the structural characteristics with the percentage gains in agglomeration economies. Chi-square tests were also carried out to show the relationship between the structural characteristics and the percentage gains in agglomeration economies.

5.4.1 Age of Firms versus Percentage Gains in Agglomeration Economies.

The age of firms was cross tabulated with the percentage gains in joint transportation. Chi-Square test was carried out and the result was found to be significant at 27 degree of freedom and at 0.5 significant level. This reveals a significant positive relationship between the age of firms and percentage gains in joint transportation. (See Appendix VI).

The age of firms and the percentage gains in power supply was cross tabulated, The chi-square test was carried out at 322 degree of freedom and 0.5 level of significant. The result was significant revealing a positive relationship. (See Appendix VII)

The age of firms and percentages gains in joints raw material purchase/supply was cross tabulated. The results of the chi-square test carried out at 322 degree of freedom and 0.5% level of significance reveals a positive relationship.(see Appendix VIII).

The age of firms and the percentage gains in research and development was crosstabulated. The chi-square result was found to be significant at 276 degree of freedom and 0.5 level of significance. This signifies a positive relationship.(See Appendix VIX).

The age of firms and the percentage gains in labour was cross tabulated. The chi-square test carried out at 0.5 level of significance and at 276 degree of freedom, was significant, revealing a positive relationship. (See Appendix X).

Age of firms and percentage gains in water supply was cross tabulated. The chi-square test carried out was significant at 0.5% level of significance and 138 degree of freedom. This reveals a positive relationship (See Appendix XI)

Age of firms and percentage gains in waste treatment were cross tabulated. The chi-square test carried out was significant at 230 degree of freedom and 0.5% level of significance. This connotes a positive relationship between the age of firms and percentage gains in waste treatment. (See Appendix XII).

Age of firms and percentage gains in Security was cross tabulated. The chi-square test was significant at 0.5% level, and 184 degree of freedom. This connotes that the age of firms and percentage gains in security are positively related. (See Appendix XIII).

Age of firms and percentage gains in telecommunication was cross tabulated. The chi-square test carried out 0.5% level of significance and 138 degree of freedom was not significant. This connotes that there is no positive relationship between the age of firms and the Telecommunication. (See Appendix XIV).

Age of firms and percentage gains in Ports and Shipping was cross tabulated. The chi-square test carried out at 0.5% level of significance, and 236 degree of freedom was significant. This signifies a positive relationship. (See Appendix XV)

The age of firms and percentage gains in Access to financial institution was cross tabulated. The chi-square result was found to be insignificant at 0.5% level , and 276 degree of freedom. This connotes that there is no relationship between age of firms and the percentage gains in access to financial institution. (See Appendix XVI).

5.4.2 Areal Plant size and Percentage Gains in Agglomeration Economies

The areal plant size and the percentage gains in transportation were cross tabulated. The Chi-square result was found to be insignificant at 0.5% level and 236 degree of freedom. This connotes that there is no positive relationship between the areal plant size and percentage gains in transportation. (See Appendix XVII)

Also, Areal plant size and percentage gains in power supply was cross tabulated. Chi-square tests were carried at 0.5 level of significance and at 28 degree of freedom. However, the results of the chi-square was found to be insignificant. Meaning that there is no positive relationship between areal plant size and percentage gains in power supply (See Appendix XVIII).

The cross tabulation of the areal plant size versus percentage gains in raw material purchase/ supply and the chi-square test carried at 0.5% level significant and 28 degree of freedom was significant . This connotes that areal plant size and raw material purchase/supply was positively related (See Appendix XIX).

The areal plant size and percentage gains in Research and Development were cross tabulated. The chi-square test was carried out and the result was found to be significant at 0.5% level and 24 degree of freedom. This confirms that there is significant positive relationship between the areal plant size and percentage gains in research and development. (See (Appendix XX)

The areal plant size and percentage gains in labour supply were cross tabulated. The chi-square results were found to be significant at 0.5% level and 24 degree of freedom. This indicates a significantly positive relationship (See Appendix XXI)

The areal plant size was further cross tabulated with percentage gains in water supply. The results of the chi-square tests carried out were found to be significant at 0.5% level and at 12 degree of freedom. This connotes a positive relationship between areal plant size and percentage gains in water supply (see Appendix XXII).

Cross tabulation of the areal plant size versus the percentage gains in waste treatment was carried out, the chi-square test was also carried out, and the result was found to be significant at 0.5% level and 20 degree of freedom. This shows a positive relationship (See Appendix XXIII)

The areal plant size and percentage gains in Security were cross tabulated. The chi-square test was carried out and the result was found to be insignificant at 0.5% level and 16 degree of freedom. This reveals that there is no relationship between areal plant size and percentage gains in security (See Appendix XXIV).

The areal plant size and percentage gains in telecommunication were also cross tabulated. The chi-square tests were carried out and the result was found to be insignificant at 0.5% level at 12 degree of freedom. This connotes that there is no relationship between areal plants size and percentage gains in telecommunication. (See Appendix XXV)

The areal and plant size and joints port and shipping were cross tabulated. The chi-square tests were carried out, and the result was not significant at 0.5% level and at 16 degree of freedom. This connotes that there is no relationship between areal plant size and percentage gains in joint ports and shipping (see Appendix XXVI).

The areal plant size and percentage gains in Access to financial institution were cross tabulated. The chi-square test was carried out and the result was found to be significant at 24 degree of freedom and 0.5% level of significance. (See Appendix XXVII)

5.4.3 Capacity utilization versus percentage gains in agglomeration economies

The capacity utilization and percentage gain in transportation was cross tabulated. The chi-square tests were carried out and the result was found to be significant. This signifies a significant positive relationship between capacity utilization and percentage gains in transportation. (See Appendix XXVIII).

The Cross tabulation between the capacity utilization versus percentage gains in power supply was carried out. The chi-square test was also carried out and the result was found to be significant at 21 degree of freedom and 0.5% significance level. This reveals a positive relationship between the capacity utilization and percentage gains in water supply. (See Appendix XXIX).

The capacity utilization and the raw material purchase/supply were cross tabulated. The chi-square tests was carried out, and the results was found to be significant at 21 degree of freedom and 0.5 level of significance. This connotes a significantly positive relationship (see Appendix XXX).

The cross tabulation of capacity utilization and percentage gains in Research and Development reveals a significant positive relationship. This was found out as a result of the chi-square test carried out at 18 degree of freedom and 0.5% level of significance. (See Appendix XXXI).

The capacity utilization and percentage gains in labour were cross tabulated. The chi-square test carried out was found to be insignificant at 18 degree of freedom and 0.5% level of significance. This connotes that there is no relationship between the capacity utilization and percentage in labour supply. (See Appendix XXXII)

The capacity utilization and percentage gains water supply were cross tabulated. The chi-square test carried out, and the result was found to be significant at 9 degree of freedom and 0.5% level of significance. (See Appendix XXXIII)

The Cross tabulation of capacity utilization and percentage gains in waste treatment were carried out. The chi-square test was also carried out, and the result reveals a significant relationship at 15 degree of freedom and 0.5% level of significance. (See Appendix XXXIV)

The cross tabulation of capacity utilization and percentage gains in security were carried out. The chi-square test was also carried out and the result reveal an insignificant relationship at 12 degree of freedom and 0.5% level of significance. This connotes that there is no relationship between the capacity utilization and percentage gains in security (See Appendix XXXV).

The capacity utilization and percentage gains in telecommunication were tabulated. The chi-square test was carried out and the result reveals a significant relationship at 9 degree of freedom and 0.5% level of significance. (See Appendix XXXVI).

The capacity utilization and percentage gains in ports and shipping were cross tabulated. The chi-square test was carried out and the result was insignificant at 12 degree of freedom and 0.5% level of significance. This connotes that there is no positive relationship between capacity utilization and percentage gains in ports and shipping (See Appendix XXXVII).

The capacity utilization and percentage gains in access to financial institution were cross tabulated. The chi-square test was carried out and the result was found to be significant at 18 degree of freedom and 0.5% level of significance. This reveals a positive relationship. (See Appendix XXXVIII).

5.4.4 Estimated Firms Investment versus Percentage Gains in Agglomeration

Economies

Estimated firms investment and percentage gains in transportation were cross tabulated. The chi-square test was carried out and the result was found to be significant at 295 degree of freedom and 0.5% level of significance. This reveals a positive relationship between estimated firms investment and percentage gains in transportation. (See Appendix XXXIX).

Estimated firms investment and percentage gains in power supply were cross tabulated. The chi-square test was carried out and the result was found to be significant at 33 degree of freedom and 0.5% level of significance. This indicates a positive relationship between estimated firms investment and percentage gains in power supply. (See Appendix XL).

The cross tabulation of firms investment and percentage gains in raw material purchase/supply reveal a no positive relationship. The chi-square test carried out at 35 degree of freedom and 0.5% level of significance was found not be insignificant. (See Appendix XLI).

The cross tabulation of estimated firms investment and percentage gains in collaboration in research and development was carried out. The chi-square test conducted, and the results were insignificant at 432 degree of freedom and 0.5% significant level. This reveals no positive relationship. (See Appendix XLII).

The cross tabulation of the estimated firms investment and percentage gains in labour supply was carried out. The chi-square was also conducted, and the results were significant at 30 degree of freedom and 0.5% significance level. This reveals positive relationship. (See Appendix XLIII).

The estimated firms investment and percentage gains in water supply were cross tabulated. The chi-square conducted and result shows a significant relationship at 15 degree of freedom and 0.5% significance level. (See Appendix XLIV).

The Estimated firms investment and percentage gains in waste treatment were cross tabulated. The chi-square test was carried out, and the result reveals an insignificant relationship. (See Appendix XLV).

The estimated firm's investment and the percentage gains in Security were cross tabulated. The chi-square test was conducted and the result was found to be insignificant. Meaning that there is no relationship between estimated firms investment and percentage gains in security (See Appendix XLVI)

The cross tabulation between the estimate firms investment and percentage gains in telecommunication was carried out. The chi-square test was also conducted, the results was found out to be insignificance at 15 degree of freedom and 0.5% level of significance, this reveal a no positive relationship. (See Appendix XLVII).

The cross tabulation of the estimated firms investment and percentage gains in ports and shipping was conducted. The chi-square test was carried out and the results were significant at 20 degree of freedom and 0.5% significant level. This results reveals a significant positive relationship.(See Appendix XLVIII).

Estimated firms investment and percentage gains in access to financial institution were cross tabulated. The results of the chi-square test at 432 degree of freedom and 0.5% level of significance was found to be insignificant. Connoting an insignificant relationship. (See Appendix XLIX).

5.4.5 Management staff versus percentage gain in agglomeration economies

Management staff was cross tabulated with the percentage gains in Transportation. The chi-square test results were found to significant at 295 degree of freedom and 0.5% significance level. This however, reveals a positive relationship between the management staff and the percentage gains in transport. (See Appendix L).

The Cross tabulation of management staff versus percentage gains in power supply was carried out. The chi-square test conducted and the results were found to be insignificant at 35 degree of freedom and 0.5% significance level. (see Appendix LI).

The Cross tabulation of management staff and percentage gains in raw materials/purchase supply was carried out. The result of the chi-square test conducted shows a positive relationship at 35 degree of freedom and 0.5% level of significance. (See Appendix LII).

The Cross tabulation of management staff and percentage gains in Research and Development was carried out. The chi-square results reveal a significant positive relationship at 30 degree of freedom and 0.5% significant level (see Appendix LIII).

The Cross tabulation of management staff and percentage gains in labour was carried out. The results of the chi-square test carried out reveals a positive relationship at 30 degree of freedom and 0.5% significant level (See Appendix LIV).

Management staff and the percentage gains in water supply were cross tabulated. The chi-square tests were carried out and the result was found to be insignificant at 0.5 degree of freedom and 0.5% significant. (See Appendix LV).

Management staff was cross tabulated with the percentage gains in waste treatment were cross tabulated. The chi-square test results were significant at 25 degree of freedom and 0.5% significance level meaning that a significant positive relationship exists between the management staff and percentage (See Appendix LVI).

The Cross tabulation of management staff and percentage gains in security was conducted and the results was found to be insignificant at 20 degree of freedom and 0.5% significant level (See Appendix LVII).

Management staff and percentage gains in telecommunication were cross tabulated. The chi-square test results show a significant positive relationship at 15 degree of freedom and 0.5% level of significance. (See Appendix LVIII).

Management staff and percentage gains in ports and shipping were cross tabulated. The chi square tests was conducted and the results found out a significant positive relationship level, at 20 degree of freedom and 0.5% significant level . (See Appendix LVIX).

Management staff and percentage gains in Access to Financial Institution were cross tabulated. The chi-square test results show an insignificant relationship at 30 degree of freedom and 0.5% level of significance. This connotes that there is no positive

relationship between management staff and access to financial institution (See Appendix LX).

5.4.6 Auxiliary/ Clerical and Operational Staff versus Percentage Gains in Agglomeration Economies

The cross tabulation of auxiliary/clerical and operational staff, and the percentage gains in transportation was carried out. The Chi-Square results reveal a significant relationship at 354 degree of freedom and 0.5% significance level. (See Appendix LXI).

The cross tabulation of auxiliary/clerical and operational staff, and the percentage gains in power supply was carried out. The Chi-Square tests was carried out and the results were found to be in significant at 42 degree of freedom and 0.5% significance level. (See Appendix LXII).

The cross tabulation of auxiliary/clerical and operational staff, and the percentage gains in raw material/purchase supply was carried out. The Chi-Square tests reveals a significant relationship at 42 degree of freedom and 0.5% significance level. (See Appendix LXIII).

The auxiliary/clerical and operational staff, and the percentage gains in Research and Development were cross tabulated. The Chi-Square tests conducted and the result was found to be significant at 36 degree of freedom and 0.5% level of significance. This signifies that that there is no relationship between the auxiliary and operational staff and the percentage gains in research and development.(See Appendix LXIV).

The cross tabulation of auxiliary/clerical and operational staff, and the percentage gains in labour was carried out. The Chi-Square tests results show an insignificant relationship at 36 degree of freedom and 0.5% level of significance. (See Appendix LXV).

The cross tabulation of auxiliary/clerical and operational staff, and the percentage gains in water supply was carried out. The Chi-Square tests was conducted and the results was found out to be insignificant. This connotes a no positive relationship. (See Appendix LXVI)

The auxiliary/clerical and operational staff, and the percentage gains in waste treatment were cross tabulated. The Chi-Square tests was carried out and the results reveal a significant relationship at 30 degree of freedom and 0.5% level of significance. (See Appendix LXVII).

The auxiliary/clerical and operational staff, and the percentage gains in Security were cross tabulated. The Chi-Square tests results reveal a significant positive relationship at 24 degree of freedom and 0.5% level of significance. (See Appendix LXVIII).

The cross tabulation of auxiliary/clerical and operational staff, and the percentage gains in telecommunication was carried out. The Chi-Square tests was found to be insignificant at 18 degree of freedom and 0.5% significant level. (See Appendix LXIX).

The cross tabulation of auxiliary/clerical and operational staff, and the percentage gains in ports and shipping was carried out. The Chi-Square tests conducted and the result was found to be significant at 24 degree of freedom and 0.5% level of significance. (See Appendix LXX)

The auxiliary/clerical and operational staff, and the percentage gains in Access to financial institution were cross tabulated. The chi-square tests were carried out and the results reveal an insignificant relationship at 36 degree of freedom and 0.5% level of significance. (See Appendix LXXI).

The hypothesis which states that: The degree of agglomeration economies enjoyed by firms is not determined by the structural characteristic of firms is tested using the canonical correlation statistical technique.

The canonical correlation equation is given by,

$$CV_{Y1} = a_1Y_1 + a_2Y_2 + \dots + a_m Y_m \quad CV_{X1} = b_1X_1 + b_2X_2 + \dots + b_pX_p.$$

Y's = Agglomeration economies, forming the dependent variables, where

Y₁ = Joint Transportation (Savings accruing from joint transportation (transportation economies)

Y₂ = Joint Power supply (Savings accruing from joint use of power (power economies)

Y₃ = Joint Raw Material Purchase/Supply (Savings accruing from joint Raw materials purchase (input economies)

Y₄ = Collaboration in Research and Development (Savings accruing from joint R & D measured as a percentage monetary savings from R&D)

Y₅ = Joint Labour Supply (Savings accruing from wage rate (Labour economies i.e reduction in the cost of Labour)

Y₆ = Joint Water Supply (Savings accruing from joint water supply measured as a percentage reduction in the cost of water supply).

Y₇ = Joint waste treatment (Savings accruing from joint waste treatment)

- Y8 = Joint Security (Savings accruing from joint security services).
- Y9 = Joint Telecommunication (Savings accruing from joint telecommunication).
- Y10 = Joint Ports & Shipping (Savings accruing from joint ports and shipping)
- Y11 = Access to Financial institution (Savings accruing from access to financial Institution).

While X's = Structural characteristics, forming the independent variables. Where

- X₁ = Age of Firms (Years)
- X₂ = Areal plant size (m²)
- X₃ = Capacity utilization (in percentage)
- X₄ = Labour Size (Number of workers)
- X₅ = Firms Investment (the monetary value)

Table 5.12 shows the result of Canonical Correlation Analysis of agglomeration economies and structural characteristics of firms. It reveals that agglomeration economies have a stronger variation coefficient, with r value of 0.9009, r² value of 0.87 and 87% variance, while the structural characteristics has r value of 0.8381, r² value of 0.70 and 70% of variance. (See Appendix LXXII)

The Roy's Largest Root Test depicted in table 5.13 was employed to test for the significance of the canonical correlations at 0.05 significant levels; result of the test shows the calculated F-value 3.5247 and the tabulated F-value 2.90. Since the calculated F-value is greater than the tabulated value. (See Appendix LXXII) The null hypothesis is therefore rejected while the alternative hypothesis which states that the degree of agglomeration economies is determined by the structural characteristics of firms is accepted. This suggests that the degree of agglomeration economies enjoyed by firms is significantly explained by the size and structural characteristics of the firms.

TABLE 5.12: Summary of result of Canonical Correlation Analysis.

Variables	Canonical Correlation (r)	r²	% of variance	Decision
Set I				
H ₁ Y ₁₋₁₁	0.9009	0.81	81%	Accept
Set II				
X ₁₁₁ – X ₅₅₅	0.8381	0.70	70%	

Source: Author's Analysis, 2011.

TABLE 5.13 Roy's Largest Root Test of Significant

R	df_r	df_c	Level of Significant	Calc. F	Tab. F.	Decision
0.9009	11	9	5%	3.5247	2.90	H ₁ is accepted
0.8381						

Source: Author's Analysis, 2011.

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5.5 Importance of Agglomeration Economies

This section reveals the ranking of agglomeration economies by firms in order of importance.

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Table 5.14 The Ranking of Agglomeration Economies in order of Importance

Advantages	Very important		Important		Not important		Total	%
	No.	%	No.	%	No.	%		
							103	100
Joint transportation	10	9.7	62	60.2	31	30.1	103	100
Joint raw material supply/purchase	19	18.5	59	57.3	25	24.3	103	100
Joint water supply	10	9.7	45	43.7	48	46.6	103	100
Collaboration in R & D	10	9.7	54	52.4	39	37.9	103	100
Joint power supply	03	2.9	49	47.5	51	49.5	103	100
Joint security	8	7.8	52	50.5	43	41.7	103	100
Joint telecommunication	2	-	5	4.8	98	95.1	103	100
Joint waste treatment	7	6.8	45	43.7	51	49.5	103	100
Joint ports & shipping	9	8.7	48	46.6	46	44.7	103	100
Access to financial institution	31	30.1	69	67.0	03	2.9	103	100

Source: Author's Analysis, 2011

5.5.1 Agglomeration Economies Enjoyed by Firms in order of Importance

Table 5.14 shows the agglomeration economies enjoyed by firms in order of importance. Out of 103(100%) firms, 10(9.7%) firms believed that joint transportation is very important, 62(60.2%) firms agreed that (joint transportation) it is important, while 31(30.1%) believed it is not important. It is obvious that joint transportation is an important agglomeration economies factor. Out of 103(100%) firms, 9(18.5%) firms opined that joint raw material purchase/supply is very important, 59(57.3%) agreed, it is important, while 25(24.3%) firms believed, it is not important. This shows that joint raw material purchase is an important agglomeration economies factor. Out of 103(100%) firms, 10(9.7%) firms believed that joint water supply is very important, while 45 (43.7%) firms agreed that it is important, 48(46.6%) firms agreed that it is not important. Joint water supply is therefore an important factor of agglomeration economies. Also, out of 103(100%) firms, 10(9.7%) firms opined collaboration in R& D. is very important, 54(52.4%) believed it is important, and 39(37.9%) firms agreed that it is not important. Collaboration in R & D is therefore an important agglomeration economies factor.

Furthermore, Table 5.14 reveals the importance of joint power supply. Out of 103(100%) firms, 3 (2.9%) firms agreed that it is very important, 49(47.5%) believed it is important and 51(49.5%) agreed, it is not important. Conclusively joint power supply is an important agglomeration economies factors. Out of 103(100%) firms, 8(7.8%) firms believed that joint security, is very important, 52(50.5%) believed it is important, while 43(41.7%) believed it is not important. This further revealed that joint security is an important factor of agglomeration economies. Majority of the firms believed that joint telecommunication is not very important; 5(4.8%) opined it is important, while, 98(95.1%) firms believed it is not important. Obviously joint telecommunication is not an important factor of agglomeration economies. Out of 103(100%) firms, 7(6.8%) firms believed that joint waste treatment is very important, 45(43.7%) believed, it is important, while, 51(49.5%) firms agreed that is not important. Conclusively, joint waste treatment is an important agglomeration economies factor.

Table 5.14 also shows the importance of joint ports and shipping. Out of 103(100%) firms, 9(8.7%) firms opined it is very important, 48(46.6%) firms opined it is important and 46(44.7%) firms agreed it is not important. This analysis has revealed that joint ports and shipping is an important agglomeration economies factor. Out of 103 (100%) firms 31(30.1%) firms believed that access to financial institution is very important, 69(67.0%) firms agreed it is important, only 3(2.9%) firms believed it is not

important. Access to financial institution is therefore, a very vital factor of agglomeration economies.

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CHAPTER SIX

6.0 PERCEIVED LOCATIONAL IMPACTS OF AGGLOMERATION ON THE IMMEDIATE ENVIRONMENT

This chapter analyzes the various agglomeration impacts such as the effects of firm's operation on the immediate environment. It also discusses the socio-economic characteristics in relation to the various effects of firms operation. The numbers of respondents affected by the firms operation, perception about the severity of these environmental problems, as well as the role of these firms in curtailing or ameliorating these environmental problems are also analyzed. Only one hypothesis is tested, that is, distance from the firms is not significantly related to the pattern of perception of environmental problems.

6.1 Perceived Agglomeration Impacts

This section discusses the distance of the respondent's residence to the firms, the duration in the places of residence, respondents affected by firms operation, the effects of firms operation, and the severity of the environmental problems as well as the efforts of the firms in curtailing such negative effects.

Table 6.1 Immediate Residents Affected by the Operations of the Firm(s)

	Frequency	Percentage
Affected	95	79.2
Not affected	25	20.8
Total	120	100

Source: Author's Analysis, 2011.

Table 6.1 shows that 85 (85%) of the respondents are affected by the operations of the firms, while 15 (15%) are not affected by the operation of the firms. This connotes that majority of the respondents are affected by the firms operation.

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Table 6.2: The Effect of the Firm(s) Operations on the Immediate Environment.

Effects	Frequency	Percentage
Land pollution	15	12.5
Heavy traffics	10	8.3
Vibration	10	8.3
Air pollution	24	20
Water pollution	7	5.8
Irritating fumes	10	8.3
Noise pollution	24	20
Over crowding	9	7.5
Increase in house rent	5	4.2
Crime rate increase	6	5
Total	120	100

Source: Author's Analysis, 2011.

The effect of firms operation on the immediate environment is shown in table 6.2, 24(2%) respondents each were affected by air pollution and noise pollution, whereas 15(12.5%) respondents were affected by land pollution. Another 10 (8.3%) respondents each were affected by heavy traffics, vibration and irritating fumes, while 9(7.5%) were affected by water pollution. Also, 7(5.8%) were affected by water pollution, while 6(5%) were affected by crime rate increase.

It must be noted that all these negative impacts of agglomeration industries are caused solely by the industrial activities; noise and pollution poses the greatest impact.

6.1.1 Relationship between Gender of Respondents and the Effects of Firms Operation

Relationship between Gender of Respondents and the Effects of Firms Operation is shown in table 6.3, 20(16.7%) male respondents were affected by noise pollution, whereas 3(2.5%) female were affected. Another 18(15%) males were affected by air pollution, while 11(9.2%) females were affected. Also, 9(7.5%) males each were affected by vibration and irritating fumes, whereas none of the females were affected. Furthermore, 6(5%) male respondents were affected by land pollution, while 4(3%) female were also affected. Another 5(4%) males each were affected by water pollution and overcrowding, whereas 2(1.7%) females were affected by water pollution and 9(7.5%) females by overcrowding. Also, 2(1.7%) males were affected by increase in house rent, whereas 4(3%) females were affected. It is obvious that both sexes were more affected by air and noise pollution.

Table 6.3 Cross Tabulation of Gender of Respondents with the Effect of Firms Operation

Effects	Male		Female	
	No	%	No	%
Land Pollution	6	5	4	3
Heavy Traffics	4	3	3	2.5
Vibration	9	7.5	-	-
Air Pollution	18	15	11	9.2
Water Pollution	5	4	2	1.7
Irritating fumes	9	7.5	-	-
Noise Pollution	20	16.7	3	2.5
Over Crowding	5	4	9	7.5
Increase in house rent	2	1.7	4	3
Crime rate increase	3	2.5	3	2.5
Total	81	67.5	39	32.5

Source: Author's Analysis

6.1.2 The Age of Respondents and the Effects of Firms Operation

Table 6.4 shows that 2(2.7%) respondents with less than 21 years were affected by noise pollution, whereas 3(2.5%) between the age of 21 and 31 years were affected. Also, only 1 (0.8%) with less than 21 years were affected by land pollution, while 3 (2.5%) between the age 21 and 30 years were affected. Another, 8(6.7%) between 31 and 40years were affected by air pollution, whereas 7(5.8%) between 41 and 50 years were affected. 5(4.2%)between 31and 4years were affected by noise pollution, while 11(9.2%) respondents between 41 and 50 years were affected. 3(2.5%) between 31-40 years were affected each by vibration and irritating fumes, while 3(2.5%) respondents each between 41 and 50 years were also affected. Furthermore, 6(5%) between 51 and 60 years were affected by over crowding, whereas 5(4.2%) above 60 years were affected. Another 5(4.2%) respondents between 51 and 60 years were affected by air pollution, while 2 (1.7%) above 60 years were also affected Moreover, 2(1.7%) between 51 and 60 years were affected by crime rate increase, whereas 4(3%) above 60 years were affected.

Table 6.4 Cross Tabulation of Age of Respondents with the Effects of Firms Operation

Effects	<20		21-30		31-40		41-50		51-60		60+	
	No	%	No	%	No	%	No	%	No	%	No	%
Land Pollution	1	0.8	3	2.5	2	1.7	2	1.7	1	0.8	1	0.8
Heavy Traffics	-		2	1.7			2	1.7			3	2.5
Vibration	1	0.8	2	1.7	3	2.5	3	2.5				
Air Pollution	-		7	5.8	8	6.7	7	5.8	5	4.2	2	1.7
Water Pollution	1	0.8	1	0.8	2	1.7	2	1.7	1	0.8		
Irritating fumes	.		-		3	2.5	3	2.5	2	1.7	1	0.8
Noise Pollution	2	2.7	3	2.5	5	4.2	11	9.2	2	1.7		
Over Crowding	.				2	1.7	1	0.8	6	5	5	4.2
Increase in house rent	.				1	0.8	3	2.5	1	0.8	1	0.8
Crime rate increase	.								2	1.7	4	3
Total	5	4.2	18	15	26	21.7	34	28	20	16.7	17	14.2

Source: Author's Analysis, 2011.

6.1.3 Marital Status of the Respondents and the Effects of Firms Operation.

Table 6.5 reveals that 16(13%) married respondents were affected by air pollution, whereas 6(5%) single respondents were affected. Also, 12(10%) married respondents were affected by noise pollution, while 2(1.7%) single were affected. Another 6(5%) married respondents were affected by overcrowding, whereas 4 (3.3%) single were affected. Furthermore, 6(5%) married were affected by vibration, while 2(1.7%) single were affected.

Moreover, 6(5%) divorced were affected by noise pollution, whereas 3(2.5%) separated were affected. Another 4(3.3%) divorced were affected by air pollution, while 3(2.5%) separated were affected. 3(2.5%) divorced were affected by over crowding, whereas only 1(0.8%) separated were affected. Also, 2(1.7%) divorced were affected by land pollution while 2(1.7%) separated were also affected.

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Table 6.5: Cross Tabulation of Marital Status with Effects of Firms Operation

Effects	Married		Single		Divorced		Separated	
	No	%	No	%	No	%	No	%
Land Pollution	03	2.5	03	2.5	02	1.7	02	1.7
Heavy Traffics	03	2.5	03	2.5	01	0.8	-	
Vibration	06	5	02	1.7	01	0.8	-	
Air Pollution	16	13	06	5	04	3.3	03	2.5
Water Pollution	5	4.2	01	0.8	01	0.8	-	
Irritating fumes	4	3.3	03	2.5	-		02	1.7
Noise Pollution	12	10	02	1.7	06	5	03	2.5
Over Crowding	06	5	04	3.3	03	2.5	01	0.8
Increase in house rent	03	2.5	-		01	0.8	02	1.7
Crime rate increase	04	3.3	01	0.8	-		01	0.8
Total	62	52	25	20.8	19	15.8	14	11.7

Source: Author's Analysis, 2011.

6.1.4 Educational Qualification and the Effects on Firms Operation

Table 6.6 reveals that 8(6.7%) respondents each having no formal education and primary education were affected by noise pollution, whereas 3(2.5%) having no formal education and primary education were affected by land pollution. Another, 7(5.8%) respondents with no formal education were affected by air pollution, while 6(5%) with primary education were also affected. Further more, 2(1.7%) respondents having no formal education were affected by vibration, whereas 3(2.5%) with primary education were affected. Also, 5(4.2%) respondents with secondary education were affected by air pollution, while 6(5%) respondents with tertiary education were affected. Another 4(3.3%) with secondary education were affected by land pollution whereas 5(4.2%) with tertiary education were affected. 4(3.3) respondents each with secondary and tertiary education were affected by noise pollution, whereas 2(1.7%) each with secondary education and tertiary education were affected by water pollution, also 3(2.5%) with secondary education were affected by heavy traffics while 4(3.3%) with tertiary education were affected. Another 2(1.7%) respondents with secondary education where affected by crime rate increase, while only 1(0.8%) with tertiary education was affected.

**Table 6.6: Cross Tabulation of Educational Qualification with Effects of Firms
Operation**

Effects	No formal Education		Primary Education		Secondary Education		Tertiary Education	
	No	%	No	%	No	%	No	%
Land Pollution	03	2.5	03	2.5	04	3.3	05	4.2
Heavy Traffics	01	0.8	02	1.7	03	2.5	04	3.3
Vibration	02	1.7	03	2.5	02	1.7	03	2.5
Air Pollution	07	5.8	06	5	05	4.2	06	5
Water Pollution	01	0.8	02	1.7	02	1.7	02	1.7
Irritating fumes	02	1.7	03	2.5	03	2.5	02	1.7
Noise Pollution	08	6.7	08	6.7	04	3.3	04	3.3
Over Crowding	01	0.8	03	2.5	02	1.7	03	2.5
Increase in house rent	-		02	1.7	01	0.8	02	1.7
Crime rate increase	02	1.7	01	0.8	02	1.7	01	0.8
Total	27	22.5	33	27.5	28	23.3	32	26.7

Source: Author's Analysis, 2011.

6.1.5 Distance of Respondents from Firms and the Effects of Firms Operation

Table 6.7 shows that 7(5.8%) respondents with the distance of <0.5km from the firms were affected by air pollution, whereas 5(4.2%) with the distance 0.5-1km were also affected by air pollution. Another 5(4.2%) with less than 0.5km were affected by noise pollution, while 4(3.3%) between 0.5 and 1km were also affected. Furthermore, 3(2.5%) respondents with the distance of <0.5km were affected by vibration whereas 3(2.5%) between 0.5-1km were also affected by vibration. 2(1.7%) with <0.5km were affected by overcrowding, while 3(2.5%) between 0.5and1km were affected.

Another, 5 (4.2%) respondents between the distance 1.1 and 1.5km were affected by noise pollution, whereas 3(2.5%) with the distance between 1.6 and 2.0km were affected. 4(3.3%) with the distance between 1.1 and 1.5km were affected by air pollution, while 5(4.2%) with the distance between 1.6 and 2.0km. were also affected. Furthermore, 3(2.5%) between 1.1 and 1.5km were affected by overcrowding, whereas 3(2.5) between 1.6 and 2.0km were also affected. 3(2.5%) between 1.1-1.5km were affected by increase crime rate, while only 1(0.8%) between 1.6-2.0 were affected by the same.

Also, 4(3.3%) respondents between 2.1 and 2.5km were affected by air pollution, whereas 4 (3.3%) between 2.6-3.0km were affected by the same. 4(3.3%) between 2.1and 2.5km were affected by noise pollution, while 2(1.7%) between 2.6 and 3.0km were affected by the same. 2(1.7%) between 2.1 and 2.5km were affected by water pollution, whereas none between 2.6-3.0km were affected. Only 1(0.8%) respondents between 2.1-2.5km was affected by increase in crime rate, while none were affected between 2.5-3.0km. Also, 2(1.7%) between 2.1-2.5km were affected by irritating fumes, while only 1(0.8%) between 2.6-30km was affected.

Table 6.7 Cross Tabulation of Distance of Respondents from Firms with Effects of Firms Operation

Effects of Firms Operation	Distance of the Respondents to the Firm.											
	<0.5km		0.6-1km		1.1-1.5		1.6-2.0		2.1-2.5		2.6-3.0	
	No	%	No	%	No	%	No	%	No	%	No	%
Land Pollution	02	1.7	02	1.7	02	1.7	01	0.8	01	0.8	01	0.8
Heavy Traffics					02	1.7	02	1.7	02	1.7	01	0.8
Vibration	03	2.5	03	2.5	01	0.8			01	0.8	01	0.8
Air Pollution	07	5.8	05	4.2	04	3.3	05	4.2	04	3.3	04	3.3
Water Pollution			02	1.7	02	1.7	01	0.8	02	1.7		
Irritating fumes	01	0.8	02	1.7	01	0.8	02	1.7	02	1.7	01	0.8
Noise Pollution	05	4.2	04	3.3	05	4.2	03	2.5	04	3.3	02	1.7
Over Crowding	02	1.7	03	2.5	03	2.5	03	2.5	02	1.7	01	0.8
Increase in house rent					02	1.7	01	0.8	02	1.7		
Crime rate increase			01	0.8	03	2.5	01	0.8	01	0.8		
Total	20	6.7	22	18.3	25	20.8	19	15.8	21	17.5	11	9.2

Source: Author's Analysis, 2011.

6.1.6 Length of Stay and the Effects of Firms Operation

Table 6.8 shows that 7(5.8%) respondent with living duration of <5years were affected by air pollution, whereas 4(3.3%) with living duration between 5 and 10 years were affected by the same. Another 5(4.2%) with living duration of <5 years were affected by noise pollution, while 4(3.3%) between 5 and 10 years were affected by the same. Also, 4(3.3%) respondents each with living duration <5 years. and between 5 and 10 years were both affected by overcrowding. Only 1(0.8%) with <5years was affected by land pollution, while 2(1.7%) between 6 and 10 years were affected.

Furthermore, 4(3.3%) respondents with the living duration between 11 and 15 years were affected by air pollution, whereas 6(5%) between 16 and 20 years were affected by noise pollution. Also, 3(2.5%) between 11 and 15 years were affected by noise pollution, while 5(4.2%) between 16 and 20 years were affected . Another 3 (2.5%) between 11 and 15 years were affected by overcrowding, while 2(1.7%) between 16 and 20 years were also affected. Another 2(1.7%) between 11 and 15 years were affected by land pollution, whereas 3(2.5%) between 16 and 20 years were affected by the same. Only 1(0.8%) between 11 and 15 years was affected irritating fumes, while 2(1.7%) between 16 and 20 years were affected by the same.

Moreover, 4(3.3%) respondents with the living duration between 21 and 25 years were affected by noise pollution, whereas 2(1.7%) above 26 years were also affected by same. 4(3.3%) respondent each with living duration between 21 and 25 years, and above 26 years were affected by air pollution. 2 (1.7%) between 21 and 25 years were affected by land pollution, while none above 26 years were affected. Only 1(0.8%) between 21 and 25 years were affected by vibration, whereas none above 26 years were affected.

Table 6.8 Cross Tabulation of Length of Stay with the effects of Firms Operation

Effects of Firms Operation	Duration of stay of the Respondents											
	<5		6-10		11-15		16-20		21-25		26+	
	No	%	No	%	No	%	No	%	No	%	No	%
Land Pollution	1	0.8	2	1.7	2	1.7	3	2.5	2	1.7	-	
Heavy Traffics			1	0.8	2	1.7	2	1.7	1	0.8	1	0.8
Vibration	2	1.7	2	1.7	2	1.7	2	1.7	1	0.8	-	
Air Pollution	7	5.8	4	3.3	4	3.3	6	5	4	3.3	4	3.3
Water Pollution	-		2	1.7	1	0.8	2	1.7	2	1.7	-	
Irritating fumes	2	1.7	2	1.7	1	0.8	2	1.7	1	0.8	1	0.8
Noise Pollution	5	4.2	4	3.3	3	2.5	5	4.2	4	3.3	2	1.7
Over Crowding	4	3.3	4	3.3	3	2.5	2	1.7	1	0.8		
Increase in house rent	1	0.8					1	0.8	2	1.7	2	1.7
Crime rate increase	-		2	1.7			2	1.7	1	0.8	1	0.8
Total	22	18.3	23	19.2	18	15	27	22.5	19	15.8	11	9.2

Source: Author's Analysis, 2011

Table 6.9 Perception about the Severity of these Environmental Problems

Perception	Frequency	Percentage
Very severe	17	14.2
Severe	57	47.5
Not severe	28	23.3
None	18	15.5
Total	120	100

Source: Author's Analysis, 2011.

Table 6.9 shows the perception of the respondents about the severity of the environmental problem, 17 (14.2%) opined very severe, 57(47.5%) opined severe, while 28 (23.3%) believed that the problem is severe, another 18(15.5%) believed that the agglomerated firms have no environmental consequences on their well-being. Majority of the respondents however, attested to the severeness of the environmental problem.

The hypothesis which states that: Distance from the firms is not significantly related to the pattern of perception of environmental problems is tested using the Pearson Product (Moment) Correlation statistical analysis.

The Pearson Product (Moment) Correlation equation is given by:

$$r = \frac{\sum (x - \bar{x}) (y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}}$$

Y = Perception of environmental problems, i.e. the independent variables, where

X = distance in km., i.e. the dependent variables, where

The analysis of Pearson Moment correlation carried out in testing the hypothesis which states that: the pattern of perception of environmental problems is not significantly related to the distance from the firms was depicted in table 6.10. The dependent variable is the perception of environmental problems, while the independent variable is the distance from the firms.. A correlation analysis between the severity of impact and distance resulted in a value of minus 0.641 which is significant at the 5% level Therefore, null hypothesis Ho above is rejected, and the Hi is accepted. This implies that the pattern of perception of environmental problems is significantly related to the distance from the firms. There is a distance-decay effect in the impact..

Table 6.10: Analysis of the Correlation for the Perception of Environmental Problems and Distance from the Firms

Correlations

Correlations

		INTENSITY OF IMPACT	DISTANCE(Km)
INTENSITY OF IMPACT	Pearson Correlation	1	-.641*
	Sig. (2-tailed)		.034
	N	11	11
DISTANCE(Km)	Pearson Correlation	-.641*	1
	Sig. (2-tailed)	.034	
	N	11	11

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

6.1.7 Gender of the Respondents and the Perception of Environmental Problem

Table 6.11 shows that 11(9.2%) male opined that environmental problem is very severe, whereas 6(5%) female opined it is very severe. Also, 45(37.5%) male believed that environmental problem is severe, while 12 (10%) female believed it is severe. Another, 10(8%) male opined that environmental problem is not severe, whereas 18(15%) female believed it is not severe. Furthermore, 15(12.5%) male believed that environmental problem has no effect, while 3 (2.5%) female opined it has no effect. It can be concluded that most of the respondents believed that the firms operation has a severe effect on the environment.

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Table 6.11: Cross Tabulation of the Gender of Respondents with the Perception of Environmental Problem

Sex of the respondents.	Environment problem perception									
	Very severe		Severe		Not severe		Not effect		Total	
	No	%	No	%	No	%	No	%	No	%
Male	11	9.2	45	37.5	10	8	15	12.5	81	67.5
Female	6	5	12	10	18	15	3	2.5	39	32.5
Total	17	14.2	57	47.5	28	23	18	15	120	100

Source: Author's Analysis, 2011.

6.1.8 Ages of the Respondents and the Perception of Environmental Problems

Table 6.12 shows that the respondents each <20 years and between 31 and 40 years perceived the environmental problem as very severe, whereas 3(2.5%) each between 21 and 30 years, 41 and 50 years perceived the same. 2(1.7%) between 51 and 60 years perceived it is very severe, while only 1(0.8%) above 60 years perceived the same. Another 18(15%) between 31 and 40 years perceived it is severe, while 12 (10%) between 51 and 60 years perceived it is severe. Also, 10(8%) each between 21 and 30 years; 41 and 50 years perceived it is severe, whereas 6(5%) above 60 years perceived same. Furthermore, 15(12.5%) between 41 and 50 years perceived not severe, while 4(3%) between 21 and 30 years perceived same. Another 10(8%) above 60 years perceived the environmental problems as having no effect, while 6(5%) between 41 and 50 years perceived same. 3(2.5%) between 21 and 30 years attested that environmental problem has no effect, whereas 2(1.7%) between 51 and 60 years opined that the environmental problem has no effect.

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Table 6.12: Cross Tabulation of Age of the Respondents with the Perception of Environmental Problems

Age of respondents	Very Severe		Severe		Not Severe		No Effect		Total	
	No	%	No	%	No	%	No	%	No	%
< 20	4	3	1	0.8					5	
21 – 30	3	2.5	10	8	5	4	3	2.5	18	
31 – 40	4	3	18	15	4	3			26	
41 – 50	3	2.5	10	8	15	12.5	6	5	34	
51 – 60	2	1.7	12	10	4	3	2	1.7	20	
>60	1	0.8	06	5			10	8	17	
TOTAL	17	14.2	57	47.5	28	22.5	18		120	

Source: Author's Analysis, 2011.

6.1.9 Marital Status of the Respondents and Environmental Problem Perception

Table 6.13 reveals that 12(10%) married respondents perceived the environmental problem as severe, whereas 3(2.5%) single perceived same. Another 32(26.7%) married perceived the environmental problems as severe, while 14(11.7%) single perceived same. 6(5%) divorced perceived it is severe, while 5(4%) separated also perceived same. Furthermore, 19(15.8%) married perceived it is not severe, whereas 9(7.5%) single perceived the environmental problems as not severe. Also 6(5%) divorced perceived the environmental problems as not have effect, while 5(4%) respondents each, married and separated perceived it has no effect.

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Table 6.13: Cross Tabulation of Marital Status of the Respondents with the Perception of Environmental Problems

Marital Status	Very Severe		Severe		Not severe		No Effect		Total	
	No	%	No	%	No	%	No	%	No	%
Married	12	10	32	26.7	19	15.8	5	4	68	57
Single	3	2.5	14	11.7	9	7.5	2	17	28	23
Divorced	2	1.7	6	5			6	5	14	12
Separated			5	4			5	4	10	8
Total	17	14.2	57	47.5	28	22.5	18	15	120	100

Source: Author's Analysis, 2011.

6.14 Educational Qualification of the Respondents and the Perception of Environmental Problems

Table 6.23 reveals that 6(5%) respondents with secondary education perceived the environmental problems as severe, whereas 5(4%) with tertiary education perceived same. Also, 4(3%) having no formal education perceived the environmental problem as very severe, while 2(1.7%) with primary education perceived same. Furthermore, 19 (15.8%) having secondary education affirmed the environmental problems as severe, while 17(5.8%) with no formal education affirmed same. Another 21(17.5%) possessing tertiary education perceived the environmental problem is severe, whereas 10(8%) with primary education perceived same. Furthermore, 6(5%) respondent each possessing no formal education, having secondary education perceived the environmental problems as not severe, whereas 10(8%) having primary education perceived same. Moreover, 2(1.7%) respondents each with primary and secondary education perceived the environmental problems has no effect, while 5(4%) with tertiary education also perceived the environmental problem as having no effect.

Table 6.14: Cross Tabulation of educational Status with Perception of Environmental Problems

Educational Qualification	Very severe		Severe		Not Severe		No Effect		Total	
	No	%	No	%	No	%	No	%	No	%
No Formal Education	4	3	17	5.8	6	5			27	22.5
Primary Education	2	1.7	10	8	10	8	2	1.7	24	20
Secondary Education	6	5	19	15.8	6	5	2	1.7	33	27.5
Tertiary Education	5	4	21	17.5	5	4	5	4	36	30
Total	17	14.2	57	47.5	27	22.5	9	7.5	120	100

Source: Author's analysis, 2011.

Table 6.15: Notion about the Firms Doing Enough to Curtail the Negative Impacts

	Frequency	Percentage
Yes	15	12.5
No	90	75
Nil	15	12.5
Total	120	100

Source: Author's Analysis, 2011.

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Table 6.15 reveals that out of 120(100%) respondents, 19 (12.5%) were of the opinion that the firms are doing enough to curtail the negative impacts, while 90 (75%) opined that the firms are not doing enough to curtail the negative impacts; there were no response from 15 (12.5%) respondents.

It is apparent that the firms are not doing enough to curtail the negative impacts of these environmental problems.

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CHAPTER SEVEN

7.0 SUMMARY AND CONCLUSION

7.1 SUMMARY

The impetus for this study was stimulated by the desire to examine the spatio-temporal dynamics and environmental impact of industrial agglomeration in the Lagos region, and the study has provided quantitative analysis of the clustering of firms over time and the perceived effects of the clustering on the environment in the Lagos region, between 2005 and 2009.

The structural and operational characteristics of firms shows that most of the firms were established between 28-34 years ago, the areal plant size were mostly less than 500m², and the capacity utilization of majority of the firms were between 81-100%. The labour characteristics revealed that most of the firms employed less than 50 employees, and management staff of less than 10. The study further revealed that most of the firms invested above ₦200m and the firms largely involved in raw materials purchase/supply relationship. It is apparent that most of the firms are large scale, since the federal government (1990) opined that large scale industrial are those firms having above N750,000 or investment. The gross financial annual output of most of the firms are was above N372m. out of the 103(100%) firms 38(36.9%) have less than 5 management staff, while 46 (44.7%) have between 6-10 management staff out of the 103(100%) firms, 73(70.9%) firms have less than 50 auxiliary, clerical and operational/technical staff. The structural characteristics of firms and the percentage gains in agglomeration economies were cross tabulated; and the chi-square carried out reveals a significant positive relationship between majority of the structural characteristics and the percentage gains in agglomeration economies. This lends credence to the significance of the degree of agglomeration economies enjoyed by firms as a determinant of the structural characteristics of firms.

The most important location factors were the market facilities. In all, the concentration of manufacturing establishments in the region can be explained by the

initial advantage that the region has over other places and so the tendency for industrial promoters to want to locate in the estate is not impossible.

This study has emphasized the economic rationality that led to the agglomeration of manufacturing activities in the Lagos region. Location optimality is derived directly from the forces of industrial location in Lagos and these forces are the concentration of manufacturing establishments in the industrial estate, which have been well laid out and provided with necessary infrastructural facilities. In addition, the fact that bulk of the raw materials used by some industries is not sourced locally, the geographical location of Lagos, having the best well developed port, location close to the entire port is inevitable, hence the concentration of manufacturing establishment in the Lagos industrial estates.

Most of the firms attested that they still enjoyed the initial advantages. It was apparent that most firms have started enjoying agglomeration benefits as far as some 28-34 years ago. The sharing of services was also important feature of the manufacturing industries and it was evident that transport facilities formed the most important facility being shared by the firms.

The research also examined the temporal variation as well as agglomeration benefits enjoyed amongst firms especially, between 2005-2009. The agglomeration benefits were analyzed, first on the bases of each industry group; and second at the aggregate level. There was correlation between the agglomeration benefits on the bases of each industry group, and at the aggregate level. These benefits vary significantly amongst the firms. Taking the lead was the access to the financial institution; accounted for 33.1% in 2005; 47.6% in 2006; 47.2% in 2007; 45.7% in 2008 and 51.5% in 2009. Telecommunications in contrast accounted for 4.9% in 2005; 1.9% in 2006; 1.9% in 2007; and 0.0% in 2008 and 2009 respectively. An analysis of variance test to determine whether or not the agglomeration economies enjoyed vary significantly among the firms indicated a 0.5% level of significance. A canonical correlation analysis of agglomeration economies and structural characteristics had an F- value of 2.90. This is significant at the 5% significant level. Thus, the degree of agglomeration economies enjoyed by firms is significantly explained by the structural characteristics. Agglomeration economies amongst the firms is not strong enough, because the number of firms that enjoyed less than 40% savings from agglomeration economies are far greater than those enjoying between 41-100%.

Of the ten impacts indicated by the respondents, air pollution and noise pollution, each accounting for twenty percent of the responses, were the most significant. Increase in house rent with a percentage of four was the least significant. Seventy five percent of the respondents reported that the firms are not doing enough to address the impact. There is a distance-decay effect in the impact. A correlation analysis between the severity of impact and distance resulted in a value of minus 0.641 which is significant at the 5% level. Finally, this study revealed impact of agglomeration of firms on the immediate environment, and found out that an agglomeration firm has impacted negatively.

7.2. IMPLICATIONS OF THE FINDINGS

The research findings have implications for the development of agglomeration and the industrial development of Lagos state and Nigeria as a whole. This is because Lagos state is still the commercial nerve centre of the country. Although, agglomeration economies are not very strong amongst the manufacturing establishments, it can be encouraged and strengthened.

There has been growing numbers of regional and local cluster policies in western Europe over the past decade, in regions as diverse as north Rhine Westphalia (Germany), Spain and Scotland. The industrial clusters in such countries have been the key drivers of economic development and the role of clustering of economic activity in relation to innovation and economic performance has being tremendous. Agglomeration economies amongst firms are capable of generating multiplier effects that can lead to socio-economic transformation of a region positively. The development of industrial estates is highly significant in encouraging agglomeration of firms, coupled with this is the development of infrastructural facilities. Facilities such as power supply, water supply and transport, which will have centripetal effects on the investors, these facilities will significantly enhance the operations of agglomeration firms.

In development of agglomeration, government has an important role to play, the small scale, the medium and large scale enterprises must be encouraged. Concerted efforts at the development of the iron and steel and petrol chemical industries will encouraged agglomeration development. The development of these major projects could facilitate local sourcing of raw materials, parts and or sub-assembly in basic

metal, iron and steel and fabricated metal products and the industrial and domestics and rubber products industries.

Industrial agglomeration can lead to amazing technological development of a region, thereby facilitating diffusion and innovation creation which will immensely contribute to the economic welfare and improved standard of living. The industrial estates has to be created and equipped with facilities, because industrialization in this modern world is a determinant of national power, thus, any country that failed in this aspect, will find it difficult to perform in other aspects of the economy. Government should invest in the industrial sector. The negative impacts of agglomeration also should be adequately curtailed by government, through its laws and regulations which need to be enforced on these firms, so that the immediate environment will not unnecessarily suffer the consequences of the actions of these industries.

Agglomeration of firms if encouraged, will lead to increase agglomeration economies, these agglomeration of firms should be made viable, encouraged and strengthened through government investment in the industrial sector, making the location factors to be liberal, giving tax holidays to the younger investors, relaxing the laws governing the importation of some raw materials, as this will have positive impact on productions. Financial aids should be given to these industries in form of loan, while the collateral securities should be made affordable for the investors. Assistance, in form of subsidy should be given to the investors.

Agglomeration policy could be further harnessed to launch Lagos state and Nigeria as a country into the desired goal of industrialization, and also help to transform the economy of the country.

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UNIVERSITY OF IBADAN

APPENDIX I
QUESTIONNAIRE ON AGGLOMERATION ECONOMIES AMONGST
FIRMS IN THE LAGOS REGION.

DEPARTMENT OF GEOGRAPHY
UNIVERSITY OF IBADAN
IBADAN-NIGERIA

Background Information

- (1) Location (Address/ Industrial Estate).....
- (2) Name of establishment
- (3) Year of establishment
- (4) Initial capital outlay (N):
- (5) Estimated firms investment (by the end of 2009) N.....
- (6) Plant size (floor space) Sq. meters
- (7) Capacity utilization %
- (8) Annual output (please give units and cost price per unit)
-
- (9) Staff strength and profile

Management	Operational Technical	Clerical/Auxiliary	Total

(B). Agglomeration Economies

10. When did your firm start enjoying agglomeration benefits?
Year
11. What are the advantages offered by your locating within the estate over locating elsewhere?
(i)
(ii)
(iii)
(iv)
12. Do your firm still enjoy these initial advantages?
Yes () No ()

13. Working relationship with other firms? (Choose the most appropriate)

Nature of Relationship	Within Lagos Metropolis	In the Country
i.. Raw materials purchase/supply	i.....	i.....
ii. Subcontract	ii.....	ii.....
iii. Collaboration in research & Development.	iii.....	iii.....
iv. Sales promotion.	iv.....	iv.....
v. Transpotation	v.....	v.....
vi. Power supply	vi.....	vi.....
vii Water supply	vii.....	vii.....
viii. Security	viii.....	viii.....
ix. Wastes treatment	ix.....	ix.....
x.Telecommunication	x.....	x.....
xi. Ports & Shipping	xi.....	xi.....
xii Labour supply	xii.....	xii.....

14. Does your plant share any of the following services with other firm(s)?

(a) Electricity	Yes ()	No ()
(b) Water	Yes ()	No ()
(c) Labour	Yes ()	No ()
(d) Transport facilities	Yes ()	No ()
(e) Security	Yes ()	No ()
(f) Wastes treatment	Yes ()	No ()
(g) Subcontract	Yes ()	No ()
(h) Raw materials purchase/ supply	Yes ()	No ()
(i) Telecommunication	Yes ()	No ()
(j) Ports and shipping	Yes ()	No ()
(k) Sales promotion	Yes ()	No ()
(l) Collaboration in research & Development	Yes ()	No ()
(m) Others (Please specify)	Yes ()	No ()

15. Please rank (1 for the most important, 16 for the least important) the location factors in order of importance

(i) Nearness to raw material ()

- (ii) Market facilities ()
- (iii) Transportation ()
- (iv) Research and Development ()
- (v) Water Supply ()
- (vi) Nearness to Labour ()
- (vii) Power Supply ()
- (viii) Personal reasons ()
- (ix) Availability of cheap land ()
- (x) Government policy ()
- (xi) Telecommunication ()
- (xii) Ports & Shipping Services ()
- (xiii) Access to financial institution ()
- (xiv) Security ()
- (xv) Wastes treatment ()
- (xvi) Proximity to related firms ()
- (xvii) Others (specify)

16. Express in percentages the benefits (Savings) enjoyed by your company in the last five years.

ITEM	2005 %	2006 %	2007 %	2008 %	2009 %
Joint transportation					
Joint power supply					
Joint raw material purchase/ supply					
Collaboration in research & Dev.					
Joint Labour supply					
Joint Wastes treatment					
Joint Security					
Joint telecommunication					
Joint Port & Shipping					
Access to financial institution					

17. Rank in order of importance from

- (1) Not important
- (2) Important

(3) Very important, the following advantages of agglomeration to your firm.

ITEM	RANK
Joint labour	
Joint transportation	
Joint raw material purchase	
Joint water supply	
Collaboration in Research and Development	
Joint power supply	
Joint security	
Joint telecommunication	
Joint wastes treatment	
Ports and Shipping	
Access to financial institution	

Thank you.

APPENDIX II

**LOCATION IMPACTS OF AGGLOMERATION ECONOMIES ON THE
FIRMS IMMEDIATE ENVIRONMENT**

**DEPARTMENT OF GEOGRAPHY
UNIVERSITY OF IBADAN
IBADAN-NIGERIA**

A. SOCIO ECONOMIC CHARACTERISTICS

1. Sex (i) Male () (ii) Female ()
2. Age (i) Less than 20 years () (ii) 20 – 30 years () (iii) 31 – 40 years
(iv) 41 – 50 years (v) 51 - 60 years (vi) above 60 years
3. Marital status (i) Married () (ii) Single () (iii) Divorced ()
4. Educational Qualification (i) No formal Education () (ii) Primary Education ()
(iii) Secondary Education () (iv) Tertiary Education ()
5. Nationality (i) Nigeria (ii) Foreigner

B. THE IMPACTS OF AGGLOMERATION ON THE IMMEDIATE ENVIRONMENT.

8. Street of Residence/ Location
9. Distance to the firm(s)Km
10. How long have you been living here now Years
11. Are you in any way affected by the operation(s) of the firms?
Yes () No ()
12. If yes how were you affected? (please, tick the most appropriate)
(i) Noise Pollution ()
(ii) Air Pollution ()
(iii) Irritating Fumes ()
(iv) Vibrating ()
(v) Land Pollution () (vi) Others (Please Specify)
13. What is your perception about severity of these environmental problems?
(i) Very Severe () (ii) Severe () (iii) Not Severe ()
14. In your opinion, do you think the firms are doing enough to curtail such
negative impacts? Yes () No ()
15. What are your suggested solutions to these environmental problems?
(i)
(ii)
(iii)
(iv)

APPENDIX III

Quadrant Count Analysis of the Spatial Distribution of the Agglomeration Firms

Industries/Grid with (x)	F	Fx
0	531	0
1	28	28
2	18	36
3	8	24
4	1	5
5	2	10
15	588	103

$$\begin{aligned} \text{Mean} &= \frac{\sum fx}{\sum f} \\ &= \frac{103}{588} = 0.175 \\ &= 0.18 \end{aligned}$$

Determination of level of clustering of industries in Lagos Region

Industry	Variance
X	$\sigma = \frac{x - \sigma_p}{N - 1}$
0	$\sigma = \frac{(0 - 0.41)^2 \cdot 0.169}{(103 - 1) = 102} = 0.0016$
1	$\sigma = \frac{(1 - 0.41)^2 \cdot 0.59^2 \cdot 0.3431}{(103 - 1) = 102} = 0.0034$
2	$\sigma = \frac{(2 - 0.41)^2 \cdot 1.59^2 \cdot 2.5281}{(103 - 1) = 102} = 0.0248$
3	$\sigma = \frac{(3 - 0.41)^2 \cdot 2.59^2 \cdot 6.7081}{(103 - 1) = 102} = 0.0658$
4	$\sigma = \frac{(4 - 0.41)^2 \cdot 3.59^2 \cdot 12.8881}{(103 - 1) = 102} = 0.1264$
5	$\sigma = \frac{(5 - 0.41)^2 \cdot 4.59^2 \cdot 21.0681}{(103 - 1) = 102} = 0.2066$

Variance mean ratio = 0.8496 + 0.0954 + 0.4464 + 0.526 + 0.1234 + 0.4132 / 0.41

$$\begin{aligned} &= \frac{2.457}{0.41} \\ &= 5.993 \end{aligned}$$

Industry	
x	Clustered of industry per grid = σ_0 x freq of industry per grid
0	0.0016 X 531 = 0.8496
1	0.00341 X 28 = 0.0954

2	$0.0248 \times 18 = 0.4464$
3	$0.0658 \times 8 = 0.526$
4	$0.1264 \times 1 = 0.1264$
5	$0.2066 \times 2 = 0.4132$

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APPENDIX IV

Cross tabulation of the Industry Groups and the Estates

Industry Groups * Estates Crosstabulation

		Estates											Total		
		Apapa	Maton	Agbar a	Ikeja	Ilupeju	Ijora	Iganm u	Oshodi	Ogba	Ikorod u	Oregu n		Mushin / Oshodi	
Industry Groups	Food, beverages & tobacco	2 1.9%	0 .0%	1 1.0%	4 3.9%	3 2.9%	0 .0%	0 .0%	2 1.9%	0 .0%	0 .0%	0 .0%	0 .0%	12 11.7%	
	Chemical & phamaceutical	3 2.9%	0 .0%	2 1.9%	4 3.9%	2 1.9%	2 1.9%	0 .0%	0 .0%	1 1.0%	0 .0%	2 1.9%	0 .0%	16 15.5%	
	Domestic, Industries & plastics	0 .0%	0 .0%	0 .0%	3 2.9%	1 1.0%	0 .0%	0 .0%	3 2.9%	0 .0%	1 1.0%	1 1.0%	0 .0%	9 8.7%	
	Basic metal iron and steel fabrication	4 3.9%	0 .0%	0 .0%	3 2.9%	3 2.9%	0 .0%	2 1.9%	1 1.0%	0 .0%	0 .0%	0 .0%	0 .0%	13 12.6%	
	Pulp, paper and paper products printing.	2 1.9%	0 .0%	1 1.0%	4 3.9%	3 2.9%	0 .0%	2 1.9%	3 2.9%	0 .0%	0 .0%	0 .0%	1 1.0%	16 15.5%	
	Textile, weaving apparel and leather goods	2 1.9%	1 1.0%	2 1.9%	3 2.9%	2 1.9%	1 1.0%	2 1.9%	0 .0%	0 .0%	2 1.9%	2 1.9%	4 3.9%	21 20.4%	
	Wood & wood goods including furniture	0 .0%	2 1.9%	0 .0%	0 .0%	0 .0%	0 .0%	0 .0%	0 .0%	0 .0%	0 .0%	0 .0%	0 .0%	2 1.9%	
	Non-metalic mineral products	0 .0%	0 .0%	0 .0%	0 .0%	0 .0%	0 .0%	1 1.0%	0 .0%	0 .0%	0 .0%	0 .0%	2 1.9%	1 1.0%	4 3.9%
	Motor Vehicle and miscellaneous	0 .0%	0 .0%	0 .0%	3 2.9%	0 .0%	0 .0%	0 .0%	0 .0%	0 .0%	0 .0%	0 .0%	2 1.9%	1 1.0%	6 5.8%
	Electrical electronic	0 .0%	0 .0%	1 1.0%	0 .0%	0 .0%	0 .0%	0 .0%	1 1.0%	1 1.0%	1 1.0%	0 .0%	0 .0%	4 3.9%	
Total	13 12.6%	3 2.9%	7 6.8%	24 23.3%	14 13.6%	3 2.9%	7 6.8%	10 9.7%	2 1.9%	4 3.9%	9 8.7%	7 6.8%	103 100.0%		

Chi- square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	170.345 ^a	99	.000
Likelihood Ratio	120.878	99	.067
Linear-by-Linear Association	9.126	1	.003
N of Valid Cases	103		

a. 120 cells (100.0%) have expected count less than 5. The minimum expected count is .04.

($X^2 = 170.345$, $df = 99$, $p < 0.05$)

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APPENDIX V

Analysis of variance (ANOVA) for the Benefits of Agglomeration Economies

Multiple Comparisons of the Means

Degree of Agglomeration Economies

LSD

(I) AgroEcon	(J) AgroEcon	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Joint Transportation	Joint Power Supply	11.043*	2.931	.000	5.29	16.80
	Joint Raw material Purchase/Supply	-2.294	2.682	.393	-7.56	2.97
	Collaboration in Research and Development	9.734*	2.863	.001	4.11	15.35
	Joint Labour Supply	10.635*	2.804	.000	5.13	16.14
	Joint Water Supply	18.335*	3.145	.000	12.16	24.51
	Joint Waste Treatment	6.381*	2.745	.020	.99	11.77
	Joint Security	2.568	2.723	.346	-2.78	7.91
	Joint Telecommunication	30.370*	3.999	.000	22.52	38.22
	Joint Ports and Shipping	3.094	2.753	.261	-2.31	8.50
	Access to Financial Institution	-20.095*	2.612	.000	-25.22	-14.97
Joint Power Supply	Joint Transportation	-11.043*	2.931	.000	-16.80	-5.29
	Joint Raw material Purchase/Supply	-13.337*	2.776	.000	-18.79	-7.89
	Collaboration in Research and Development	-1.308	2.951	.658	-7.10	4.48
	Joint Labour Supply	-.408	2.894	.888	-6.09	5.27
	Joint Water Supply	7.293*	3.226	.024	.96	13.62
	Joint Waste Treatment	-4.661	2.837	.101	-10.23	.91
	Joint Security	-8.475*	2.815	.003	-14.00	-2.95
	Joint Telecommunication	19.327*	4.062	.000	11.35	27.30

	Joint Ports and Shipping	-7.949*	2.845	.005	-13.53	-2.36
	Access to Financial Institution	-31.138*	2.709	.000	-36.46	-25.82
Joint Raw material Purchase/Supply	Joint Transportation	2.294	2.682	.393	-2.97	7.56
	Joint Power Supply	13.337*	2.776	.000	7.89	18.79
	Collaboration in Research and Development	12.029*	2.703	.000	6.72	17.34
	Joint Labour Supply	12.929*	2.641	.000	7.74	18.11
	Joint Water Supply	20.630*	3.001	.000	14.74	26.52
	Joint Waste Treatment	8.676*	2.579	.001	3.61	13.74
	Joint Security	4.862	2.555	.057	-.15	9.88
	Joint Telecommunication	32.664*	3.886	.000	25.04	40.29
	Joint Ports and Shipping	5.388*	2.587	.038	.31	10.47
		Access to Financial Institution	-17.801*	2.436	.000	-22.58
Collaboration in Research and Development	Joint Transportation	-9.734*	2.863	.001	-15.35	-4.11
	Joint Power Supply	1.308	2.951	.658	-4.48	7.10
	Joint Raw material Purchase/Supply	-12.029*	2.703	.000	-17.34	-6.72
	Joint Labour Supply	.901	2.825	.750	-4.64	6.45
	Joint Water Supply	8.601*	3.164	.007	2.39	14.81
	Joint Waste Treatment	-3.353	2.767	.226	-8.78	2.08
	Joint Security	-7.167*	2.744	.009	-12.55	-1.78
	Joint Telecommunication	20.636*	4.013	.000	12.76	28.51
	Joint Ports and Shipping	-6.640*	2.774	.017	-12.09	-1.19
		Access to Financial Institution	-29.830*	2.635	.000	-35.00
Joint Labour Supply	Joint Transportation	-10.635*	2.804	.000	-16.14	-5.13
	Joint Power Supply	.408	2.894	.888	-5.27	6.09
	Joint Raw material Purchase/Supply	-12.929*	2.641	.000	-18.11	-7.74

	Collaboration in Research and Development	-901	2.825	.750	-6.45	4.64
	Joint Water Supply	7.700*	3.111	.014	1.59	13.81
	Joint Waste Treatment	-4.254	2.706	.116	-9.57	1.06
	Joint Security	-8.067*	2.683	.003	-13.33	-2.80
	Joint Telecommunication	19.735*	3.972	.000	11.94	27.53
	Joint Ports and Shipping	-7.541*	2.714	.006	-12.87	-2.21
	Access to Financial Institution	-30.731*	2.571	.000	-35.78	-25.68
Joint Water Supply	Joint Transportation	-18.335*	3.145	.000	-24.51	-12.16
	Joint Power Supply	-7.293*	3.226	.024	-13.62	-.96
	Joint Raw material Purchase/Supply	-20.630*	3.001	.000	-26.52	-14.74
	Collaboration in Research and Development	-8.601*	3.164	.007	-14.81	-2.39
	Joint Labour Supply	-7.700*	3.111	.014	-13.81	-1.59
	Joint Waste Treatment	-11.954*	3.058	.000	-17.96	-5.95
	Joint Security	-15.768*	3.038	.000	-21.73	-9.80
	Joint Telecommunication	12.035*	4.219	.004	3.75	20.32
	Joint Ports and Shipping	-15.241*	3.065	.000	-21.26	-9.22
	Access to Financial Institution	-38.431*	2.939	.000	-44.20	-32.66
Joint Waste Treatment	Joint Transportation	-6.381*	2.745	.020	-11.77	-.99
	Joint Power Supply	4.661	2.837	.101	-.91	10.23
	Joint Raw material Purchase/Supply	-8.676*	2.579	.001	-13.74	-3.61
	Collaboration in Research and Development	3.353	2.767	.226	-2.08	8.78
	Joint Labour Supply	4.254	2.706	.116	-1.06	9.57
	Joint Water Supply	11.954*	3.058	.000	5.95	17.96
	Joint Security	-3.814	2.621	.146	-8.96	1.33
	Joint Telecommunication	23.989*	3.930	.000	16.27	31.70

	Joint Ports and Shipping	-3.287	2.653	.216	-8.50	1.92
	Access to Financial Institution	-26.477*	2.506	.000	-31.40	-21.56
Joint Security	Joint Transportation	-2.568	2.723	.346	-7.91	2.78
	Joint Power Supply	8.475*	2.815	.003	2.95	14.00
	Joint Raw material Purchase/Supply	-4.862	2.555	.057	-9.88	.15
	Collaboration in Research and Development	7.167*	2.744	.009	1.78	12.55
	Joint Labour Supply	8.067*	2.683	.003	2.80	13.33
	Joint Water Supply	15.768*	3.038	.000	9.80	21.73
	Joint Waste Treatment	3.814	2.621	.146	-1.33	8.96
	Joint Telecommunication	27.802*	3.915	.000	20.12	35.49
	Joint Ports and Shipping	.526	2.630	.841	-4.64	5.69
	Access to Financial Institution	-22.663*	2.482	.000	-27.53	-17.79
Joint Telecommunication	Joint Transportation	-30.370*	3.999	.000	-38.22	-22.52
	Joint Power Supply	-19.327*	4.062	.000	-27.30	-11.35
	Joint Raw material Purchase/Supply	-32.664*	3.886	.000	-40.29	-25.04
	Collaboration in Research and Development	-20.636*	4.013	.000	-28.51	-12.76
	Joint Labour Supply	-19.735*	3.972	.000	-27.53	-11.94
	Joint Water Supply	-12.035*	4.219	.004	-20.32	-3.75
	Joint Waste Treatment	-23.989*	3.930	.000	-31.70	-16.27
	Joint Security	-27.802*	3.915	.000	-35.49	-20.12
	Joint Ports and Shipping	-27.276*	3.936	.000	-35.00	-19.55
	Access to Financial Institution	-50.466*	3.839	.000	-58.00	-42.93
Joint Ports and Shipping	Joint Transportation	-3.094	2.753	.261	-8.50	2.31
	Joint Power Supply	7.949*	2.845	.005	2.36	13.53
	Joint Raw material Purchase/Supply	-5.388*	2.587	.038	-10.47	-.31

	Collaboration in Research and Development	6.640*	2.774	.017	1.19	12.09
	Joint Labour Supply	7.541*	2.714	.006	2.21	12.87
	Joint Water Supply	15.241*	3.065	.000	9.22	21.26
	Joint Waste Treatment	3.287	2.653	.216	-1.92	8.50
	Joint Security	-.526	2.630	.841	-5.69	4.64
	Joint Telecommunication	27.276*	3.936	.000	19.55	35.00
	Access to Financial Institution	-23.189*	2.515	.000	-28.13	-18.25
Access to Financial Institution	Joint Transportation	20.095*	2.612	.000	14.97	25.22
	Joint Power Supply	31.138*	2.709	.000	25.82	36.46
	Joint Raw material Purchase/Supply	17.801*	2.436	.000	13.02	22.58
	Collaboration in Research and Development	29.830*	2.635	.000	24.66	35.00
	Joint Labour Supply	30.731*	2.571	.000	25.68	35.78
	Joint Water Supply	38.431*	2.939	.000	32.66	44.20
	Joint Waste Treatment	26.477*	2.506	.000	21.56	31.40
	Joint Security	22.663*	2.482	.000	17.79	27.53
	Joint Telecommunication	50.466*	3.839	.000	42.93	58.00
	Joint Ports and Shipping	23.189*	2.515	.000	18.25	28.13

*. The mean difference is significant at the 0.05 level.

There are 11 Agglomeration Economies, the means from the 11 are paired up and Difference for each pair estimated in the table below. For each pair, the significant mean difference at 5% level is starred (*)

SORT CASES BY DegrAgroEcon (A).

SORT CASES BY Sn (A).

The results indicate that there is significant difference between any pairs of means as shown in the table.

Degree of Agglomeration Economies

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Joint Transportation	71	36.66	20.898	2.480	31.72	41.61	0	88
Joint Power Supply	63	25.62	16.079	2.026	21.57	29.67	0	53
Joint Raw material Purchase/Supply	91	38.96	19.604	2.055	34.87	43.04	2	71
Collaboration in Research and Development	69	26.93	18.502	2.227	22.48	31.37	0	67
Joint Labour Supply	75	26.03	18.411	2.126	21.79	30.26	0	70
Joint Water Supply	49	18.33	12.967	1.852	14.60	22.05	0	50
Joint Waste Treatment	82	30.28	16.711	1.845	26.61	33.95	0	60
Joint Security	85	34.09	16.491	1.789	30.54	37.65	2	65
Joint Telecommunication	24	6.29	3.884	.793	4.65	7.93	2	20
Joint Ports and Shipping	81	33.57	18.989	2.110	29.37	37.77	5	66
Access to Financial Institution	103	56.76	10.846	1.069	54.64	58.88	21	80
Total	793	33.50	20.239	.719	32.09	34.91	0	88

Source: Author's analysis, 2011.

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APPENDIX VI

Cross tabulation of the Age of Firms with joint Transportation

Years of establishment * Joint transportation total Cross tabulation

			Joint transportation total			
			< 11	11 – 20	21 – 30	31 – 40
Years of establishment	1945 - 1950	Count	0	0	1	0
		% of Total	.0%	.0%	1.0%	.0%
	1951 - 1955	Count	0	1	0	0
		% of Total	.0%	1.0%	.0%	.0%
	1956 - 1960	Count	0	1	2	1
		% of Total	.0%	1.0%	1.9%	1.0%
	1961 - 1965	Count	2	0	0	3
		% of Total	1.9%	.0%	.0%	2.9%
	1966 - 1970	Count	0	0	2	3
		% of Total	.0%	.0%	1.9%	2.9%
	1971 - 1975	Count	0	2	2	3
		% of Total	.0%	1.9%	1.9%	2.9%
	1976 - 1980	Count	1	0	2	3
		% of Total	1.0%	.0%	1.9%	2.9%
	1981 - 1985	Count	0	3	2	7
		% of Total	.0%	2.9%	1.9%	6.8%
	1986 - 1990	Count	2	1	0	5
		% of Total	1.9%	1.0%	.0%	4.9%
	1991 - 1995	Count	0	0	2	4
		% of Total	.0%	.0%	1.9%	3.9%
	1996 - 2000	Count	1	0	2	5
		% of Total	1.0%	.0%	1.9%	4.9%
	2001 - 2005	Count	0	3	6	2
		% of Total	.0%	2.9%	5.8%	1.9%
	2006 - 2010	Count	1	1	1	3
		% of Total	1.0%	1.0%	1.0%	2.9%
Total		Count	7	12	22	39

Years of establishment * Joint transportation total Cross tabulation

			Joint transportation total			
			< 11	11 – 20	21 – 30	31 – 40
Years of establishment	1945 - 1950	Count	0	0	1	0
		% of Total	.0%	.0%	1.0%	.0%
	1951 - 1955	Count	0	1	0	0
		% of Total	.0%	1.0%	.0%	.0%
	1956 - 1960	Count	0	1	2	1
		% of Total	.0%	1.0%	1.9%	1.0%
	1961 - 1965	Count	2	0	0	3
		% of Total	1.9%	.0%	.0%	2.9%
	1966 - 1970	Count	0	0	2	3
		% of Total	.0%	.0%	1.9%	2.9%
	1971 - 1975	Count	0	2	2	3
		% of Total	.0%	1.9%	1.9%	2.9%
	1976 - 1980	Count	1	0	2	3
		% of Total	1.0%	.0%	1.9%	2.9%
	1981 - 1985	Count	0	3	2	7
		% of Total	.0%	2.9%	1.9%	6.8%
	1986 - 1990	Count	2	1	0	5
		% of Total	1.9%	1.0%	.0%	4.9%
	1991 - 1995	Count	0	0	2	4
		% of Total	.0%	.0%	1.9%	3.9%
	1996 - 2000	Count	1	0	2	5
		% of Total	1.0%	.0%	1.9%	4.9%
	2001 - 2005	Count	0	3	6	2
		% of Total	.0%	2.9%	5.8%	1.9%
	2006 - 2010	Count	1	1	1	3
		% of Total	1.0%	1.0%	1.0%	2.9%
Total		Count	7	12	22	39
		% of Total	6.8%	11.7%	21.4%	37.9%

Years of establishment * Joint transportation total Crosstabulation

			Joint transportation total		
			41 – 50	51 – 60	61 – 70
Years of establishment	1945 - 1950	Count	0	1	0
		% of Total	.0%	1.0%	.0%
	1951 - 1955	Count	1	0	1
		% of Total	1.0%	.0%	1.0%
	1956 - 1960	Count	0	0	0
		% of Total	.0%	.0%	.0%
	1961 - 1965	Count	0	0	0
		% of Total	.0%	.0%	.0%
	1966 - 1970	Count	1	0	0
		% of Total	1.0%	.0%	.0%
	1971 - 1975	Count	1	0	0
		% of Total	1.0%	.0%	.0%
	1976 - 1980	Count	4	0	0
		% of Total	3.9%	.0%	.0%
	1981 - 1985	Count	2	0	0
		% of Total	1.9%	.0%	.0%
	1986 - 1990	Count	2	0	0
		% of Total	1.9%	.0%	.0%
	1991 - 1995	Count	2	0	0
		% of Total	1.9%	.0%	.0%
	1996 - 2000	Count	2	1	0
		% of Total	1.9%	1.0%	.0%
	2001 - 2005	Count	1	0	0
		% of Total	1.0%	.0%	.0%
	2006 - 2010	Count	2	1	0
		% of Total	1.9%	1.0%	.0%
	Total	Count	18	3	1
		% of Total	17.5%	2.9%	1.0%

Years of establishment * Joint transportation total Crosstabulation

			Joint transportation	
			total	
			71 – 80	Total
Years of establishment	1945 - 1950	Count	0	2
		% of Total	.0%	1.9%
	1951 - 1955	Count	0	3
		% of Total	.0%	2.9%
	1956 - 1960	Count	0	4
		% of Total	.0%	3.9%
	1961 - 1965	Count	0	5
		% of Total	.0%	4.9%
	1966 - 1970	Count	0	6
		% of Total	.0%	5.8%
	1971 - 1975	Count	0	8
		% of Total	.0%	7.8%
	1976 - 1980	Count	0	10
		% of Total	.0%	9.7%
	1981 - 1985	Count	0	14
		% of Total	.0%	13.6%
	1986 - 1990	Count	1	11
		% of Total	1.0%	10.7%
	1991 - 1995	Count	0	8
		% of Total	.0%	7.8%
	1996 - 2000	Count	0	11
		% of Total	.0%	10.7%
	2001 - 2005	Count	0	12
		% of Total	.0%	11.7%
	2006 - 2010	Count	0	9
		% of Total	.0%	8.7%
Total		Count	1	103
		% of Total	1.0%	100.0%

Years of establishment * Joint transportation

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2797.451 ^a	2714	.129
Likelihood Ratio	629.242	2714	1.000
Linear-by-Linear Association	.006	1	.941
N of Valid Cases	103		

a. 2820 cells (100.0%) have expected count less than 5.
The minimum expected count is .01.

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APPENDIX VII

Cross tabulation of the Age of Firms with joint Power supply

Years of establishment * Joint power supply total Crosstabulation

			Joint power supply total			
			< 11	11 – 20	21 – 30	31 – 40
Years of establishment	1945 - 1950	Count	0	1	0	0
		% of Total	.0%	1.0%	.0%	.0%
	1951 - 1955	Count	0	1	1	1
		% of Total	.0%	1.0%	1.0%	1.0%
	1956 - 1960	Count	0	1	2	1
		% of Total	.0%	1.0%	1.9%	1.0%
	1961 - 1965	Count	0	3	1	1
		% of Total	.0%	2.9%	1.0%	1.0%
	1966 - 1970	Count	0	3	1	1
		% of Total	.0%	2.9%	1.0%	1.0%
	1971 - 1975	Count	0	2	2	3
		% of Total	.0%	1.9%	1.9%	2.9%
	1976 - 1980	Count	1	1	3	4
		% of Total	1.0%	1.0%	2.9%	3.9%
	1981 - 1985	Count	0	4	5	1
		% of Total	.0%	3.9%	4.9%	1.0%
	1986 - 1990	Count	2	3	2	1
		% of Total	1.9%	2.9%	1.9%	1.0%
	1991 - 1995	Count	0	1	5	0
		% of Total	.0%	1.0%	4.9%	.0%
1996 - 2000	Count	0	3	3	2	
	% of Total	.0%	2.9%	2.9%	1.9%	
2001 - 2005	Count	1	3	3	2	
	% of Total	1.0%	2.9%	2.9%	1.9%	
2006 - 2010	Count	0	4	4	1	
	% of Total	.0%	3.9%	3.9%	1.0%	
Total		Count	4	30	32	18
		% of Total	3.9%	29.1%	31.1%	17.5%

Years of establishment * Joint power supply total Crosstabulation

			Joint power supply total		
			41 – 50	51 – 60	61 – 70
Years of establishment	1945 - 1950	Count	1	0	0
		% of Total	1.0%	.0%	.0%
	1951 - 1955	Count	0	0	0
		% of Total	.0%	.0%	.0%
	1956 - 1960	Count	0	0	0
		% of Total	.0%	.0%	.0%

1961 - 1965	Count	0	0	0
	% of Total	.0%	.0%	.0%
1966 - 1970	Count	1	0	0
	% of Total	1.0%	.0%	.0%
1971 - 1975	Count	0	0	1
	% of Total	.0%	.0%	1.0%
1976 - 1980	Count	1	0	0
	% of Total	1.0%	.0%	.0%
1981 - 1985	Count	3	1	0
	% of Total	2.9%	1.0%	.0%
1986 - 1990	Count	1	0	1
	% of Total	1.0%	.0%	1.0%
1991 - 1995	Count	1	0	1
	% of Total	1.0%	.0%	1.0%
1996 - 2000	Count	2	1	0
	% of Total	1.9%	1.0%	.0%
2001 - 2005	Count	2	1	0
	% of Total	1.9%	1.0%	.0%
2006 - 2010	Count	0	0	0
	% of Total	.0%	.0%	.0%
Total	Count	12	3	3
	% of Total	11.7%	2.9%	2.9%

Years of establishment * Joint power supply total Crosstabulation

			Joint power supply total	
			71 – 80	Total
Years of establishment	1945 - 1950	Count	0	2
		% of Total	.0%	1.9%
	1951 - 1955	Count	0	3
		% of Total	.0%	2.9%
	1956 - 1960	Count	0	4
		% of Total	.0%	3.9%
	1961 - 1965	Count	0	5
		% of Total	.0%	4.9%
	1966 - 1970	Count	0	6
		% of Total	.0%	5.8%
	1971 - 1975	Count	0	8
		% of Total	.0%	7.8%
	1976 - 1980	Count	0	10
		% of Total	.0%	9.7%
	1981 - 1985	Count	0	14
		% of Total	.0%	13.6%
	1986 - 1990	Count	1	11

	% of Total	1.0%	10.7%
1991 - 1995	Count	0	8
	% of Total	.0%	7.8%
1996 - 2000	Count	0	11
	% of Total	.0%	10.7%
2001 - 2005	Count	0	12
	% of Total	.0%	11.7%
2006 - 2010	Count	0	9
	% of Total	.0%	8.7%
Total	Count	1	103
	% of Total	1.0%	100.0%

Years of establishment * Joint power supply

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	352.363 ^a	322	.118
Likelihood Ratio	201.721	322	1.000
Linear-by-Linear Association	.008	1	.927
N of Valid Cases	103		

a. 376 cells (100.0%) have expected count less than 5.
The minimum expected count is .01.

APPENDIX VIII

Cross tabulation of the Age of Firms with joint Raw material purchase/supply

Years of establishment * Joint raw material purchase/ supply total Cross tabulation

			Joint raw material purchase/ supply total			
			< 11	11 - 20	21 - 30	31 - 40
Years of establishment	1945 – 1950	Count	0	0	1	0
		% of Total	.0%	.0%	1.0%	.0%
	1951 – 1955	Count	0	1	1	0
		% of Total	.0%	1.0%	1.0%	.0%
	1956 – 1960	Count	0	0	1	0
		% of Total	.0%	.0%	1.0%	.0%
	1961 – 1965	Count	0	0	1	1
		% of Total	.0%	.0%	1.0%	1.0%
	1966 – 1970	Count	0	0	0	1
		% of Total	.0%	.0%	.0%	1.0%
	1971 – 1975	Count	0	1	0	2
		% of Total	.0%	1.0%	.0%	1.9%
	1976 – 1980	Count	1	0	2	4
		% of Total	1.0%	.0%	1.9%	3.9%
	1981 – 1985	Count	0	1	4	4
		% of Total	.0%	1.0%	3.9%	3.9%
	1986 – 1990	Count	0	1	4	2
		% of Total	.0%	1.0%	3.9%	1.9%
	1991 – 1995	Count	0	1	2	2
		% of Total	.0%	1.0%	1.9%	1.9%
	1996 – 2000	Count	0	1	4	2
		% of Total	.0%	1.0%	3.9%	1.9%
	2001 – 2005	Count	1	3	2	4
		% of Total	1.0%	2.9%	1.9%	3.9%
	2006 – 2010	Count	1	2	1	2
		% of Total	1.0%	1.9%	1.0%	1.9%
Total		Count	3	11	23	24

Years of establishment * Joint raw material purchase/ supply total Crosstabulation

			Joint raw material purchase/ supply total		
			41 – 50	51 - 60	61 – 70
Years of establishment	1945 – 1950	Count	1	0	0
		% of Total	1.0%	.0%	.0%
	1951 – 1955	Count	0	1	0
		% of Total	.0%	1.0%	.0%

1956 – 1960	Count	2	0	1
	% of Total	1.9%	.0%	1.0%
1961 – 1965	Count	2	0	0
	% of Total	1.9%	.0%	.0%
1966 – 1970	Count	4	1	0
	% of Total	3.9%	1.0%	.0%
1971 – 1975	Count	1	4	0
	% of Total	1.0%	3.9%	.0%
1976 – 1980	Count	3	0	0
	% of Total	2.9%	.0%	.0%
1981 – 1985	Count	3	2	0
	% of Total	2.9%	1.9%	.0%
1986 – 1990	Count	3	1	0
	% of Total	2.9%	1.0%	.0%
1991 – 1995	Count	2	0	1
	% of Total	1.9%	.0%	1.0%
1996 – 2000	Count	3	1	0
	% of Total	2.9%	1.0%	.0%
2001 – 2005	Count	0	2	0
	% of Total	.0%	1.9%	.0%
2006 – 2010	Count	2	0	1
	% of Total	1.9%	.0%	1.0%
Total	Count	26	12	3
	% of Total	25.2%	11.7%	2.9%

Years of establishment * Joint raw material purchase/ supply total Crosstabulation

			Joint raw material purchase/ supply total	
			71 – 80	Total
Years of establishment	1945 – 1950	Count	0	2
		% of Total	.0%	1.9%
1951 – 1955	Count	0	3	
	% of Total	.0%	2.9%	
1956 – 1960	Count	0	4	
	% of Total	.0%	3.9%	
1961 – 1965	Count	1	5	
	% of Total	1.0%	4.9%	
1966 – 1970	Count	0	6	
	% of Total	.0%	5.8%	
1971 – 1975	Count	0	8	
	% of Total	.0%	7.8%	
1976 – 1980	Count	0	10	
	% of Total	.0%	9.7%	
1981 – 1985	Count	0	14	

	% of Total	.0%	13.6%
1986 – 1990	Count	0	11
	% of Total	.0%	10.7%
1991 – 1995	Count	0	8
	% of Total	.0%	7.8%
1996 – 2000	Count	0	11
	% of Total	.0%	10.7%
2001 – 2005	Count	0	12
	% of Total	.0%	11.7%
2006 – 2010	Count	0	9
	% of Total	.0%	8.7%
Total	Count	1	103
	% of Total	1.0%	100.0%

Years of establishment * Joint raw material purchase/ supply

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	342.133 ^a	322	.211
Likelihood Ratio	218.924	322	1.000
Linear-by-Linear Association	5.732	1	.017
N of Valid Cases	103		

a. 376 cells (100.0%) have expected count less than 5.
The minimum expected count is .01.

APPENDIX IX

Cross tabulation of the Age of Firms with Collaboration in Research and Development

Years of establishment * Collaboration in Research and Development total Cross tabulation

			Collaboration in Research and Development total			
			< 11	11 - 20	21 - 30	31 - 40
Years of establishment	1945 - 1950	Count	0	0	1	1
		% of Total	.0%	.0%	1.0%	1.0%
	1951 - 1955	Count	0	0	1	1
		% of Total	.0%	.0%	1.0%	1.0%
	1956 - 1960	Count	1	1	1	0
		% of Total	1.0%	1.0%	1.0%	.0%
	1961 - 1965	Count	0	2	0	3
		% of Total	.0%	1.9%	.0%	2.9%
	1966 - 1970	Count	0	1	1	3
		% of Total	.0%	1.0%	1.0%	2.9%
	1971 - 1975	Count	0	1	3	1
		% of Total	.0%	1.0%	2.9%	1.0%
	1976 - 1980	Count	1	0	2	4
		% of Total	1.0%	.0%	1.9%	3.9%
	1981 - 1985	Count	2	2	2	6
		% of Total	1.9%	1.9%	1.9%	5.8%
	1986 - 1990	Count	3	2	0	2
		% of Total	2.9%	1.9%	.0%	1.9%
	1991 - 1995	Count	1	2	1	2
		% of Total	1.0%	1.9%	1.0%	1.9%
	1996 - 2000	Count	2	1	3	4
		% of Total	1.9%	1.0%	2.9%	3.9%
	2001 - 2005	Count	3	4	3	2
		% of Total	2.9%	3.9%	2.9%	1.9%
	2006 - 2010	Count	1	4	0	3
		% of Total	1.0%	3.9%	.0%	2.9%
Total		Count	14	20	18	32
		% of Total	13.6%	19.4%	17.5%	31.1%

Years of establishment * Collaboration in Research and Development total Cross tabulation

			Collaboration in Research and Development total			Total
			41 - 50	51 - 60	61 - 70	
Years of establishment	1945 - 1950	Count	0	0	0	2

	% of Total	.0%	.0%	.0%	1.9%
1951 - 1955	Count	0	1	0	3
	% of Total	.0%	1.0%	.0%	2.9%
1956 - 1960	Count	1	0	0	4
	% of Total	1.0%	.0%	.0%	3.9%
1961 - 1965	Count	0	0	0	5
	% of Total	.0%	.0%	.0%	4.9%
1966 - 1970	Count	0	0	1	6
	% of Total	.0%	.0%	1.0%	5.8%
1971 - 1975	Count	3	0	0	8
	% of Total	2.9%	.0%	.0%	7.8%
1976 - 1980	Count	2	0	1	10
	% of Total	1.9%	.0%	1.0%	9.7%
1981 - 1985	Count	2	0	0	14
	% of Total	1.9%	.0%	.0%	13.6%
1986 - 1990	Count	4	0	0	11
	% of Total	3.9%	.0%	.0%	10.7%
1991 - 1995	Count	2	0	0	8
	% of Total	1.9%	.0%	.0%	7.8%
1996 - 2000	Count	1	0	0	11
	% of Total	1.0%	.0%	.0%	10.7%
2001 - 2005	Count	0	0	0	12
	% of Total	.0%	.0%	.0%	11.7%
2006 - 2010	Count	1	0	0	9
	% of Total	1.0%	.0%	.0%	8.7%
Total	Count	16	1	2	103
	% of Total	15.5%	1.0%	1.9%	100.0%

Years of establishment * Collaboration in Research and Development

Chi-Square Tests

	value	Df	Asymp.sig. (2-sided)
Pearson Chi-Square	326.408 ^a	276	.020
Likelihood Ratio	200.667	276	1.000
Linear-by-Linear Association	6.310	1	.012
N of valid Cases	103		

a. 329 cells (100.0%) have expected count less than 5

The minimum expected count is .01

APPENDIX X

Crosstabulation of the Age of Firms with Joint Labour supply

Years of establishment * Joint labour supply total Cross tabulation

			Joint labour supply total			
			< 11	11 - 20	21 – 30	31 – 40
Years of establishment	1945 – 1950	Count	0	0	1	1
		% of Total	.0%	.0%	1.0%	1.0%
	1951 – 1955	Count	0	0	1	1
		% of Total	.0%	.0%	1.0%	1.0%
	1956 – 1960	Count	0	0	2	2
		% of Total	.0%	.0%	1.9%	1.9%
	1961 – 1965	Count	0	2	2	1
		% of Total	.0%	1.9%	1.9%	1.0%
	1966 – 1970	Count	1	3	0	1
		% of Total	1.0%	2.9%	.0%	1.0%
	1971 – 1975	Count	0	0	5	1
		% of Total	.0%	.0%	4.9%	1.0%
	1976 – 1980	Count	2	0	2	2
		% of Total	1.9%	.0%	1.9%	1.9%
	1981 – 1985	Count	3	3	4	2
		% of Total	2.9%	2.9%	3.9%	1.9%
	1986 – 1990	Count	2	3	2	1
		% of Total	1.9%	2.9%	1.9%	1.0%
	1991 – 1995	Count	0	1	4	3
		% of Total	.0%	1.0%	3.9%	2.9%
	1996 – 2000	Count	3	0	3	3
		% of Total	2.9%	.0%	2.9%	2.9%
	2001 – 2005	Count	1	3	1	5
		% of Total	1.0%	2.9%	1.0%	4.9%
	2006 – 2010	Count	3	1	3	1
		% of Total	2.9%	1.0%	2.9%	1.0%
Total		Count	15	16	30	24
		% of Total	14.6%	15.5%	29.1%	23.3%

Years of establishment * Joint labour supply total Cross tabulation

			Joint labour supply total			Total
			41 – 50	51 - 60	61 – 70	
Years of establishment	1945 – 1950	Count	0	0	0	2
		% of Total	.0%	.0%	.0%	1.9%
	1951 – 1955	Count	0	0	1	3
		% of Total	.0%	.0%	1.0%	2.9%
	1956 – 1960	Count	0	0	0	4

	% of Total	.0%	.0%	.0%	3.9%
1961 – 1965	Count	0	0	0	5
	% of Total	.0%	.0%	.0%	4.9%
1966 – 1970	Count	1	0	0	6
	% of Total	1.0%	.0%	.0%	5.8%
1971 – 1975	Count	1	1	0	8
	% of Total	1.0%	1.0%	.0%	7.8%
1976 – 1980	Count	3	1	0	10
	% of Total	2.9%	1.0%	.0%	9.7%
1981 – 1985	Count	2	0	0	14
	% of Total	1.9%	.0%	.0%	13.6%
1986 – 1990	Count	1	1	1	11
	% of Total	1.0%	1.0%	1.0%	10.7%
1991 – 1995	Count	0	0	0	8
	% of Total	.0%	.0%	.0%	7.8%
1996 – 2000	Count	2	0	0	11
	% of Total	1.9%	.0%	.0%	10.7%
2001 – 2005	Count	1	1	0	12
	% of Total	1.0%	1.0%	.0%	11.7%
2006 – 2010	Count	0	1	0	9
	% of Total	.0%	1.0%	.0%	8.7%
Total	Count	11	5	2	103
	% of Total	10.7%	4.9%	1.9%	100.0%

Years of establishment * Joint labour supply

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	296.390 ^a	276	.191
Likelihood Ratio	217.362	276	.996
Linear-by-Linear Association	1.172	1	.279
N of Valid Cases	103		

a. 329 cells (100.0%) have expected count less than 5.
The minimum expected count is .02.

APPENDIX XI

Crosstabulation of the Age of Firms with Joint Water supply

Years of establishment * Joint water supply total Cross tabulation

			Joint water supply total		
			< 11	11 - 20	21 – 30
Years of establishment	of 1945 - 1950	Count	0	1	1
		% of Total	.0%	1.0%	1.0%
	1951 - 1955	Count	0	3	0
		% of Total	.0%	2.9%	.0%
	1956 - 1960	Count	1	3	0
		% of Total	1.0%	2.9%	.0%
	1961 - 1965	Count	0	1	4
		% of Total	.0%	1.0%	3.9%
	1966 - 1970	Count	0	5	1
		% of Total	.0%	4.9%	1.0%
	1971 - 1975	Count	1	4	3
		% of Total	1.0%	3.9%	2.9%
	1976 - 1980	Count	0	6	4
		% of Total	.0%	5.8%	3.9%
	1981 - 1985	Count	1	12	1
		% of Total	1.0%	11.7%	1.0%
	1986 - 1990	Count	1	6	3
		% of Total	1.0%	5.8%	2.9%
	1991 - 1995	Count	1	6	1
		% of Total	1.0%	5.8%	1.0%
	1996 - 2000	Count	3	8	0
		% of Total	2.9%	7.8%	.0%
	2001 - 2005	Count	4	6	2
		% of Total	3.9%	5.8%	1.9%
	2006 - 2010	Count	2	5	2
		% of Total	1.9%	4.9%	1.9%
Total		Count	14	66	22
		% of Total	13.6%	64.1%	21.4%

Years of establishment * Joint water supply total Crosstabulation

			Joint water supply total	
			31 - 40	Total
Years of establishment	1945 - 1950	Count	0	2
		% of Total	.0%	1.9%
	1951 - 1955	Count	0	3
		% of Total	.0%	2.9%
	1956 - 1960	Count	0	4
		% of Total	.0%	3.9%
	1961 - 1965	Count	0	5
		% of Total	.0%	4.9%
	1966 - 1970	Count	0	6
		% of Total	.0%	5.8%
	1971 - 1975	Count	0	8
		% of Total	.0%	7.8%
	1976 - 1980	Count	0	10
		% of Total	.0%	9.7%
	1981 - 1985	Count	0	14
		% of Total	.0%	13.6%
	1986 - 1990	Count	1	11
		% of Total	1.0%	10.7%
	1991 - 1995	Count	0	8
		% of Total	.0%	7.8%
	1996 - 2000	Count	0	11
		% of Total	.0%	10.7%
	2001 - 2005	Count	0	12
		% of Total	.0%	11.7%
	2006 - 2010	Count	0	9
		% of Total	.0%	8.7%
	Total	Count	1	103
		% of Total	1.0%	100.0%

Years of establishment * Joint water supply

Chi-Square Tests

	Value	df	Asy mp. Sig. (2-sided)
Pearson Chi-Square	150.413 ^a	138	.222
Likelihood Ratio	117.953	138	.891
Linear-by-Linear Association	5.141	1	.023
N of Valid Cases	103		

a. 188 cells (100.0%) have expected count less than 5.
The minimum expected count is .01.

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APPENDIX XII

Cross tabulation of the Age of Firms with Joint Waste treatment

Years of establishment * Joint waste treatment total Crosstabulation

			Joint waste treatment total			
			< 11	11 - 20	21 - 30	31 - 40
Years of establishment	1945 – 1950	Count	0	0	1	0
		% of Total	.0%	.0%	1.0%	.0%
	1951 – 1955	Count	0	1	0	2
		% of Total	.0%	1.0%	.0%	1.9%
	1956 – 1960	Count	0	1	2	1
		% of Total	.0%	1.0%	1.9%	1.0%
	1961 – 1965	Count	0	1	1	1
		% of Total	.0%	1.0%	1.0%	1.0%
	1966 – 1970	Count	0	1	0	5
		% of Total	.0%	1.0%	.0%	4.9%
	1971 – 1975	Count	0	2	1	2
		% of Total	.0%	1.9%	1.0%	1.9%
	1976 – 1980	Count	1	3	1	3
		% of Total	1.0%	2.9%	1.0%	2.9%
	1981 – 1985	Count	0	6	5	2
		% of Total	.0%	5.8%	4.9%	1.9%
	1986 – 1990	Count	5	4	1	0
		% of Total	4.9%	3.9%	1.0%	.0%
	1991 – 1995	Count	0	2	1	2
		% of Total	.0%	1.9%	1.0%	1.9%
	1996 – 2000	Count	2	2	4	3
		% of Total	1.9%	1.9%	3.9%	2.9%
	2001 – 2005	Count	2	3	5	2
		% of Total	1.9%	2.9%	4.9%	1.9%
	2006 – 2010	Count	1	4	2	2
		% of Total	1.0%	3.9%	1.9%	1.9%
Total		Count	11	30	24	25
		% of Total	10.7%	29.1%	23.3%	24.3%

Years of establishment * Joint waste treatment total Crosstabulation

			Joint waste treatment total		Total
			41 – 50	51 - 60	
Years of establishment	1945 – 1950	Count	1	0	2
		% of Total	1.0%	.0%	1.9%
	1951 – 1955	Count	0	0	3
		% of Total	.0%	.0%	2.9%
	1956 – 1960	Count	0	0	4
		% of Total	.0%	.0%	3.9%

1961 – 1965	Count	2	0	5
	% of Total	1.9%	.0%	4.9%
1966 – 1970	Count	0	0	6
	% of Total	.0%	.0%	5.8%
1971 – 1975	Count	3	0	8
	% of Total	2.9%	.0%	7.8%
1976 – 1980	Count	1	1	10
	% of Total	1.0%	1.0%	9.7%
1981 – 1985	Count	1	0	14
	% of Total	1.0%	.0%	13.6%
1986 – 1990	Count	1	0	11
	% of Total	1.0%	.0%	10.7%
1991 – 1995	Count	2	1	8
	% of Total	1.9%	1.0%	7.8%
1996 – 2000	Count	0	0	11
	% of Total	.0%	.0%	10.7%
2001 – 2005	Count	0	0	12
	% of Total	.0%	.0%	11.7%
2006 – 2010	Count	0	0	9
	% of Total	.0%	.0%	8.7%
Total	Count	11	2	103
	% of Total	10.7%	1.9%	100.0%

Years of establishment * Joint waste treatment

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	259.456 ^a	230	.089
Likelihood Ratio	198.720	230	.933
Linear-by-Linear Association	6.978	1	.008
N of Valid Cases	103		

a. 282 cells (100.0%) have expected count less than 5.
The minimum expected count is .02.

APPENDIX XIII

Cross tabulation of the Age of Firms with Joint Security

Years of establishment * Joint security total Cross tabulation

			Joint security total			
			< 11	11 – 20	21 – 30	31 – 40
Years of establishment	1945 – 1950	Count	0	0	1	1
		% of Total	.0%	.0%	1.0%	1.0%
	1951 – 1955	Count	0	1	2	0
		% of Total	.0%	1.0%	1.9%	.0%
	1956 – 1960	Count	0	3	1	0
		% of Total	.0%	2.9%	1.0%	.0%
	1961 – 1965	Count	1	3	0	0
		% of Total	1.0%	2.9%	.0%	.0%
	1966 – 1970	Count	1	1	3	1
		% of Total	1.0%	1.0%	2.9%	1.0%
	1971 – 1975	Count	0	2	5	1
		% of Total	.0%	1.9%	4.9%	1.0%
	1976 – 1980	Count	0	2	4	3
		% of Total	.0%	1.9%	3.9%	2.9%
	1981 – 1985	Count	2	2	9	1
		% of Total	1.9%	1.9%	8.7%	1.0%
	1986 – 1990	Count	1	4	2	4
		% of Total	1.0%	3.9%	1.9%	3.9%
	1991 – 1995	Count	1	2	5	0
		% of Total	1.0%	1.9%	4.9%	.0%
	1996 – 2000	Count	0	5	3	3
		% of Total	.0%	4.9%	2.9%	2.9%
	2001 – 2005	Count	1	6	2	2
		% of Total	1.0%	5.8%	1.9%	1.9%
	2006 – 2010	Count	0	4	5	0
		% of Total	.0%	3.9%	4.9%	.0%
Total		Count	7	35	42	16
		% of Total	6.8%	34.0%	40.8%	15.5%

Years of establishment * Joint security total Crosstabulation

			Joint security total	
			41 – 50	Total
Years of establishment	1945 – 1950	Count	0	2
		% of Total	.0%	1.9%
	1951 – 1955	Count	0	3
		% of Total	.0%	2.9%
	1956 – 1960	Count	0	4

	% of Total	.0%	3.9%
1961 – 1965	Count	1	5
	% of Total	1.0%	4.9%
1966 – 1970	Count	0	6
	% of Total	.0%	5.8%
1971 – 1975	Count	0	8
	% of Total	.0%	7.8%
1976 – 1980	Count	1	10
	% of Total	1.0%	9.7%
1981 – 1985	Count	0	14
	% of Total	.0%	13.6%
1986 – 1990	Count	0	11
	% of Total	.0%	10.7%
1991 – 1995	Count	0	8
	% of Total	.0%	7.8%
1996 – 2000	Count	0	11
	% of Total	.0%	10.7%
2001 – 2005	Count	1	12
	% of Total	1.0%	11.7%
2006 – 2010	Count	0	9
	% of Total	.0%	8.7%
Total	Count	3	103
	% of Total	2.9%	100.0%

Years of establishment * Joint security

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	180.311 ^a	184	.563
Likelihood Ratio	159.621	184	.903
Linear-by-Linear Association	.255	1	.613
N of Valid Cases	103		

a. 235 cells (100.0%) have expected count less than 5.
The minimum expected count is .03.

APPENDIX XIV

Cross tabulation of the Age of Firms with Joint Telecommunication

Years of establishment * Joint telecommunication total Cross tabulation

		Joint telecommunication total		
		< 11	11 - 20	21 - 30
Years of establishment	1945 – 1950 Count	1	1	0
	% of Total	1.0%	1.0%	.0%
	1951 – 1955 Count	0	3	0
	% of Total	.0%	2.9%	.0%
	1956 – 1960 Count	1	2	1
	% of Total	1.0%	1.9%	1.0%
	1961 – 1965 Count	1	4	0
	% of Total	1.0%	3.9%	.0%
	1966 – 1970 Count	4	2	0
	% of Total	3.9%	1.9%	.0%
	1971 – 1975 Count	2	6	0
	% of Total	1.9%	5.8%	.0%
	1976 – 1980 Count	1	8	1
	% of Total	1.0%	7.8%	1.0%
	1981 – 1985 Count	4	8	1
	% of Total	3.9%	7.8%	1.0%
	1986 – 1990 Count	4	6	1
	% of Total	3.9%	5.8%	1.0%
	1991 – 1995 Count	1	7	0
	% of Total	1.0%	6.8%	.0%
	1996 – 2000 Count	7	4	0
	% of Total	6.8%	3.9%	.0%
	2001 – 2005 Count	5	6	1
	% of Total	4.9%	5.8%	1.0%
	2006 – 2010 Count	4	5	0
	% of Total	3.9%	4.9%	.0%
Total	Count	35	62	5
	% of Total	34.0%	60.2%	4.9%

Years of establishment * Joint telecommunication total Crosstabulation

		Joint telecommunication total		
		31 – 40	Total	
Years of establishment	1945 – 1950	Count	0	2
		% of Total	.0%	1.9%
	1951 – 1955	Count	0	3
		% of Total	.0%	2.9%
	1956 – 1960	Count	0	4
		% of Total	.0%	3.9%
	1961 – 1965	Count	0	5
		% of Total	.0%	4.9%
	1966 – 1970	Count	0	6
		% of Total	.0%	5.8%
	1971 – 1975	Count	0	8
		% of Total	.0%	7.8%
	1976 – 1980	Count	0	10
		% of Total	.0%	9.7%
	1981 – 1985	Count	1	14
		% of Total	1.0%	13.6%
1986 – 1990	Count	0	11	
	% of Total	.0%	10.7%	
1991 – 1995	Count	0	8	
	% of Total	.0%	7.8%	
1996 – 2000	Count	0	11	
	% of Total	.0%	10.7%	
2001 – 2005	Count	0	12	
	% of Total	.0%	11.7%	
2006 – 2010	Count	0	9	
	% of Total	.0%	8.7%	
Total	Count	1	103	
	of Total	1.0%	100.0%	

Years of establishment * Joint telecommunication

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	105.187 ^a	138	.983
Likelihood Ratio	85.286	138	1.000
Linear-by-Linear Association	1.798	1	.180
N of Valid Cases	103		

a. 188 cells (100.0%) have expected count less than 5.
The minimum expected count is .01.

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APPENDIX XV

Cross tabulation of the Age of Firms with Joint Ports and Shipping

Years of establishment * Joint ports & shipping total Cross tabulation

			Joint ports & shipping total			
			< 11	11 - 20	21 - 30	31 - 40
Years of establishment	1945 – 1950	Count	0	0	1	1
		% of Total	.0%	.0%	1.0%	1.0%
	1951 – 1955	Count	0	0	1	2
		% of Total	.0%	.0%	1.0%	1.9%
	1956 – 1960	Count	2	1	1	0
		% of Total	1.9%	1.0%	1.0%	.0%
	1961 – 1965	Count	0	1	0	3
		% of Total	.0%	1.0%	.0%	2.9%
	1966 – 1970	Count	0	2	3	1
		% of Total	.0%	1.9%	2.9%	1.0%
	1971 – 1975	Count	0	2	4	1
		% of Total	.0%	1.9%	3.9%	1.0%
	1976 – 1980	Count	1	0	5	3
		% of Total	1.0%	.0%	4.9%	2.9%
	1981 – 1985	Count	1	1	9	1
		% of Total	1.0%	1.0%	8.7%	1.0%
	1986 – 1990	Count	0	2	4	5
		% of Total	.0%	1.9%	3.9%	4.9%
	1991 – 1995	Count	0	3	2	3
		% of Total	.0%	2.9%	1.9%	2.9%
	1996 – 2000	Count	2	2	3	4
		% of Total	1.9%	1.9%	2.9%	3.9%
	2001 – 2005	Count	1	8	3	0
		% of Total	1.0%	7.8%	2.9%	.0%
	2006 – 2010	Count	2	2	1	4
		% of Total	1.9%	1.9%	1.0%	3.9%
Total		Count	9	24	37	28
		% of Total	8.7%	23.3%	35.9%	27.2%

Years of establishment * Joint ports & shipping total Cross tabulation

			Joint ports & shipping total	Total
			41 – 50	
Years of establishment	1945 – 1950	Count	0	2
		% of Total	.0%	1.9%
	1951 – 1955	Count	0	3
		% of Total	.0%	2.9%

1956 – 1960	Count	0	4
	% of Total	.0%	3.9%
1961 – 1965	Count	1	5
	% of Total	1.0%	4.9%
1966 – 1970	Count	0	6
	% of Total	.0%	5.8%
1971 – 1975	Count	1	8
	% of Total	1.0%	7.8%
1976 – 1980	Count	1	10
	% of Total	1.0%	9.7%
1981 – 1985	Count	2	14
	% of Total	1.9%	13.6%
1986 – 1990	Count	0	11
	% of Total	.0%	10.7%
1991 – 1995	Count	0	8
	% of Total	.0%	7.8%
1996 – 2000	Count	0	11
	% of Total	.0%	10.7%
2001 – 2005	Count	0	12
	% of Total	.0%	11.7%
2006 – 2010	Count	0	9
	% of Total	.0%	8.7%
Total	Count	5	103
	% of Total	4.9%	100.0%

Years of establishment * Joint ports & shipping

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	186.233 ^a	184	.440
Likelihood Ratio	161.881	184	.879
Linear-by-Linear Association	3.863	1	.049
N of Valid Cases	103		

a. 235 cells (100.0%) have expected count less than 5.
The minimum expected count is .05.

APPENDIX XVI

Cross tabulation of the Age of Firms with Access to Financial Institution

Years of establishment * Access to financial institution total Cross tabulation

			Access to financial institution total			
			11 – 20	21 - 30	31 – 40	41 – 50
Years of establishment	1945 – 1950	Count	0	1	0	1
		% of Total	.0%	1.0%	.0%	1.0%
	1951 – 1955	Count	0	0	0	2
		% of Total	.0%	.0%	.0%	1.9%
	1956 – 1960	Count	0	0	1	2
		% of Total	.0%	.0%	1.0%	1.9%
	1961 – 1965	Count	0	2	0	1
		% of Total	.0%	1.9%	.0%	1.0%
	1966 – 1970	Count	1	1	1	1
		% of Total	1.0%	1.0%	1.0%	1.0%
	1971 – 1975	Count	0	1	2	2
		% of Total	.0%	1.0%	1.9%	1.9%
	1976 – 1980	Count	1	2	4	2
		% of Total	1.0%	1.9%	3.9%	1.9%
	1981 – 1985	Count	1	2	3	5
		% of Total	1.0%	1.9%	2.9%	4.9%
	1986 – 1990	Count	1	1	2	4
		% of Total	1.0%	1.0%	1.9%	3.9%
	1991 – 1995	Count	0	3	3	2
		% of Total	.0%	2.9%	2.9%	1.9%
	1996 – 2000	Count	1	2	2	4
		% of Total	1.0%	1.9%	1.9%	3.9%
	2001 – 2005	Count	1	1	6	2
		% of Total	1.0%	1.0%	5.8%	1.9%
	2006 – 2010	Count	1	1	5	2
		% of Total	1.0%	1.0%	4.9%	1.9%
Total		Count	7	17	29	30
		% of Total	6.8%	16.5%	28.2%	29.1%

Years of establishment * Access to financial institution total Crosstabulation

			Access to financial institution total			Total
			51 – 60	61 - 70	81 – 90	
Years of establishment	1945 – 1950	Count	0	0	0	2
		% of Total	.0%	.0%	.0%	1.9%

1951 – 1955	Count	1	0	0	3
	% of Total	1.0%	.0%	.0%	2.9%
1956 – 1960	Count	0	0	1	4
	% of Total	.0%	.0%	1.0%	3.9%
1961 – 1965	Count	1	1	0	5
	% of Total	1.0%	1.0%	.0%	4.9%
1966 – 1970	Count	2	0	0	6
	% of Total	1.9%	.0%	.0%	5.8%
1971 – 1975	Count	3	0	0	8
	% of Total	2.9%	.0%	.0%	7.8%
1976 – 1980	Count	1	0	0	10
	% of Total	1.0%	.0%	.0%	9.7%
1981 – 1985	Count	2	1	0	14
	% of Total	1.9%	1.0%	.0%	13.6%
1986 – 1990	Count	2	1	0	11
	% of Total	1.9%	1.0%	.0%	10.7%
1991 – 1995	Count	0	0	0	8
	% of Total	.0%	.0%	.0%	7.8%
1996 – 2000	Count	2	0	0	11
	% of Total	1.9%	.0%	.0%	10.7%
2001 – 2005	Count	2	0	0	12
	% of Total	1.9%	.0%	.0%	11.7%
2006 – 2010	Count	0	0	0	9
	% of Total	.0%	.0%	.0%	8.7%
Total	Count	16	3	1	103
	% of Total	15.5%	2.9%	1.0%	100.0%

Years of establishment * Access to financial institution

Chi-Square Tests

	value	Df	Asymp.sig. (2-sided)
Pearson Chi-Square	254.752 ^a	276	.816
Likelihood Ratio	186.893	276	1.000
Linear-by-Linear Association	4.496	1	.034
N of valid Cases	103		

a.329 cells (100.0%) have expected count less than 5
The minimum expected count is .01

APPENDIX XVII

Cross tabulation of Areal Plant Size with Joint Transportation

Areal Plant Size * Joint transportation total Crosstabulation

			Joint transportation total				
			< 11	11 – 20	21 - 30	31 – 40	41 - 50
Areal Plant Size	< 501	Count	3	4	9	17	5
		% of Total	2.9%	3.9%	8.7%	16.5%	4.9%
	501 - 1000	Count	2	6	6	11	5
		% of Total	1.9%	5.8%	5.8%	10.7%	4.9%
	1001 - 2000	Count	1	1	6	6	7
		% of Total	1.0%	1.0%	5.8%	5.8%	6.8%
	2001 - 3000	Count	1	1	1	2	1
		% of Total	1.0%	1.0%	1.0%	1.9%	1.0%
	> 3000	Count	0	0	0	3	0
		% of Total	.0%	.0%	.0%	2.9%	.0%
Total	Count		7	12	22	39	18
		% of Total	6.8%	11.7%	21.4%	37.9%	17.5%

Areal Plant Size * Joint transportation total Crosstabulation

			Joint transportation total			Total
			51 – 60	61 – 70	71 - 80	
Areal Plant Size	< 501	Count	3	0	0	41
		% of Total	2.9%	.0%	.0%	39.8%
	501 - 1000	Count	0	1	1	32
		% of Total	.0%	1.0%	1.0%	31.1%
	1001 - 2000	Count	0	0	0	21
		% of Total	.0%	.0%	.0%	20.4%
	2001 - 3000	Count	0	0	0	6
		% of Total	.0%	.0%	.0%	5.8%
	> 3000	Count	0	0	0	3
		% of Total	.0%	.0%	.0%	2.9%
Total	Count		3	1	1	103
		% of Total	2.9%	1.0%	1.0%	100.0%

Areal Plant Size * Joint transportation

Chi-Square Tests

	Value	df	Asy mp. Sig. (2-sided)
Pearson Chi-Square	213.658 ^a	236	.849
Likelihood Ratio	173.512	236	.999
Linear-by-Linear Association	.056	1	.812
N of Valid Cases	103		

a. 300 cells (100.0%) have expected count less than 5.
The minimum expected count is .03.

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APPENDIX XVIII

Cross tabulation of Areal plant Size with Joint Power Supply

Areal Plant Size * Joint power supply total Cross tabulation

			Joint power supply total				
			< 11	11 – 20	21 - 30	31 – 40	41 - 50
Areal Plant Size	< 501	Count	2	12	12	7	6
		% of Total	1.9%	11.7%	11.7%	6.8%	5.8%
	501 - 1000	Count	1	13	5	7	3
		% of Total	1.0%	12.6%	4.9%	6.8%	2.9%
	1001 - 2000	Count	0	3	11	3	3
		% of Total	.0%	2.9%	10.7%	2.9%	2.9%
	2001 - 3000	Count	1	1	3	0	0
		% of Total	1.0%	1.0%	2.9%	.0%	.0%
	> 3000	Count	0	1	1	1	0
		% of Total	.0%	1.0%	1.0%	1.0%	.0%
Total		Count	4	30	32	18	12
		% of Total	3.9%	29.1%	31.1%	17.5%	11.7%

Areal Plant Size * Joint power supply total Cross tabulation

			Joint power supply total			Total
			51 – 60	61 – 70	71 - 80	
Areal Plant Size	< 501	Count	2	0	0	41
		% of Total	1.9%	.0%	.0%	39.8%
	501 - 1000	Count	1	1	1	32
		% of Total	1.0%	1.0%	1.0%	31.1%
	1001 - 2000	Count	0	1	0	21
		% of Total	.0%	1.0%	.0%	20.4%
	2001 - 3000	Count	0	1	0	6
		% of Total	.0%	1.0%	.0%	5.8%
	> 3000	Count	0	0	0	3
		% of Total	.0%	.0%	.0%	2.9%
Total		Count	3	3	1	103
		% of Total	2.9%	2.9%	1.0%	100.0%

Areal Plant Size * Joint power supply

APPENDIX XIX

Cross tabulation of Areal plant Size with Joint Raw material Purchase /Supply

Areal Plant Size * Joint raw material purchase/ supply total Cross tabulation

			Joint raw material purchase/ supply total				
			< 11	11 – 20	21 - 30	31 – 40	41 - 50
Areal Plant Size	< 501	Count	0	6	12	7	10
		% of Total	.0%	5.8%	11.7%	6.8%	9.7%
	501 - 1000	Count	0	4	9	7	7
		% of Total	.0%	3.9%	8.7%	6.8%	6.8%
	1001 - 2000	Count	1	1	2	7	8
		% of Total	1.0%	1.0%	1.9%	6.8%	7.8%
	2001 - 3000	Count	2	0	0	1	1
		% of Total	1.9%	.0%	.0%	1.0%	1.0%
	> 3000	Count	0	0	0	2	0
		% of Total	.0%	.0%	.0%	1.9%	.0%
Total		Count	3	11	23	24	26
		% of Total	2.9%	10.7%	22.3%	23.3%	25.2%

Areal Plant Size * Joint raw material purchase/ supply total Cross tabulation

			Joint raw material purchase/ supply total			Total
			51 – 60	61 – 70	71 – 80	
Areal Plant Size	< 501	Count	6	0	0	41
		% of Total	5.8%	.0%	.0%	39.8%
	501 - 1000	Count	3	1	1	32
		% of Total	2.9%	1.0%	1.0%	31.1%
	1001 - 2000	Count	2	0	0	21
		% of Total	1.9%	.0%	.0%	20.4%
	2001 - 3000	Count	0	2	0	6
		% of Total	.0%	1.9%	.0%	5.8%
	> 3000	Count	1	0	0	3
		% of Total	1.0%	.0%	.0%	2.9%
Total		Count	12	3	1	103
		% of Total	11.7%	2.9%	1.0%	100.0%

Areal Plant Size * Joint raw material purchase/ supply

Chi-Square Tests

	Value	df	Asy mp. Sig. (2-sided)
Pearson Chi-Square	61.032 ^a	28	.000
Likelihood Ratio	42.725	28	.037
Linear-by-Linear Association	.955	1	.328
N of Valid Cases	103		

a. 33 cells (82.5%) have expected count less than 5. The minimum expected count is .03.

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APPENDIX XX

Cross tabulation of Areal plant Size with Collaboration in Research and Development

Areal Plant Size * Collaboration in Research and Development total Cross tabulation

			Collaboration in Research and Development total				
			< 11	11 – 20	21 - 30	31 – 40	41 - 50
Areal Plant Size < 501	Count		5	12	8	11	5
	% of Total		4.9%	11.7%	7.8%	10.7%	4.9%
501 - 1000	Count		4	4	6	10	6
	% of Total		3.9%	3.9%	5.8%	9.7%	5.8%
1001 - 2000	Count		3	2	4	10	2
	% of Total		2.9%	1.9%	3.9%	9.7%	1.9%
2001 - 3000	Count		2	1	0	0	3
	% of Total		1.9%	1.0%	.0%	.0%	2.9%
> 3000	Count		0	1	0	1	0
	% of Total		.0%	1.0%	.0%	1.0%	.0%
Total	Count		14	20	18	32	16
	% of Total		13.6%	19.4%	17.5%	31.1%	15.5%

Areal Plant Size * Collaboration in Research and Development total Cross tabulation

			Collaboration in Research and Development total		Total
			51 – 60	61 – 70	
Areal Plant Size < 501	Count		0	0	41
	% of Total		.0%	.0%	39.8%
501 - 1000	Count		1	1	32
	% of Total		1.0%	1.0%	31.1%
1001 - 2000	Count		0	0	21
	% of Total		.0%	.0%	20.4%
2001 - 3000	Count		0	0	6
	% of Total		.0%	.0%	5.8%
> 3000	Count		0	1	3
	% of Total		.0%	1.0%	2.9%
Total	Count		1	2	103
	% of Total		1.0%	1.9%	100.0%

Areal Plant Size * Collaboration in Research and Development Chi-Square Tests

	value	Df	Asymp.sig. (2-sided)
Pearson Chi-Square	37.174 ^a	24	.042
Likelihood Ratio	29.122	24	.216
Linear-by-Linear Association	1.885	1	.170
N of valid Cases	103		

a. 26 cells (74.3%) have expected count less than 5

The minimum expected count is .03

APPENDIX XXI

Cross tabulation of Areal plant Size with Joint Labour Supply

Areal Plant Size * Joint labour supply total Cross tabulation

			Joint labour supply total				
			< 11	11 - 20	21 - 30	31 – 40	41 - 50
Areal Plant Size	< 501	Count	7	8	11	11	3
		% of Total	6.8%	7.8%	10.7%	10.7%	2.9%
	501 - 1000	Count	5	5	10	6	3
		% of Total	4.9%	4.9%	9.7%	5.8%	2.9%
	1001 - 2000	Count	2	2	6	6	4
		% of Total	1.9%	1.9%	5.8%	5.8%	3.9%
	2001 - 3000	Count	1	1	2	0	0
		% of Total	1.0%	1.0%	1.9%	.0%	.0%
	> 3000	Count	0	0	1	1	1
		% of Total	.0%	.0%	1.0%	1.0%	1.0%
Total	Count	15	16	30	24	11	
	% of Total	14.6%	15.5%	29.1%	23.3%	10.7%	

Areal Plant Size * Joint labour supply total Cross tabulation

			Joint labour supply total		Total
			51 – 60	61 - 70	
Areal Plant Size	< 501	Count	1	0	41
		% of Total	1.0%	.0%	39.8%
	501 - 1000	Count	1	2	32
		% of Total	1.0%	1.9%	31.1%
	1001 - 2000	Count	1	0	21
		% of Total	1.0%	.0%	20.4%
	2001 - 3000	Count	2	0	6
		% of Total	1.9%	.0%	5.8%
	> 3000	Count	0	0	3
		% of Total	.0%	.0%	2.9%
Total	Count	5	2	103	
	% of Total	4.9%	1.9%	100.0%	

Areal Plant Size * Joint labour supply

APPENDIX XXII

Cross tabulation of Areal plant Size with Joint Water Supply

Areal Plant Size * Joint water supply total Cross tabulation

			Joint water supply total				Total
			< 11	11 - 20	21 - 30	31 - 40	
Areal Plant Size < 501	Count		9	23	8	1	41
	% of Total		8.7%	22.3%	7.8%	1.0%	39.8%
501 - 1000	Count		4	21	7	0	32
	% of Total		3.9%	20.4%	6.8%	.0%	31.1%
1001 - 2000	Count		1	19	1	0	21
	% of Total		1.0%	18.4%	1.0%	.0%	20.4%
2001 - 3000	Count		0	2	4	0	6
	% of Total		.0%	1.9%	3.9%	.0%	5.8%
> 3000	Count		0	1	2	0	3
	% of Total		.0%	1.0%	1.9%	.0%	2.9%
Total	Count		14	66	22	1	103
	% of Total		13.6%	64.1%	21.4%	1.0%	100.0%

Areal Plant Size * Joint water supply

Chi-Square Tests

	Value	df	Asy mp. Sig. (2-sided)
Pearson Chi-Square	21.534 ^a	12	.043
Likelihood Ratio	21.319	12	.046
Linear-by-Linear Association	3.851	1	.050
N of Valid Cases	103		

a. 14 cells (70.0%) have expected count less than 5. The minimum expected count is .03.

APPENDIX XXIII

Cross tabulation of Areal plant Size with Joint Waste treatment

			Joint waste treatment total				
			< 11	11 – 20	21 – 30	31 – 40	41 - 50
Areal Plant Size	< 501	Count	5	13	13	7	3
		% of Total	4.9%	12.6%	12.6%	6.8%	2.9%
	501 - 1000	Count	2	12	4	8	5
		% of Total	1.9%	11.7%	3.9%	7.8%	4.9%
	1001 - 2000	Count	1	5	5	7	3
		% of Total	1.0%	4.9%	4.9%	6.8%	2.9%
	2001 - 3000	Count	3	0	1	1	0
		% of Total	2.9%	.0%	1.0%	1.0%	.0%
	> 3000	Count	0	0	1	2	0
		% of Total	.0%	.0%	1.0%	1.9%	.0%
Total	Count		11	30	24	25	11
		% of Total	10.7%	29.1%	23.3%	24.3%	10.7%

Areal Plant Size * Joint waste treatment total Cross tabulation

			Joint waste treatment total	
			51 – 60	Total
Areal Plant Size	< 501	Count	0	41
		% of Total	.0%	39.8%
	501 - 1000	Count	1	32
		% of Total	1.0%	31.1%
	1001 - 2000	Count	0	21
		% of Total	.0%	20.4%
	2001 - 3000	Count	1	6
		% of Total	1.0%	5.8%
	> 3000	Count	0	3
		% of Total	.0%	2.9%
Total	Count		2	103
		% of Total	1.9%	100.0%

Areal Plant Size * Joint waste treatment

Chi-Square Tests

	Value	df	Asy mp. Sig. (2-sided)
Pearson Chi-Square	31.685 ^a	20	.047
Likelihood Ratio	28.189	20	.105
Linear-by-Linear Association	1.815	1	.178
N of Valid Cases	103		

a. 22 cells (73.3%) have expected count less than 5. The minimum expected count is .06.

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APPENDIX XXIV

Cross tabulation of Areal plant Size with Joint Security

Areal Plant Size * Joint security total Cross tabulation

			Joint security total			
			< 11	11 – 20	21 – 30	31 – 40
Areal Plant Size	< 501	Count	2	18	16	4
		% of Total	1.9%	17.5%	15.5%	3.9%
	501 - 1000	Count	3	7	13	7
		% of Total	2.9%	6.8%	12.6%	6.8%
	1001 - 2000	Count	1	7	10	3
		% of Total	1.0%	6.8%	9.7%	2.9%
	2001 - 3000	Count	1	2	1	2
		% of Total	1.0%	1.9%	1.0%	1.9%
	> 3000	Count	0	1	2	0
		% of Total	.0%	1.0%	1.9%	.0%
Total		Count	7	35	42	16
		% of Total	6.8%	34.0%	40.8%	15.5%

Areal Plant Size * Joint security total Cross tabulation

			Joint security total	
			41 – 50	Total
Areal Plant Size	< 501	Count	1	41
		% of Total	1.0%	39.8%
	501 - 1000	Count	2	32
		% of Total	1.9%	31.1%
	1001 - 2000	Count	0	21
		% of Total	.0%	20.4%
	2001 - 3000	Count	0	6
		% of Total	.0%	5.8%
	> 3000	Count	0	3
		% of Total	.0%	2.9%
Total		Count	3	103
		% of Total	2.9%	100.0%

Areal Plant Size * Joint security

Chi-Square Tests

	Value	df	Asy mp. Sig. (2-sided)
Pearson Chi-Square	11.468 ^a	16	.780
Likelihood Ratio	12.457	16	.712
Linear-by-Linear Association	.114	1	.735
N of Valid Cases	103		

a. 18 cells (72.0%) have expected count less than 5. The minimum expected count is .09.

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APPENDIX XXV

Cross tabulation of Areal plant Size with Joint Telecommunication

Areal Plant Size * Joint telecommunication total Cross tabulation

			Joint telecommunication total				Total
			< 11	11 - 20	21 - 30	31 – 40	
Areal Plant Size	< 501	Count	18	21	1	1	41
		% of Total	17.5%	20.4%	1.0%	1.0%	39.8%
	501 – 1000	Count	8	23	1	0	32
		% of Total	7.8%	22.3%	1.0%	.0%	31.1%
	1001 – 2000	Count	7	12	2	0	21
		% of Total	6.8%	11.7%	1.9%	.0%	20.4%
	2001 – 3000	Count	2	3	1	0	6
		% of Total	1.9%	2.9%	1.0%	.0%	5.8%
	> 3000	Count	0	3	0	0	3
		% of Total	.0%	2.9%	.0%	.0%	2.9%
Total		Count	35	62	5	1	103
		% of Total	34.0%	60.2%	4.9%	1.0%	100.0%

Areal Plant Size * Joint telecommunication

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.185 ^a	12	.600
Likelihood Ratio	10.774	12	.548
Linear-by-Linear Association	1.697	1	.193
N of Valid Cases	103		

a. 14 cells (70.0%) have expected count less than 5. The minimum expected count is .03.

APPENDIX XXVI

Cross tabulation of Areal plant Size with Joint Ports and Shipping

Areal Plant Size * Joint ports & shipping total Cross tabulation

			Joint ports & shipping total			
			< 11	11 - 20	21 - 30	31 - 40
Areal Plant Size	< 501	Count	3	12	12	13
		% of Total	2.9%	11.7%	11.7%	12.6%
	501 - 1000	Count	3	7	10	10
		% of Total	2.9%	6.8%	9.7%	9.7%
	1001 - 2000	Count	3	4	11	2
		% of Total	2.9%	3.9%	10.7%	1.9%
	2001 - 3000	Count	0	1	2	2
		% of Total	.0%	1.0%	1.9%	1.9%
	> 3000	Count	0	0	2	1
		% of Total	.0%	.0%	1.9%	1.0%
Total	Count		9	24	37	28
		% of Total		8.7%	23.3%	35.9%

Areal Plant Size * Joint ports & shipping total Crosstabulation

			Joint ports & shipping total	
			41 - 50	Total
Areal Plant Size	< 501	Count	1	41
		% of Total	1.0%	39.8%
	501 - 1000	Count	2	32
		% of Total	1.9%	31.1%
	1001 - 2000	Count	1	21
		% of Total	1.0%	20.4%
	2001 - 3000	Count	1	6
		% of Total	1.0%	5.8%
	> 3000	Count	0	3
		% of Total	.0%	2.9%
Total	Count		5	103
		% of Total		4.9%

Areal Plant Size * Joint ports & shipping

Chi-Square Tests

	Value	df	Asy mp. Sig. (2-sided)
Pearson Chi-Square	11.879 ^a	16	.752
Likelihood Ratio	13.261	16	.654
Linear-by-Linear Association	.305	1	.581
N of Valid Cases	103		

a. 17 cells (68.0%) have expected count less than 5. The minimum expected count is .15.

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APPENDIX XXVII

Cross tabulation of Areal plant Size with Access to financial Institution

Areal Plant Size * Access to financial institution total Cross tabulation

			Access to financial institution total				
			11 – 20	21 - 30	31 – 40	41 – 50	51 - 60
Areal Plant Size < 501	Count		4	8	10	10	8
	% of Total		3.9%	7.8%	9.7%	9.7%	7.8%
501 - 1000	Count		1	7	11	6	5
	% of Total		1.0%	6.8%	10.7%	5.8%	4.9%
1001 - 2000	Count		0	2	5	11	3
	% of Total		.0%	1.9%	4.9%	10.7%	2.9%
2001 - 3000	Count		2	0	1	2	0
	% of Total		1.9%	.0%	1.0%	1.9%	.0%
> 3000	Count		0	0	2	1	0
	% of Total		.0%	.0%	1.9%	1.0%	.0%
Total	Count		7	17	29	30	16
	% of Total		6.8%	16.5%	28.2%	29.1%	15.5%

Areal Plant Size * Access to financial institution total Cross tabulation

			Access to financial institution total		
			61 – 70	81 - 90	Total
Areal Plant Size < 501	Count		1	0	41
	% of Total		1.0%	.0%	39.8%
501 - 1000	Count		2	0	32
	% of Total		1.9%	.0%	31.1%
1001 - 2000	Count		0	0	21
	% of Total		.0%	.0%	20.4%
2001 - 3000	Count		0	1	6
	% of Total		.0%	1.0%	5.8%
> 3000	Count		0	0	3
	% of Total		.0%	.0%	2.9%
Total	Count		3	1	103
	% of Total		2.9%	1.0%	100.0%

Areal Plant Size * Access to Financial Institution

Chi-Square Tests

	value	Df	Asymp.sig. (2-sided)
Pearson Chi-Square	40.134 ^a	24	.021
Likelihood Ratio	30.840	24	.158
Linear-by-Linear Association	5.88	1	.443
N of valid Cases	103		

a.26 cells (74.3%) have expected count less than 5
The minimum expected count is .0

APPENDIX XXIII

Cross tabulation of the Capacity Utilization with Joint Transportation

Capacity * Joint transportation total Cross tabulation

			Joint transportation total					
			< 11	11 – 20	21 - 30	31 – 40	41 - 50	51 - 60
Capacity	21 - 40%	Count	1	2	0	0	1	0
		% of Total	1.0%	1.9%	.0%	.0%	1.0%	.0%
	41 - 60%	Count	4	0	0	5	1	0
		% of Total	3.9%	.0%	.0%	4.9%	1.0%	.0%
	61 - 80%	Count	2	1	11	14	5	1
		% of Total	1.9%	1.0%	10.7%	13.6%	4.9%	1.0%
	81 - 100%	Count	0	9	11	20	11	2
		% of Total	.0%	8.7%	10.7%	19.4%	10.7%	1.9%
Total		Count	7	12	22	39	18	3
		% of Total	6.8%	11.7%	21.4%	37.9%	17.5%	2.9%

Capacity * Joint transportation total Cross tabulation

			Joint transportation total		
			61 - 70	71 – 80	Total
Capacity	21 - 40%	Count	0	0	4
		% of Total	.0%	.0%	3.9%
	41 - 60%	Count	0	0	10
		% of Total	.0%	.0%	9.7%
	61 - 80%	Count	1	0	35
		% of Total	1.0%	.0%	34.0%
	81 - 100%	Count	0	1	54
		% of Total	.0%	1.0%	52.4%
Total		Count	1	1	103
		% of Total	1.0%	1.0%	100.0%

Capacity * Joint transportation

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	211.143 ^a	177	.041
Likelihood Ratio	148.787	177	.940
Linear-by-Linear Association	3.972	1	.046
N of Valid Cases	103		

a. 240 cells (100.0%) have expected count less than 5.
The minimum expected count is .04.

APPENDIX XXIX

Cross tabulation of the Capacity Utilization with Joint Power Supply

Capacity * Joint power supply total Cross tabulation

			Joint power supply total					
			< 11	11 – 20	21 - 30	31 – 40	41 - 50	51 - 60
Capacity	21 - 40%	Count	1	2	1	0	0	0
		% of Total	1.0%	1.9%	1.0%	.0%	.0%	.0%
	41 - 60%	Count	2	1	2	5	0	0
		% of Total	1.9%	1.0%	1.9%	4.9%	.0%	.0%
	61 - 80%	Count	1	12	11	8	3	0
		% of Total	1.0%	11.7%	10.7%	7.8%	2.9%	.0%
	81 - 100%	Count	0	15	18	5	9	3
		% of Total	.0%	14.6%	17.5%	4.9%	8.7%	2.9%
Total		Count	4	30	32	18	12	3
		% of Total	3.9%	29.1%	31.1%	17.5%	11.7%	2.9%

Capacity * Joint power supply total Cross tabulation

			Joint power supply total		
			61 - 70	71 – 80	Total
Capacity	21 - 40%	Count	0	0	4
		% of Total	.0%	.0%	3.9%
	41 - 60%	Count	0	0	10
		% of Total	.0%	.0%	9.7%
	61 - 80%	Count	0	0	35
		% of Total	.0%	.0%	34.0%
	81 - 100%	Count	3	1	54
		% of Total	2.9%	1.0%	52.4%
Total		Count	3	1	103
		% of Total	2.9%	1.0%	100.0%

Capacity * Joint power supply

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	35.066 ^a	21	.028
Likelihood Ratio	34.873	21	.029
Linear-by-Linear Association	7.393	1	.007
N of Valid Cases	103		

a. 25 cells (78.1%) have expected count less than 5. The minimum expected count is .04.

APPENDIX XXX

Cross tabulation of the Capacity Utilization with Joint Raw material Purchase /Supply

Capacity * Joint raw material purchase/ supply total Cross tabulation

			Joint raw material purchase/ supply total					
			< 11	11 – 20	21 – 30	31 – 40	41 - 50	51 - 60
Capacity	21 - 40%	Count	2	1	0	0	0	0
		% of Total	1.9%	1.0%	.0%	.0%	.0%	.0%
	41 - 60%	Count	0	2	0	5	2	0
		% of Total	.0%	1.9%	.0%	4.9%	1.9%	.0%
	61 - 80%	Count	0	2	9	4	12	6
		% of Total	.0%	1.9%	8.7%	3.9%	11.7%	5.8%
	81 - 100%	Count	1	6	14	15	12	6
		% of Total	1.0%	5.8%	13.6%	14.6%	11.7%	5.8%
Total		Count	3	11	23	24	26	12
		% of Total	2.9%	10.7%	22.3%	23.3%	25.2%	11.7%

Capacity * Joint raw material purchase/ supply total Cross tabulation

		Joint raw material purchase/ supply total		
		61 - 70	71 – 80	Total
21 – 40%	Count	1	0	4
	% of Total	1.0%	.0%	3.9%
41 – 60%	Count	0	1	10
	% of Total	.0%	1.0%	9.7%
61 – 80%	Count	2	0	35
	% of Total	1.9%	.0%	34.0%
81 - 100%	Count	0	0	54
	% of Total	.0%	.0%	52.4%
Total	Count	3	1	103
	% of Total	2.9%	1.0%	100.0%

Capacity * Joint raw material purchase/ supply

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	68.365 ^a	21	.000
Likelihood Ratio	45.664	21	.001
Linear-by-Linear Association	.000	1	.990
N of Valid Cases	103		

a. 24 cells (75.0%) have expected count less than 5. The minimum expected count is .04.

APPENDIX XXXI

Cross tabulation of the Capacity Utilization with Collaboration in Research and Development

Capacity * Collaboration in Research and Development total Cross tabulation

			Collaboration in Research and Development total					
			< 11	11 – 20	21 – 30	31 – 40	41 - 50	51 - 60
Capacity	21 - 40%	Count	3	1	0	0	0	0
		% of Total	2.9%	1.0%	.0%	.0%	.0%	.0%
	41 - 60%	Count	2	4	1	3	0	0
		% of Total	1.9%	3.9%	1.0%	2.9%	.0%	.0%
	61 - 80%	Count	0	7	9	10	6	1
		% of Total	.0%	6.8%	8.7%	9.7%	5.8%	1.0%
	81 - 100%	Count	9	8	8	19	10	0
		% of Total	8.7%	7.8%	7.8%	18.4%	9.7%	.0%
Total		Count	14	20	18	32	16	1
		% of Total	13.6%	19.4%	17.5%	31.1%	15.5%	1.0%

Capacity * Collaboration in Research and Development total Cross tabulation

			Collaboration in Research and Development total	
			61 - 70	Total
Capacity	21 - 40%	Count	0	4
		% of Total	.0%	3.9%
	41 - 60%	Count	0	10
		% of Total	.0%	9.7%
	61 - 80%	Count	2	35
		% of Total	1.9%	34.0%
	81 - 100%	Count	0	54
		% of Total	.0%	52.4%
Total		Count	2	103
		% of Total	1.9%	100.0%

Capacity * Collaboration in Research and Development

Chi-Square Tests

	value	Df	Asymp.sig. (2-sided)
Pearson Chi-Square	31.953 ^a	18	.022
Likelihood Ratio	35.046	18	.009
Linear-by-Linear Association	3.740	1	.053
N of valid Cases	103		

a. 19 cells (67.9%) have expected count less than 5

The minimum expected count is .04

APPENDIX XXXII

Cross tabulation of the Capacity Utilization with Joint Labour Supply

Capacity * Joint labour supply total Cross tabulation

			Joint labour supply total					
			< 11	11 – 20	21 - 30	31 – 40	41 - 50	51 - 60
Capacity	21 - 40%	Count	2	2	0	0	0	0
		% of Total	1.9%	1.9%	.0%	.0%	.0%	.0%
	41 - 60%	Count	3	1	4	2	0	0
		% of Total	2.9%	1.0%	3.9%	1.9%	.0%	.0%
	61 - 80%	Count	5	6	8	9	5	1
		% of Total	4.9%	5.8%	7.8%	8.7%	4.9%	1.0%
	81 - 100%	Count	5	7	18	13	6	4
		% of Total	4.9%	6.8%	17.5%	12.6%	5.8%	3.9%
Total		Count	15	16	30	24	11	5
		% of Total	14.6%	15.5%	29.1%	23.3%	10.7%	4.9%

Capacity * Joint labour supply total Cross tabulation

			Joint labour supply total	
			61 – 70	Total
Capacity	21 - 40%	Count	0	4
		% of Total	.0%	3.9%
	41 - 60%	Count	0	10
		% of Total	.0%	9.7%
	61 - 80%	Count	1	35
		% of Total	1.0%	34.0%
	81 - 100%	Count	1	54
		% of Total	1.0%	52.4%
Total		Count	2	103
		% of Total	1.9%	100.0%

Capacity * Joint labour supply

APPENDIX XXXIII

Cross tabulation of the Capacity Utilization with Joint Water Supply

Capacity * Joint water supply total Cross tabulation

			Joint water supply total				Total
			< 11	11 – 20	21 – 30	31 - 40	
Capacity	21 - 40%	Count	0	1	3	0	4
		% of Total	.0%	1.0%	2.9%	.0%	3.9%
	41 - 60%	Count	1	7	2	0	10
		% of Total	1.0%	6.8%	1.9%	.0%	9.7%
	61 - 80%	Count	6	20	8	1	35
		% of Total	5.8%	19.4%	7.8%	1.0%	34.0%
	81 - 100%	Count	7	38	9	0	54
		% of Total	6.8%	36.9%	8.7%	.0%	52.4%
Total		Count	14	66	22	1	103
		% of Total	13.6%	64.1%	21.4%	1.0%	100.0%

Capacity * Joint water supply

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.517 ^a	9	.310
Likelihood Ratio	9.451	9	.397
Linear-by-Linear Association	2.798	1	.094
N of Valid Cases	103		

a. 10 cells (62.5%) have expected count less than 5. The minimum expected count is .04.

APPENDIX XXXIV

Cross tabulation of the Capacity Utilization with Joint Waste Treatment

Capacity * Joint waste treatment total Cross tabulation

			Joint waste treatment total				
			< 11	11 – 20	21 – 30	31 - 40	41 - 50
Capacity	21 - 40%	Count	3	0	0	1	0
		% of Total	2.9%	.0%	.0%	1.0%	.0%
	41 - 60%	Count	1	3	2	2	2
		% of Total	1.0%	2.9%	1.9%	1.9%	1.9%
	61 - 80%	Count	1	8	8	12	4
		% of Total	1.0%	7.8%	7.8%	11.7%	3.9%
	81 - 100%	Count	6	19	14	10	5
		% of Total	5.8%	18.4%	13.6%	9.7%	4.9%
Total		Count	11	30	24	25	11
		% of Total	10.7%	29.1%	23.3%	24.3%	10.7%

Capacity * Joint waste treatment total Cross tabulation

			Joint waste treatment total	
			51 - 60	Total
Capacity	21 - 40%	Count	0	4
		% of Total	.0%	3.9%
	41 - 60%	Count	0	10
		% of Total	.0%	9.7%
	61 - 80%	Count	2	35
		% of Total	1.9%	34.0%
	81 - 100%	Count	0	54
		% of Total	.0%	52.4%
Total		Count	2	103
		% of Total	1.9%	100.0%

Capacity * Joint waste treatment

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	28.482 ^a	15	.019
Likelihood Ratio	23.059	15	.083
Linear-by-Linear Association	.052	1	.820
N of Valid Cases	103		

a. 16 cells (66.7%) have expected count less than 5. The minimum expected count is .08.

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APPENDIX XXXV

Cross tabulation of the Capacity Utilization with Joint Security

Capacity * Joint security total Cross tabulation

			Joint security total					Total
			< 11	11 – 20	21 – 30	31 - 40	41 - 50	
Capacity	21 - 40%	Count	1	2	1	0	0	4
		% of Total	1.0%	1.9%	1.0%	.0%	.0%	3.9%
	41 - 60%	Count	1	4	3	1	1	10
		% of Total	1.0%	3.9%	2.9%	1.0%	1.0%	9.7%
	61 - 80%	Count	2	12	15	5	1	35
		% of Total	1.9%	11.7%	14.6%	4.9%	1.0%	34.0%
	81 - 100%	Count	3	17	23	10	1	54
		% of Total	2.9%	16.5%	22.3%	9.7%	1.0%	52.4%
Total		Count	7	35	42	16	3	103
		% of Total	6.8%	34.0%	40.8%	15.5%	2.9%	100.0%

Capacity * Joint security

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.616 ^a	12	.882
Likelihood Ratio	5.938	12	.919
Linear-by-Linear Association	1.605	1	.205
N of Valid Cases	103		

a. 14 cells (70.0%) have expected count less than 5. The minimum expected count is .12.

APPENDIX XXXVI

Cross tabulation of the Capacity Utilization with Joint Telecommunication

Capacity * Joint telecommunication total Cross tabulation

			Joint telecommunication total				Total
			< 11	11 – 20	21 – 30	31 - 40	
Capacity	21 - 40%	Count	4	0	0	0	4
		% of Total	3.9%	.0%	.0%	.0%	3.9%
	41 - 60%	Count	4	6	0	0	10
		% of Total	3.9%	5.8%	.0%	.0%	9.7%
	61 - 80%	Count	13	20	1	1	35
		% of Total	12.6%	19.4%	1.0%	1.0%	34.0%
	81 - 100%	Count	14	36	4	0	54
		% of Total	13.6%	35.0%	3.9%	.0%	52.4%
Total		Count	35	62	5	1	103
		% of Total	34.0%	60.2%	4.9%	1.0%	100.0%

Capacity * Joint telecommunication

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.844 ^a	9	.170
Likelihood Ratio	14.391	9	.109
Linear-by-Linear Association	5.776	1	.016
N of Valid Cases	103		

a. 11 cells (68.8%) have expected count less than 5. The minimum expected count is .04.

APPENDIX XXXVII

Cross tabulation of the Capacity Utilization with Joint Ports and Shipping

Capacity * Joint ports & shipping total Cross tabulation

			Joint ports & shipping total					Total
			< 11	11 – 20	21 – 30	31 - 40	41 - 50	
Capacity	21 - 40%	Count	1	2	1	0	0	4
		% of Total	1.0%	1.9%	1.0%	.0%	.0%	3.9%
	41 - 60%	Count	1	0	4	4	1	10
		% of Total	1.0%	.0%	3.9%	3.9%	1.0%	9.7%
	61 - 80%	Count	2	8	12	10	3	35
		% of Total	1.9%	7.8%	11.7%	9.7%	2.9%	34.0%
	81 - 100%	Count	5	14	20	14	1	54
		% of Total	4.9%	13.6%	19.4%	13.6%	1.0%	52.4%
Total		Count	9	24	37	28	5	103
		% of Total	8.7%	23.3%	35.9%	27.2%	4.9%	100.0%

Capacity * Joint ports & shipping

Chi-Square Tests

	Value	df	Asy mp. Sig. (2-sided)
Pearson Chi-Square	10.039 ^a	12	.613
Likelihood Ratio	12.914	12	.375
Linear-by-Linear Association	.095	1	.758
N of Valid Cases	103		

a. 14 cells (70.0%) have expected count less than 5. The minimum expected count is .19.

APPENDIX XXXIII

Cross tabulation of the Capacity Utilization with Access to Financial Institution

Capacity * Access to financial institution total Cross tabulation

			Access to financial institution total					
			11 – 20	21 – 30	31 – 40	41 - 50	51 - 60	61 - 70
Capacity	21 - 40%	Count	3	0	1	0	0	0
		% of Total	2.9%	.0%	1.0%	.0%	.0%	.0%
	41 - 60%	Count	1	1	2	4	1	1
		% of Total	1.0%	1.0%	1.9%	3.9%	1.0%	1.0%
	61 - 80%	Count	2	7	9	8	7	1
		% of Total	1.9%	6.8%	8.7%	7.8%	6.8%	1.0%
	81 - 100%	Count	1	9	17	18	8	1
		% of Total	1.0%	8.7%	16.5%	17.5%	7.8%	1.0%
Total		Count	7	17	29	30	16	3
		% of Total	6.8%	16.5%	28.2%	29.1%	15.5%	2.9%

Capacity * Access to financial institution total Cross tabulation

			Access to financial institution total	
			81 - 90	Total
Capacity	21 - 40%	Count	0	4
		% of Total	.0%	3.9%
	41 - 60%	Count	0	10
		% of Total	.0%	9.7%
	61 - 80%	Count	1	35
		% of Total	1.0%	34.0%
	81 - 100%	Count	0	54
		% of Total	.0%	52.4%
Total		Count	1	103
		% of Total	1.0%	100.0%

Capacity * Access to financial Institution

Chi-Square Tests

	value	Df	Asymp.sig. (2-sided)
Pearson Chi-Square	38.896 ^a	18	.003
Likelihood Ratio	23.404	18	.176
Linear-by-Linear Association	2.338	1	.126
N of valid Cases	103		

a.20 cells (71.4%) have expected count less than 5

The minimum expected count

APPENDIX XXXIX

Cross tabulation of Estimated Firms Investment with Joint Transportation

Estimated firms investment * Joint transportation total Cross tabulation

			Joint transportation total			
			< 11	11 - 20	21 - 30	31 - 40
Estimated firms investment	< 1m	Count	1	0	0	5
		% of Total	1.0%	.0%	.0%	4.9%
	1 - 50m	Count	0	2	3	3
		% of Total	.0%	1.9%	2.9%	2.9%
	51 - 100m	Count	0	0	0	3
		% of Total	.0%	.0%	.0%	2.9%
	101 - 150m	Count	1	2	1	4
		% of Total	1.0%	1.9%	1.0%	3.9%
	151 - 200m	Count	3	2	1	2
		% of Total	2.9%	1.9%	1.0%	1.9%
	> 200m	Count	2	6	17	22
		% of Total	1.9%	5.8%	16.5%	21.4%
Total		Count	7	12	22	39
		% of Total	6.8%	11.7%	21.4%	37.9%

Estimated firms investment * Joint transportation total Cross tabulation

			Joint transportation total		
			41 - 50	51 - 60	61 - 70
Estimated firms investment	< 1m	Count	2	1	0
		% of Total	1.9%	1.0%	.0%
	1 - 50m	Count	3	0	1
		% of Total	2.9%	.0%	1.0%
	51 - 100m	Count	1	0	0
		% of Total	1.0%	.0%	.0%
	101 - 150m	Count	0	0	0
		% of Total	.0%	.0%	.0%
	151 - 200m	Count	3	0	0
		% of Total	2.9%	.0%	.0%
	> 200m	Count	9	2	0
		% of Total	8.7%	1.9%	.0%
Total		Count	18	3	1
		% of Total	17.5%	2.9%	1.0%

Estimated firms investment * Joint transportation total Cross tabulation

			Joint transportation total	
			71 - 80	Total
Estimated firms investment	< 1m	Count	0	9

	% of Total	.0%	8.7%
1 - 50m	Count	0	12
	% of Total	.0%	11.7%
51 - 100m	Count	0	4
	% of Total	.0%	3.9%
101 - 150m	Count	0	8
	% of Total	.0%	7.8%
151 - 200m	Count	0	11
	% of Total	.0%	10.7%
> 200m	Count	1	59
	% of Total	1.0%	57.3%
Total	Count	1	103
	% of Total	1.0%	100.0%

Estimated firms investment * Joint transportation

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	315.633 ^a	295	.196
Likelihood Ratio	201.937	295	1.000
Linear-by-Linear Association	.326	1	.568
N of Valid Cases	103		

a. 360 cells (100.0%) have expected count less than 5.
The minimum expected count is .04.

APPENDIX XL

Cross tabulation of Estimated Firms Investment with Joint Power Supply

Estimated firms investment * Joint power supply total Cross tabulation

			Joint power supply total			
			< 11	11 - 20	21 - 30	31 - 40
Estimated firms investment	< 1m	Count	0	1	4	2
		% of Total	.0%	1.0%	3.9%	1.9%
	1 - 50m	Count	0	2	4	2
		% of Total	.0%	1.9%	3.9%	1.9%
	51 - 100m	Count	0	0	2	1
		% of Total	.0%	.0%	1.9%	1.0%
	101 - 150m	Count	1	3	0	2
		% of Total	1.0%	2.9%	.0%	1.9%
	151 - 200m	Count	1	4	4	0
		% of Total	1.0%	3.9%	3.9%	.0%
	> 200m	Count	2	20	18	11
		% of Total	1.9%	19.4%	17.5%	10.7%
Total	Total	Count	4	30	32	18
		% of Total	3.9%	29.1%	31.1%	17.5%

Estimated firms investment * Joint power supply total Cross tabulation

			Joint power supply total		
			41 - 50	51 - 60	61 - 70
Estimated firms investment	< 1m	Count	2	0	0
		% of Total	1.9%	.0%	.0%
	1 - 50m	Count	3	1	0
		% of Total	2.9%	1.0%	.0%
	51 - 100m	Count	0	0	0
		% of Total	.0%	.0%	.0%
	101 - 150m	Count	1	1	0
		% of Total	1.0%	1.0%	.0%
	151 - 200m	Count	2	0	0
		% of Total	1.9%	.0%	.0%
	> 200m	Count	4	1	3
		% of Total	3.9%	1.0%	2.9%
Total	Total	Count	12	3	3
		% of Total	11.7%	2.9%	2.9%

Estimated firms investment * Joint power supply total Cross tabulation

			Joint power supply total
			71 - 80
			Total
Estimated firms investment	< 1m	Count	0
		% of Total	.0%
			9
			8.7%

1 - 50m	Count	0	12
	% of Total	.0%	11.7%
51 - 100m	Count	1	4
	% of Total	1.0%	3.9%
101 - 150m	Count	0	8
	% of Total	.0%	7.8%
151 - 200m	Count	0	11
	% of Total	.0%	10.7%
> 200m	Count	0	59
	% of Total	.0%	57.3%
Total	Count	1	103
	% of Total	1.0%	100.0%

Estimated firms investment * Joint power supply

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	49.529 ^a	35	.053
Likelihood Ratio	37.502	35	.355
Linear-by-Linear Association	2.780	1	.095
N of Valid Cases	103		

a. 44 cells (91.7%) have expected count less than 5. The minimum expected count is .04.

APPENDIX XLI

Cross tabulation of Estimated Firms Investment with Joint Raw material Purchase /Supply

Estimated firms investment * Joint raw material purchase/ supply total Cross tabulation

			Joint raw material purchase/ supply total			
			< 11	11 – 20	21 – 30	31 - 40
Estimated firms investment	< 1m	Count	0	2	3	1
		% of Total	.0%	1.9%	2.9%	1.0%
	1 - 50m	Count	0	1	2	4
		% of Total	.0%	1.0%	1.9%	3.9%
	51 – 100m	Count	0	0	2	0
		% of Total	.0%	.0%	1.9%	.0%
	101 - 150m	Count	0	1	3	2
		% of Total	.0%	1.0%	2.9%	1.9%
	151 - 200m	Count	1	1	4	2
		% of Total	1.0%	1.0%	3.9%	1.9%
	> 200m	Count	2	6	9	15
		% of Total	1.9%	5.8%	8.7%	14.6%
Total		Count	3	11	23	24
		% of Total	2.9%	10.7%	22.3%	23.3%

Estimated firms investment * Joint raw material purchase/ supply total Cross tabulation

			Joint raw material purchase/ supply total		
			41 – 50	51 - 60	61 – 70
Estimated firms investment	< 1m	Count	2	1	0
		% of Total	1.9%	1.0%	.0%
	1 - 50m	Count	3	2	0
		% of Total	2.9%	1.9%	.0%
	51 – 100m	Count	1	1	0
		% of Total	1.0%	1.0%	.0%
	101 - 150m	Count	2	0	0
		% of Total	1.9%	.0%	.0%
	151 - 200m	Count	2	0	1
		% of Total	1.9%	.0%	1.0%
	> 200m	Count	16	8	2
		% of Total	15.5%	7.8%	1.9%
Total		Count	26	12	3
		% of Total	25.2%	11.7%	2.9%

Estimated firms investment * Joint raw material purchase/ supply total Cross tabulation

		Joint raw material purchase/ supply total
		71 – 80
		Total

Estimated firms investment	< 1m	Count	0	9
		% of Total	.0%	8.7%
	1 - 50m	Count	0	12
		% of Total	.0%	11.7%
	51 – 100m	Count	0	4
		% of Total	.0%	3.9%
	101 - 150m	Count	0	8
		% of Total	.0%	7.8%
	151 - 200m	Count	0	11
		% of Total	.0%	10.7%
	> 200m	Count	1	59
		% of Total	1.0%	57.3%
Total		Count	1	103
		% of Total	1.0%	100.0%

Estimated firms investment * Joint raw material purchase/ supply

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.346 ^a	35	.991
Likelihood Ratio	22.267	35	.953
Linear-by-Linear Association	.688	1	.407
N of Valid Cases	103		

a. 43 cells (89.6%) have expected count less than 5. The minimum expected count is .04.

APPENDIX XLII

Cross tabulation of Estimated Firms Investment with Collaboration in Research and Development

Estimated firms investment * Collaboration in Research and Development total Cross tabulation

			Collaboration in Research and Development total			
			< 11	11 - 20	21 - 30	31 - 40
Estimated firms investment	< 1m	Count	3	4	1	0
		% of Total	2.9%	3.9%	1.0%	.0%
	1 - 50m	Count	2	4	1	4
		% of Total	1.9%	3.9%	1.0%	3.9%
	51 - 100m	Count	0	1	0	1
		% of Total	.0%	1.0%	.0%	1.0%
	101 - 150m	Count	2	2	2	2
		% of Total	1.9%	1.9%	1.9%	1.9%
	151 - 200m	Count	2	2	3	2
		% of Total	1.9%	1.9%	2.9%	1.9%
	> 200m	Count	5	7	11	23
		% of Total	4.9%	6.8%	10.7%	22.3%
Total	Total	Count	14	20	18	32
		% of Total	13.6%	19.4%	17.5%	31.1%

Estimated firms investment * Collaboration in Research and Development total Cross tabulation

			Collaboration in Research and Development total			Total
			41 - 50	51 - 60	61 - 70	
Estimated firms investment	< 1m	Count	1	0	0	9
		% of Total	1.0%	.0%	.0%	8.7%
	1 - 50m	Count	0	1	0	12
		% of Total	.0%	1.0%	.0%	11.7%
	51 - 100m	Count	2	0	0	4
		% of Total	1.9%	.0%	.0%	3.9%
	101 - 150m	Count	0	0	0	8
		% of Total	.0%	.0%	.0%	7.8%
	151 - 200m	Count	2	0	0	11
		% of Total	1.9%	.0%	.0%	10.7%
	> 200m	Count	11	0	2	59
		% of Total	10.7%	.0%	1.9%	57.3%
Total	Total	Count	16	1	2	103
		% of Total	15.5%	1.0%	1.9%	100.0%

Estimated firms investment * Collaboration in Research and Development

Chi-Square Tests

	Value	Df	Asymp.sig. (2-sided)
Pearson Chi-Square	394.402 ^a	432	.902
Likelihood Ratio	273.176	432	1.000
Linear-by-Linear Association	3.019	1	.082
N of valid Cases	103		

a.511 cells (100.0%) have expected count less than 5

The minimum expected count is .01

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APPENDIX XLIII

Cross tabulation of Estimated Firms Investment with Joint Labour Supply

Estimated firms investment * Joint labour supply total Cross tabulation

			Joint labour supply total			
			< 11	11 - 20	21 - 30	31 - 40
Estimated firms investment	< 1m	Count	4	1	2	1
		% of Total	3.9%	1.0%	1.9%	1.0%
	1 - 50m	Count	1	2	3	4
		% of Total	1.0%	1.9%	2.9%	3.9%
	51 - 100m	Count	0	1	0	1
		% of Total	.0%	1.0%	.0%	1.0%
	101 - 150m	Count	2	1	2	2
		% of Total	1.9%	1.0%	1.9%	1.9%
	151 - 200m	Count	3	2	2	3
		% of Total	2.9%	1.9%	1.9%	2.9%
	> 200m	Count	5	9	21	13
		% of Total	4.9%	8.7%	20.4%	12.6%
Total	Total	Count	15	16	30	24
		% of Total	14.6%	15.5%	29.1%	23.3%

Estimated firms investment * Joint labour supply total Cross tabulation

			Joint labour supply total			
			41 - 50	51 - 60	61 - 70	Total
Estimated firms investment	< 1m	Count	0	1	0	9
		% of Total	.0%	1.0%	.0%	8.7%
	1 - 50m	Count	1	0	1	12
		% of Total	1.0%	.0%	1.0%	11.7%
	51 - 100m	Count	1	0	1	4
		% of Total	1.0%	.0%	1.0%	3.9%
	101 - 150m	Count	0	1	0	8
		% of Total	.0%	1.0%	.0%	7.8%
	151 - 200m	Count	1	0	0	11
		% of Total	1.0%	.0%	.0%	10.7%
	> 200m	Count	8	3	0	59
		% of Total	7.8%	2.9%	.0%	57.3%
Total	Total	Count	11	5	2	103
		% of Total	10.7%	4.9%	1.9%	100.0%

Estimated firms investment * Joint labour supply

Chi-Square Tests

	Value	df	Asy mp. Sig. (2-sided)
Pearson Chi-Square	35.448 ^a	30	.227
Likelihood Ratio	30.528	30	.439
Linear-by-Linear Association	.346	1	.556
N of Valid Cases	103		

a. 37 cells (88.1%) have expected count less than 5. The minimum expected count is .08.

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APPENDIX XLIV

Cross tabulation of Estimated Firms Investment with Joint Water Supply

Estimated firms investment * Joint water supply total Cross tabulation

			Joint water supply total		
			< 11	11 - 20	21 – 30
Estimated firms investment	< 1m	Count	1	8	0
		% of Total	1.0%	7.8%	.0%
	1 - 50m	Count	2	9	1
		% of Total	1.9%	8.7%	1.0%
	51 - 100m	Count	2	1	0
		% of Total	1.9%	1.0%	.0%
	101 – 150m	Count	3	4	1
		% of Total	2.9%	3.9%	1.0%
	151 – 200m	Count	3	5	3
		% of Total	2.9%	4.9%	2.9%
	> 200m	Count	3	39	17
		% of Total	2.9%	37.9%	16.5%
Total		Count	14	66	22
		% of Total	13.6%	64.1%	21.4%

Estimated firms investment * Joint water supply total Cross tabulation

			Joint water supply total	
			31 – 40	Total
Estimated firms investment	< 1m	Count	0	9
		% of Total	.0%	8.7%
	1 - 50m	Count	0	12
		% of Total	.0%	11.7%
	51 - 100m	Count	1	4
		% of Total	1.0%	3.9%
	101 – 150m	Count	0	8
		% of Total	.0%	7.8%
	151 – 200m	Count	0	11
		% of Total	.0%	10.7%
	> 200m	Count	0	59
		% of Total	.0%	57.3%
Total		Count	1	103
		% of Total	1.0%	100.0%

Estimated firms investment * Joint water supply

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	45.456 ^a	15	.000
Likelihood Ratio	28.373	15	.019
Linear-by-Linear Association	5.329	1	.021
N of Valid Cases	103		

a. 17 cells (70.8%) have expected count less than 5. The minimum expected count is .04.

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APPENDIX XLV

Cross tabulation of Estimated Firms Investment with Joint Waste Treatment

Estimated firms investment * Joint waste treatment total Cross tabulation

			Joint waste treatment total			
			< 11	11 - 20	21 - 30	31 - 40
Estimated firms investment	< 1m	Count	2	2	2	2
		% of Total	1.9%	1.9%	1.9%	1.9%
	1 - 50m	Count	1	2	3	6
		% of Total	1.0%	1.9%	2.9%	5.8%
	51 - 100m	Count	1	2	1	0
		% of Total	1.0%	1.9%	1.0%	.0%
	101 - 150m	Count	1	3	4	0
		% of Total	1.0%	2.9%	3.9%	.0%
	151 - 200m	Count	2	4	3	2
		% of Total	1.9%	3.9%	2.9%	1.9%
	> 200m	Count	4	17	11	15
		% of Total	3.9%	16.5%	10.7%	14.6%
Total	Total	Count	11	30	24	25
		% of Total	10.7%	29.1%	23.3%	24.3%

Estimated firms investment * Joint waste treatment total Cross tabulation

			Joint waste treatment total		
			41 - 50	51 - 60	Total
Estimated firms investment	< 1m	Count	1	0	9
		% of Total	1.0%	.0%	8.7%
	1 - 50m	Count	0	0	12
		% of Total	.0%	.0%	11.7%
	51 - 100m	Count	0	0	4
		% of Total	.0%	.0%	3.9%
	101 - 150m	Count	0	0	8
		% of Total	.0%	.0%	7.8%
	151 - 200m	Count	0	0	11
		% of Total	.0%	.0%	10.7%
	> 200m	Count	10	2	59
		% of Total	9.7%	1.9%	57.3%
Total	Total	Count	11	2	103
		% of Total	10.7%	1.9%	100.0%

Estimated firms investment * Joint waste treatment

Chi-Square Tests

	Value	df	Asy mp. Sig. (2-sided)
Pearson Chi-Square	22.074 ^a	25	.631
Likelihood Ratio	27.336	25	.339
Linear-by-Linear Association	1.897	1	.168
N of Valid Cases	103		

a. 31 cells (86.1%) have expected count less than 5. The minimum expected count is .08.

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APPENDIX XLVI

Cross tabulation of Estimated Firms Investment with Joint Security

Estimated firms investment * Joint security total Cross tabulation

			Joint security total			
			< 11	11 - 20	21 - 30	31 - 40
Estimated firms investment	< 1m	Count	0	2	5	2
		% of Total	.0%	1.9%	4.9%	1.9%
	1 - 50m	Count	0	5	4	2
		% of Total	.0%	4.9%	3.9%	1.9%
	51 - 100m	Count	0	3	0	1
		% of Total	.0%	2.9%	.0%	1.0%
	101 - 150m	Count	0	3	3	2
		% of Total	.0%	2.9%	2.9%	1.9%
	151 - 200m	Count	0	5	5	1
		% of Total	.0%	4.9%	4.9%	1.0%
	> 200m	Count	7	17	25	8
		% of Total	6.8%	16.5%	24.3%	7.8%
Total	Total	Count	7	35	42	16
		% of Total	6.8%	34.0%	40.8%	15.5%

Estimated firms investment * Joint security total Cross tabulation

			Joint security total	
			41 - 50	Total
Estimated firms investment	< 1m	Count	0	9
		% of Total	.0%	8.7%
	1 - 50m	Count	1	12
		% of Total	1.0%	11.7%
	51 - 100m	Count	0	4
		% of Total	.0%	3.9%
	101 - 150m	Count	0	8
		% of Total	.0%	7.8%
	151 - 200m	Count	0	11
		% of Total	.0%	10.7%
	> 200m	Count	2	59
		% of Total	1.9%	57.3%
Total	Total	Count	3	103
		% of Total	2.9%	100.0%

Estimated firms investment * Joint security

Chi-Square Tests

	Value	df	Asy mp. Sig. (2-sided)
Pearson Chi-Square	14.680 ^a	20	.794
Likelihood Ratio	18.799	20	.535
Linear-by-Linear Association	1.287	1	.257
N of Valid Cases	103		

a. 27 cells (90.0%) have expected count less than 5. The minimum expected count is .12.

UNIVERSITY OF IBADAN

APPENDIX XLVII

Cross tabulation of Estimated Firms Investment with Joint Telecommunication

Estimated firms investment * Joint telecommunication total Cross tabulation

			Joint telecommunication total		
			< 11	11 - 20	21 – 30
Estimated firms investment	< 1m	Count	2	7	0
		% of Total	1.9%	6.8%	.0%
	1 - 50m	Count	5	7	0
		% of Total	4.9%	6.8%	.0%
	51 – 100m	Count	1	2	1
		% of Total	1.0%	1.9%	1.0%
	101 - 150m	Count	6	2	0
		% of Total	5.8%	1.9%	.0%
	151 - 200m	Count	4	7	0
		% of Total	3.9%	6.8%	.0%
	> 200m	Count	17	37	4
		% of Total	16.5%	35.9%	3.9%
	Total	Count	35	62	5
		% of Total	34.0%	60.2%	4.9%

Estimated firms investment * Joint telecommunication total Cross tabulation

			Joint telecommunication total	
			31 – 40	Total
Estimated firms investment	< 1m	Count	0	9
		% of Total	.0%	8.7%
	1 - 50m	Count	0	12
		% of Total	.0%	11.7%
	51 – 100m	Count	0	4
		% of Total	.0%	3.9%
	101 - 150m	Count	0	8
		% of Total	.0%	7.8%
	151 - 200m	Count	0	11
		% of Total	.0%	10.7%
	> 200m	Count	1	59
		% of Total	1.0%	57.3%
	Total	Count	1	103
		% of Total	1.0%	100.0%

Estimated firms investment * Joint telecommunication

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.863 ^a	15	.536
Likelihood Ratio	13.928	15	.531
Linear-by-Linear Association	.878	1	.349
N of Valid Cases	103		

a. 19 cells (79.2%) have expected count less than 5. The minimum expected count is .04.

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APPENDIX XLVIII

Cross tabulation of Estimated Firms Investment with Joint Ports and Shipping

Estimated firms investment * Joint ports & shipping total Cross tabulation

			Joint ports & shipping total			
			< 11	11 - 20	21 - 30	31 - 40
Estimated firms investment	< 1m	Count	1	1	2	4
		% of Total	1.0%	1.0%	1.9%	3.9%
	1 - 50m	Count	3	4	2	3
		% of Total	2.9%	3.9%	1.9%	2.9%
	51 - 100m	Count	0	0	1	3
		% of Total	.0%	.0%	1.0%	2.9%
	101 - 150m	Count	1	4	3	0
		% of Total	1.0%	3.9%	2.9%	.0%
	151 - 200m	Count	2	3	3	3
		% of Total	1.9%	2.9%	2.9%	2.9%
	> 200m	Count	2	12	26	15
		% of Total	1.9%	11.7%	25.2%	14.6%
Total	Total	Count	9	24	37	28
		% of Total	8.7%	23.3%	35.9%	27.2%

Estimated firms investment * Joint ports & shipping total Cross tabulation

			Joint ports & shipping total	
			41 - 50	Total
Estimated firms investment	< 1m	Count	1	9
		% of Total	1.0%	8.7%
	1 - 50m	Count	0	12
		% of Total	.0%	11.7%
	51 - 100m	Count	0	4
		% of Total	.0%	3.9%
	101 - 150m	Count	0	8
		% of Total	.0%	7.8%
	151 - 200m	Count	0	11
		% of Total	.0%	10.7%
	> 200m	Count	4	59
		% of Total	3.9%	57.3%
Total	Total	Count	5	103
		% of Total	4.9%	100.0%

Estimated firms investment * Joint ports & shipping

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	24.646 ^a	20	.215
Likelihood Ratio	27.193	20	.130
Linear-by-Linear Association	.640	1	.424
N of Valid Cases	103		

a. 26 cells (86.7%) have expected count less than 5. The minimum expected count is .19.

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APPENDIX XLIX

Cross tabulation of Estimated Firms Investment With Access to Financial Institution

Estimated firms investment * Access to financial institution total Cross tabulation

			Access to financial institution total			
			11 – 20	21 - 30	31 – 40	41 - 50
Estimated firms investment	< 1m	Count	0	4	3	2
		% of Total	.0%	3.9%	2.9%	1.9%
	1 - 50m	Count	0	1	2	6
		% of Total	.0%	1.0%	1.9%	5.8%
	51 - 100m	Count	0	1	2	0
		% of Total	.0%	1.0%	1.9%	.0%
	101 – 150m	Count	2	0	3	2
		% of Total	1.9%	.0%	2.9%	1.9%
	151 – 200m	Count	1	1	4	2
		% of Total	1.0%	1.0%	3.9%	1.9%
	> 200m	Count	4	10	15	18
		% of Total	3.9%	9.7%	14.6%	17.5%
Total	Total	Count	7	17	29	30
		% of Total	6.8%	16.5%	28.2%	29.1%

Estimated firms investment * Access to financial institution total Cross tabulation

			Access to financial institution total			Total
			51 – 60	61 - 70	81 – 90	
Estimated firms investment	< 1m	Count	0	0	0	9
		% of Total	.0%	.0%	.0%	8.7%
	1 - 50m	Count	3	0	0	12
		% of Total	2.9%	.0%	.0%	11.7%
	51 - 100m	Count	1	0	0	4
		% of Total	1.0%	.0%	.0%	3.9%
	101 – 150m	Count	1	0	0	8
		% of Total	1.0%	.0%	.0%	7.8%
	151 – 200m	Count	2	1	0	11
		% of Total	1.9%	1.0%	.0%	10.7%
	> 200m	Count	9	2	1	59
		% of Total	8.7%	1.9%	1.0%	57.3%
Total	Total	Count	16	3	1	103
		% of Total	15.5%	2.9%	1.0%	100.0%

Estimated firms investment * Access to Financial Institution

Chi-Square Tests

	value	Df	Asymp.sig. (2-sided)
Pearson Chi-Square	401.297 ^a	432	.853
Likelihood Ratio	258.355	432	1.000
Linear-by-Linear Association	.678	1	.410
N of valid Cases	103		

a.511 cells (100.0%) have expected count less than 5
The minimum expected count is .01

UNIVERSITY OF IBADAN

APPENDIX L

Cross tabulation of Management Staff with Joint Transportation

Management staff * Joint transportation total Cross tabulation

			Joint transportation total				
			< 11	11 – 20	21 - 30	31 - 40	41 - 50
Management staff	< 6	Count	2	4	8	14	7
		% of Total	1.9%	3.9%	7.8%	13.6%	6.8%
	6 – 10	Count	2	6	12	18	8
		% of Total	1.9%	5.8%	11.7%	17.5%	7.8%
	11 – 15	Count	1	0	1	6	3
		% of Total	1.0%	.0%	1.0%	5.8%	2.9%
	16 – 20	Count	2	2	0	0	0
		% of Total	1.9%	1.9%	.0%	.0%	.0%
	21 – 25	Count	0	0	1	1	0
		% of Total	.0%	.0%	1.0%	1.0%	.0%
	26 and above	Count	0	0	0	0	0
		% of Total	.0%	.0%	.0%	.0%	.0%
Total		Count	7	12	22	39	18
		% of Total	6.8%	11.7%	21.4%	37.9%	17.5%

Management staff * Joint transportation total Cross tabulation

			Joint transportation total			Total
			51 – 60	61 - 70	71 - 80	
Management staff	< 6	Count	2	0	1	38
		% of Total	1.9%	.0%	1.0%	36.9%
	6 – 10	Count	0	0	0	46
		% of Total	.0%	.0%	.0%	44.7%
	11 – 15	Count	0	1	0	12
		% of Total	.0%	1.0%	.0%	11.7%
	16 – 20	Count	0	0	0	4
		% of Total	.0%	.0%	.0%	3.9%
	21 – 25	Count	0	0	0	2
		% of Total	.0%	.0%	.0%	1.9%
	26 and above	Count	1	0	0	1
		% of Total	1.0%	.0%	.0%	1.0%
Total		Count	3	1	1	103
		% of Total	2.9%	1.0%	1.0%	100.0%

Management staff * Joint transportation

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	400.824 ^a	295	.000
Likelihood Ratio	171.423	295	1.000
Linear-by-Linear Association	.413	1	.521
N of Valid Cases	103		

a. 360 cells (100.0%) have expected count less than 5.
The minimum expected count is .01.

UNIVERSITY OF IBADAN

APPENDIX LI

Cross tabulation of Management Staff with Joint Power Supply

Management staff * Joint power supply total Cross tabulation

			Joint power supply total				
			< 11	11 – 20	21 - 30	31 - 40	41 - 50
Management staff	< 6	Count	2	9	12	6	5
		% of Total	1.9%	8.7%	11.7%	5.8%	4.9%
	6 – 10	Count	1	18	13	7	4
		% of Total	1.0%	17.5%	12.6%	6.8%	3.9%
	11 – 15	Count	0	1	5	5	1
		% of Total	.0%	1.0%	4.9%	4.9%	1.0%
	16 – 20	Count	1	2	1	0	0
		% of Total	1.0%	1.9%	1.0%	.0%	.0%
	21 – 25	Count	0	0	1	0	1
		% of Total	.0%	.0%	1.0%	.0%	1.0%
	26 and above	Count	0	0	0	0	1
		% of Total	.0%	.0%	.0%	.0%	1.0%
Total		Count	4	30	32	18	12
		% of Total	3.9%	29.1%	31.1%	17.5%	11.7%

Management staff * Joint power supply total Cross tabulation

			Joint power supply total			Total
			51 – 60	61 - 70	71 – 80	
Management staff	< 6	Count	2	1	1	38
		% of Total	1.9%	1.0%	1.0%	36.9%
	6 – 10	Count	1	2	0	46
		% of Total	1.0%	1.9%	.0%	44.7%
	11 – 15	Count	0	0	0	12
		% of Total	.0%	.0%	.0%	11.7%
	16 – 20	Count	0	0	0	4
		% of Total	.0%	.0%	.0%	3.9%
	21 – 25	Count	0	0	0	2
		% of Total	.0%	.0%	.0%	1.9%
	26 and above	Count	0	0	0	1
		% of Total	.0%	.0%	.0%	1.0%
Total		Count	3	3	1	103
		% of Total	2.9%	2.9%	1.0%	100.0%

Management staff * Joint power supply

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	31.691 ^a	35	.629
Likelihood Ratio	27.856	35	.799
Linear-by-Linear Association	.068	1	.794
N of Valid Cases	103		

a. 41 cells (85.4%) have expected count less than 5. The minimum expected count is .01.

UNIVERSITY OF IBADAN

APPENDIX LII

Cross tabulation of Management Staff with Joint Raw material Purchase / Supply

Management staff * Joint raw material purchase/ supply total Cross tabulation

			Joint raw material purchase/ supply total				
			< 11	11 – 20	21 - 30	31 - 40	41 - 50
Management staff	< 6	Count	1	3	12	8	8
		% of Total	1.0%	2.9%	11.7%	7.8%	7.8%
	6 – 10	Count	1	6	11	9	13
		% of Total	1.0%	5.8%	10.7%	8.7%	12.6%
	11 – 15	Count	0	1	0	3	4
		% of Total	.0%	1.0%	.0%	2.9%	3.9%
	16 – 20	Count	1	1	0	2	0
		% of Total	1.0%	1.0%	.0%	1.9%	.0%
	21 – 25	Count	0	0	0	2	0
		% of Total	.0%	.0%	.0%	1.9%	.0%
	26 and above	Count	0	0	0	0	1
		% of Total	.0%	.0%	.0%	.0%	1.0%
Total		Count	3	11	23	24	26
		% of Total	2.9%	10.7%	22.3%	23.3%	25.2%

Management staff * Joint raw material purchase/ supply total Cross tabulation

			Joint raw material purchase/ supply total			Total
			51 – 60	61 – 70	71 – 80	
Management staff	< 6	Count	5	1	0	38
		% of Total	4.9%	1.0%	.0%	36.9%
	6 - 10	Count	5	1	0	46
		% of Total	4.9%	1.0%	.0%	44.7%
	11 - 15	Count	2	1	1	12
		% of Total	1.9%	1.0%	1.0%	11.7%
	16 - 20	Count	0	0	0	4
		% of Total	.0%	.0%	.0%	3.9%
	21 - 25	Count	0	0	0	2
		% of Total	.0%	.0%	.0%	1.9%
	26 and above	Count	0	0	0	1
		% of Total	.0%	.0%	.0%	1.0%
Total		Count	12	3	1	103
		% of Total	11.7%	2.9%	1.0%	100.0%

Management staff * Joint raw material purchase/ supply

Chi-Square Tests

	Value	df	Asy mp. Sig. (2-sided)
Pearson Chi-Square	36.266 ^a	35	.409
Likelihood Ratio	32.240	35	.602
Linear-by-Linear Association	.289	1	.591
N of Valid Cases	103		

a. 41 cells (85.4%) have expected count less than 5. The minimum expected count is .01.

UNIVERSITY OF IBADAN

APPENDIX LIII

Cross tabulation of Management Staff with Collaboration in Research and Development

Management staff * Collaboration in Research and Development total Cross tabulation

			Collaboration in Research and Development total				
			< 11	11 – 20	21 - 30	31 - 40	41 - 50
Management staff	< 6	Count	6	10	6	10	6
		% of Total	5.8%	9.7%	5.8%	9.7%	5.8%
	6 - 10	Count	6	6	11	13	9
		% of Total	5.8%	5.8%	10.7%	12.6%	8.7%
	11 - 15	Count	0	4	1	4	1
		% of Total	.0%	3.9%	1.0%	3.9%	1.0%
	16 - 20	Count	2	0	0	2	0
		% of Total	1.9%	.0%	.0%	1.9%	.0%
	21 - 25	Count	0	0	0	2	0
		% of Total	.0%	.0%	.0%	1.9%	.0%
	26 and above	Count	0	0	0	1	0
		% of Total	.0%	.0%	.0%	1.0%	.0%
Total		Count	14	20	18	32	16
		% of Total	13.6%	19.4%	17.5%	31.1%	15.5%

Management staff * Collaboration in Research and Development total Cross tabulation

			Collaboration in Research and Development total		
			51 – 60	61 – 70	Total
Management staff	< 6	Count	0	0	38
		% of Total	.0%	.0%	36.9%
	6 - 10	Count	0	1	46
		% of Total	.0%	1.0%	44.7%
	11 - 15	Count	1	1	12
		% of Total	1.0%	1.0%	11.7%
	16 - 20	Count	0	0	4
		% of Total	.0%	.0%	3.9%
	21 - 25	Count	0	0	2
		% of Total	.0%	.0%	1.9%
	26 and above	Count	0	0	1
		% of Total	.0%	.0%	1.0%
Total		Count	1	2	103
		% of Total	1.0%	1.9%	100.0%

Management staff * Collaboration in research and Development

Chi-Square Tests

	Value	df	Asymp.sig. (2-sided)
Pearson Chi-Square	31.912 ^a	30	.372
Likelihood Ratio	30.583	30	.436
Linear-by-Linear Association	1.457	1	.227
N of valid Cases	103		

a.32 cells (76.2%) have expected count less than 5

The minimum expected count is .01

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APPENDIX LIV

Cross tabulation of Management Staff with Joint Labour Supply

Management staff * Joint labour supply total Cross tabulation

			Joint labour supply total				
			< 11	11 – 20	21 - 30	31 - 40	41 - 50
Management staff	< 6	Count	10	5	9	10	1
		% of Total	9.7%	4.9%	8.7%	9.7%	1.0%
	6 - 10	Count	3	8	15	10	8
		% of Total	2.9%	7.8%	14.6%	9.7%	7.8%
	11 - 15	Count	0	2	3	3	2
		% of Total	.0%	1.9%	2.9%	2.9%	1.9%
	16 - 20	Count	2	1	1	0	0
		% of Total	1.9%	1.0%	1.0%	.0%	.0%
	21 - 25	Count	0	0	2	0	0
		% of Total	.0%	.0%	1.9%	.0%	.0%
	26 and above	Count	0	0	0	1	0
		% of Total	.0%	.0%	.0%	1.0%	.0%
Total		Count	15	16	30	24	11
		% of Total	14.6%	15.5%	29.1%	23.3%	10.7%

Management staff * Joint labour supply total Cross tabulation

			Joint labour supply total		
			51 – 60	61 – 70	Total
Management staff	< 6	Count	2	1	38
		% of Total	1.9%	1.0%	36.9%
	6 - 10	Count	2	0	46
		% of Total	1.9%	.0%	44.7%
	11 - 15	Count	1	1	12
		% of Total	1.0%	1.0%	11.7%
	16 - 20	Count	0	0	4
		% of Total	.0%	.0%	3.9%
	21 - 25	Count	0	0	2
		% of Total	.0%	.0%	1.9%
	26 and above	Count	0	0	1
		% of Total	.0%	.0%	1.0%
Total		Count	5	2	103
		% of Total	4.9%	1.9%	100.0%

Management staff * Joint labour supply

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	30.492 ^a	30	.441
Likelihood Ratio	32.352	30	.351
Linear-by-Linear Association	.553	1	.457
N of Valid Cases	103		

a. 34 cells (81.0%) have expected count less than 5. The minimum expected count is .02.

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APPENDIX LV

Cross tabulation of Management Staff with Joint Water Supply

Management staff * Joint water supply total Cross tabulation

			Joint water supply total				Total
			< 11	11 – 20	21 - 30	31 - 40	
Management staff	< 6	Count	8	23	7	0	38
		% of Total	7.8%	22.3%	6.8%	.0%	36.9%
	6 - 10	Count	5	32	8	1	46
		% of Total	4.9%	31.1%	7.8%	1.0%	44.7%
	11 - 15	Count	0	7	5	0	12
		% of Total	.0%	6.8%	4.9%	.0%	11.7%
	16 - 20	Count	1	2	1	0	4
		% of Total	1.0%	1.9%	1.0%	.0%	3.9%
	21 - 25	Count	0	2	0	0	2
		% of Total	.0%	1.9%	.0%	.0%	1.9%
	26 and above	Count	0	0	1	0	1
		% of Total	.0%	.0%	1.0%	.0%	1.0%
Total		Count	14	66	22	1	103
		% of Total	13.6%	64.1%	21.4%	1.0%	100.0%

Management staff * Joint water supply

Chi-Square Tests

	Value	df	Asy mp. Sig. (2-sided)
Pearson Chi-Square	13.145 ^a	15	.591
Likelihood Ratio	14.429	15	.493
Linear-by-Linear Association	3.054	1	.081
N of Valid Cases	103		

a. 17 cells (70.8%) have expected count less than 5. The minimum expected count is .01.

APPENDIX LVI

Cross tabulation of Management Staff with Joint Waste Treatment

Management staff * Joint waste treatment total Cross tabulation

			Joint waste treatment total				
			< 11	11 – 20	21 - 30	31 - 40	41 - 50
Management staff	< 6	Count	7	11	8	10	2
		% of Total	6.8%	10.7%	7.8%	9.7%	1.9%
	6 - 10	Count	2	14	15	9	5
		% of Total	1.9%	13.6%	14.6%	8.7%	4.9%
	11 - 15	Count	0	2	1	5	3
		% of Total	.0%	1.9%	1.0%	4.9%	2.9%
	16 - 20	Count	2	2	0	0	0
		% of Total	1.9%	1.9%	.0%	.0%	.0%
	21 - 25	Count	0	1	0	1	0
		% of Total	.0%	1.0%	.0%	1.0%	.0%
	26 and above	Count	0	0	0	0	1
		% of Total	.0%	.0%	.0%	.0%	1.0%
Total		Count	11	30	24	25	11
		% of Total	10.7%	29.1%	23.3%	24.3%	10.7%

Management staff * Joint waste treatment total Cross tabulation

			Joint waste treatment total	
			51 – 60	Total
Management staff	< 6	Count	0	38
		% of Total	.0%	36.9%
	6 - 10	Count	1	46
		% of Total	1.0%	44.7%
	11 - 15	Count	1	12
		% of Total	1.0%	11.7%
	16 - 20	Count	0	4
		% of Total	.0%	3.9%
	21 - 25	Count	0	2
		% of Total	.0%	1.9%
	26 and above	Count	0	1
		% of Total	.0%	1.0%
Total		Count	2	103
		% of Total	1.9%	100.0%

Management staff * Joint waste treatment

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	36.298 ^a	25	.067
Likelihood Ratio	33.367	25	.122
Linear-by-Linear Association	2.320	1	.128
N of Valid Cases	103		

a. 30 cells (83.3%) have expected count less than 5. The minimum expected count is .02.

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APPENDIX LVII

Cross tabulation of Management Staff with Joint Security

Management staff * Joint security total Cross tabulation

			Joint security total			
			< 11	11 – 20	21 - 30	31 - 40
Management staff	< 6	Count	1	16	14	6
		% of Total	1.0%	15.5%	13.6%	5.8%
	6 - 10	Count	5	14	18	8
		% of Total	4.9%	13.6%	17.5%	7.8%
	11 - 15	Count	0	2	7	2
		% of Total	.0%	1.9%	6.8%	1.9%
	16 - 20	Count	1	2	1	0
		% of Total	1.0%	1.9%	1.0%	.0%
	21 - 25	Count	0	1	1	0
		% of Total	.0%	1.0%	1.0%	.0%
	26 and above	Count	0	0	1	0
		% of Total	.0%	.0%	1.0%	.0%
Total		Count	7	35	42	16
		% of Total	6.8%	34.0%	40.8%	15.5%

Management staff * Joint security total Cross tabulation

			Joint security total	
			41 – 50	Total
Management staff	< 6	Count	1	38
		% of Total	1.0%	36.9%
	6 - 10	Count	1	46
		% of Total	1.0%	44.7%
	11 - 15	Count	1	12
		% of Total	1.0%	11.7%
	16 - 20	Count	0	4
		% of Total	.0%	3.9%
	21 - 25	Count	0	2
		% of Total	.0%	1.9%
	26 and above	Count	0	1
		% of Total	.0%	1.0%
Total		Count	3	103
		% of Total	2.9%	100.0%

Management staff * Joint security

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.763 ^a	20	.887
Likelihood Ratio	14.157	20	.822
Linear-by-Linear Association	.015	1	.903
N of Valid Cases	103		

a. 24 cells (80.0%) have expected count less than 5. The minimum expected count is .03.

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APPENDIX LVIII

Cross tabulation of Management Staff with Joint Telecommunication

Management staff * Joint telecommunication total Cross tabulation

			Joint telecommunication total				Total
			< 11	11 – 20	21 - 30	31 - 40	
Management staff	< 6	Count	15	21	1	1	38
		% of Total	14.6%	20.4%	1.0%	1.0%	36.9%
	6 - 10	Count	14	29	3	0	46
		% of Total	13.6%	28.2%	2.9%	.0%	44.7%
	11 - 15	Count	2	10	0	0	12
		% of Total	1.9%	9.7%	.0%	.0%	11.7%
	16 - 20	Count	4	0	0	0	4
		% of Total	3.9%	.0%	.0%	.0%	3.9%
	21 - 25	Count	0	1	1	0	2
		% of Total	.0%	1.0%	1.0%	.0%	1.9%
	26 and above	Count	0	1	0	0	1
		% of Total	.0%	1.0%	.0%	.0%	1.0%
Total		Count	35	62	5	1	103
		% of Total	34.0%	60.2%	4.9%	1.0%	100.0%

Management staff * Joint telecommunication

Chi-Square Tests

	Value	df	Asy mp. Sig. (2-sided)
Pearson Chi-Square	23.288 ^a	15	.078
Likelihood Ratio	20.643	15	.149
Linear-by-Linear Association	.225	1	.635
N of Valid Cases	103		

a. 19 cells (79.2%) have expected count less than 5. The minimum expected count is .01.

APPENDIX LVIX

Cross tabulation of Management Staff with Joint Ports and Shipping

Management staff * Joint ports & shipping total Cross tabulation

			Joint ports & shipping total			
			< 11	11 – 20	21 - 30	31 - 40
Management staff	< 6	Count	7	9	11	11
		% of Total	6.8%	8.7%	10.7%	10.7%
	6 - 10	Count	2	13	16	12
		% of Total	1.9%	12.6%	15.5%	11.7%
	11 - 15	Count	0	0	5	5
		% of Total	.0%	.0%	4.9%	4.9%
	16 - 20	Count	0	2	2	0
		% of Total	.0%	1.9%	1.9%	.0%
	21 - 25	Count	0	0	2	0
		% of Total	.0%	.0%	1.9%	.0%
	26 and above	Count	0	0	1	0
		% of Total	.0%	.0%	1.0%	.0%
Total		Count	9	24	37	28
		% of Total	8.7%	23.3%	35.9%	27.2%

Management staff * Joint ports & shipping total Cross tabulation

			Joint ports & shipping total	
			41 – 50	Total
Management staff	< 6	Count	0	38
		% of Total	.0%	36.9%
	6 - 10	Count	3	46
		% of Total	2.9%	44.7%
	11 - 15	Count	2	12
		% of Total	1.9%	11.7%
	16 - 20	Count	0	4
		% of Total	.0%	3.9%
	21 - 25	Count	0	2
		% of Total	.0%	1.9%
	26 and above	Count	0	1
		% of Total	.0%	1.0%
Total		Count	5	103
		% of Total	4.9%	100.0%

Management staff * Joint ports & shipping

Chi-Square Tests

	Value	df	Asy mp. Sig. (2-sided)
Pearson Chi-Square	25.040 ^a	20	.200
Likelihood Ratio	30.552	20	.061
Linear-by-Linear Association	2.651	1	.103
N of Valid Cases	103		

a. 24 cells (80.0%) have expected count less than 5. The minimum expected count is .05.

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APPENDIX LX

Cross tabulation of Management Staff with Access to Financial Institution

Management staff * Access to financial institution total Cross tabulation

			Access to financial institution total				
			11 – 20	21 – 30	31 - 40	41 - 50	51 - 60
Management staff	< 6	Count	2	7	12	12	5
		% of Total	1.9%	6.8%	11.7%	11.7%	4.9%
	6 - 10	Count	3	9	14	10	7
		% of Total	2.9%	8.7%	13.6%	9.7%	6.8%
	11 - 15	Count	0	1	2	5	3
		% of Total	.0%	1.0%	1.9%	4.9%	2.9%
	16 - 20	Count	2	0	1	1	0
		% of Total	1.9%	.0%	1.0%	1.0%	.0%
	21 - 25	Count	0	0	0	1	1
		% of Total	.0%	.0%	.0%	1.0%	1.0%
	26 and above	Count	0	0	0	1	0
		% of Total	.0%	.0%	.0%	1.0%	.0%
Total		Count	7	17	29	30	16
		% of Total	6.8%	16.5%	28.2%	29.1%	15.5%

Management staff * Access to financial institution total Cross tabulation

			Access to financial institution total		
			61 – 70	81 - 90	Total
Management staff	< 6	Count	0	0	38
		% of Total	.0%	.0%	36.9%
	6 - 10	Count	2	1	46
		% of Total	1.9%	1.0%	44.7%
	11 - 15	Count	1	0	12
		% of Total	1.0%	.0%	11.7%
	16 - 20	Count	0	0	4
		% of Total	.0%	.0%	3.9%
	21 - 25	Count	0	0	2
		% of Total	.0%	.0%	1.9%
	26 and above	Count	0	0	1
		% of Total	.0%	.0%	1.0%
Total		Count	3	1	103
		% of Total	2.9%	1.0%	100.0%

Management staff * Access to Financial Institution

Chi-Square Tests

	Value	Df	Asymp.sig. (2-sided)
Pearson Chi-Square	26.653 ^a	30	.641
Likelihood Ratio	24.019	30	.771
Linear-by-Linear Association	.935	1	.334
N of valid Cases	103		

a.34 cells (81.0%) have expected count less than 5

The minimum expected count is .01

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APPENDIX LXI

Crosstabulation of Labour (Auxilliary/Clerical Staff and Operational Staff) with Joint Transportation

Labour (Auxiliary/ Clerical and Operational staff) * Joint transportation total Cross tabulation

		Joint transportation total			
		< 11	11 - 20	21 - 30	31 - 40
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	5	9	13	32
	% of Total	4.9%	8.7%	12.6%	31.1%
51 – 100	Count	2	2	7	7
	% of Total	1.9%	1.9%	6.8%	6.8%
101 – 150	Count	0	0	0	0
	% of Total	.0%	.0%	.0%	.0%
151 – 200	Count	0	1	1	0
	% of Total	.0%	1.0%	1.0%	.0%
201 – 250	Count	0	0	0	0
	% of Total	.0%	.0%	.0%	.0%
251 – 300	Count	0	0	1	0
	% of Total	.0%	.0%	1.0%	.0%
301 and above	Count	0	0	0	0
	% of Total	.0%	.0%	.0%	.0%
Total	Count	7	12	22	39
	% of Total	6.8%	11.7%	21.4%	37.9%

Labour (Auxiliary/ Clerical and Operational staff) * Joint transportation total Cross tabulation

		Joint transportation total		
		41 – 50	51 - 60	61 - 70
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	12	0	1
	% of Total	11.7%	.0%	1.0%
51 – 100	Count	4	2	0
	% of Total	3.9%	1.9%	.0%
101 – 150	Count	1	0	0
	% of Total	1.0%	.0%	.0%
151 – 200	Count	0	0	0
	% of Total	.0%	.0%	.0%
201 – 250	Count	1	0	0
	% of Total	1.0%	.0%	.0%
251 – 300	Count	0	0	0
	% of Total	.0%	.0%	.0%
301 and above	Count	0	1	0
	% of Total	.0%	1.0%	.0%
Total	Count	18	3	1
	% of Total	17.5%	2.9%	1.0%

Labour (Auxiliary/ Clerical and Operational staff) * Joint transportation total Cross tabulation

		Joint transportation total		
		71 – 80	Total	
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	1	73	
	% of Total	1.0%	70.9%	
	51 – 100	Count	0	24
	% of Total	.0%	23.3%	
	101 – 150	Count	0	1
	% of Total	.0%	1.0%	
	151 – 200	Count	0	2
	% of Total	.0%	1.9%	
	201 – 250	Count	0	1
	% of Total	.0%	1.0%	
251 – 300	Count	0	1	
% of Total	.0%	1.0%		
301 and above	Count	0	1	
% of Total	.0%	1.0%		
Total	Count	1	103	
	% of Total	1.0%	100.0%	

Labour (Auxiliary/ Clerical and Operational staff) * Joint transportation

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	496.079 ^a	354	.000
Likelihood Ratio	125.527	354	1.000
Linear-by-Linear Association	.610	1	.435
N of Valid Cases	103		

a. 420 cells (100.0%) have expected count less than 5. The minimum expected count is .01.

APPENDIX LXII

**Crosstabulation of Labour (Auxilliary/Clerical Staff and Operational Staff)
with Joint Power Supply**

Labour (Auxiliary/ Clerical and Operational staff) * Joint power supply total Cross tabulation

		Joint power supply total			
		< 11	11 - 20	21 - 30	31 - 40
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	2	21	25	15
	% of Total	1.9%	20.4%	24.3%	14.6%
51 – 100	Count	2	6	6	2
	% of Total	1.9%	5.8%	5.8%	1.9%
101 – 150	Count	0	0	1	0
	% of Total	.0%	.0%	1.0%	.0%
151 – 200	Count	0	2	0	0
	% of Total	.0%	1.9%	.0%	.0%
201 – 250	Count	0	0	0	0
	% of Total	.0%	.0%	.0%	.0%
251 – 300	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
301 and above	Count	0	1	0	0
	% of Total	.0%	1.0%	.0%	.0%
Total	Count	4	30	32	18
	% of Total	3.9%	29.1%	31.1%	17.5%

Labour (Auxiliary/ Clerical and Operational staff) * Joint power supply total Crosstabulation

		Joint power supply total		
		41 – 50	51 - 60	61 - 70
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	5	1	3
	% of Total	4.9%	1.0%	2.9%
51 – 100	Count	6	2	0
	% of Total	5.8%	1.9%	.0%
101 – 150	Count	0	0	0
	% of Total	.0%	.0%	.0%
151 – 200	Count	0	0	0
	% of Total	.0%	.0%	.0%
201 – 250	Count	1	0	0
	% of Total	1.0%	.0%	.0%
251 – 300	Count	0	0	0
	% of Total	.0%	.0%	.0%
301 and above	Count	0	0	0
	% of Total	.0%	.0%	.0%
Total	Count	12	3	3
	% of Total	11.7%	2.9%	2.9%

Labour (Auxiliary/ Clerical and Operational staff) * Joint power supply total Cross tabulation

		Joint power supply total		
		71 – 80	Total	
Labour (Auxiliary/ Clerical and Operational staff)	Count	1	73	
		% of Total	1.0%	
	51 – 100	Count	0	24
		% of Total	.0%	23.3%
	101 – 150	Count	0	1
		% of Total	.0%	1.0%
	151 – 200	Count	0	2
		% of Total	.0%	1.9%
	201 – 250	Count	0	1
		% of Total	.0%	1.0%
251 – 300	Count	0	1	
	% of Total	.0%	1.0%	
301 and above	Count	0	1	
	% of Total	.0%	1.0%	
Total		Count	1	
		% of Total	103	
			1.0%	
			100.0%	

Labour (Auxiliary/ Clerical and Operational staff) * Joint power supply

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	35.046 ^a	42	.768
Likelihood Ratio	30.292	42	.911
Linear-by-Linear Association	.036	1	.850
N of Valid Cases	103		

a. 50 cells (89.3%) have expected count less than 5. The minimum expected count is .01.

APPENDIX LXIII

**Crosstabulation of Labour (Auxilliary/Clerical Staff and Operational Staff)
with Joint Raw material Purchase/Supply**

Labour (Auxiliary/ Clerical and Operational staff) * Joint raw material purchase/ supply total Cross tabulation

		Joint raw material purchase/ supply total			
		< 11	11 - 20	21 - 30	31 - 40
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	2	7	15	15
	% of Total	1.9%	6.8%	14.6%	14.6%
51 – 100	Count	1	4	7	7
	% of Total	1.0%	3.9%	6.8%	6.8%
101 – 150	Count	0	0	0	0
	% of Total	.0%	.0%	.0%	.0%
151 – 200	Count	0	0	0	2
	% of Total	.0%	.0%	.0%	1.9%
201 – 250	Count	0	0	1	0
	% of Total	.0%	.0%	1.0%	.0%
251 – 300	Count	0	0	0	0
	% of Total	.0%	.0%	.0%	.0%
301 and above	Count	0	0	0	0
	% of Total	.0%	.0%	.0%	.0%
Total	Count	3	11	23	24
	% of Total	2.9%	10.7%	22.3%	23.3%

Labour (Auxiliary/ Clerical and Operational staff) * Joint raw material purchase/ supply total Cross tabulation

		Joint raw material purchase/ supply total		
		41 – 50	51 - 60	61 - 70
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	21	10	2
	% of Total	20.4%	9.7%	1.9%
51 – 100	Count	4	1	0
	% of Total	3.9%	1.0%	.0%
101 – 150	Count	0	0	1
	% of Total	.0%	.0%	1.0%
151 – 200	Count	0	0	0
	% of Total	.0%	.0%	.0%
201 – 250	Count	0	0	0
	% of Total	.0%	.0%	.0%
251 – 300	Count	0	1	0
	% of Total	.0%	1.0%	.0%
301 and above	Count	1	0	0
	% of Total	1.0%	.0%	.0%
Total	Count	26	12	3
	% of Total	25.2%	11.7%	2.9%

**Labour (Auxiliary/ Clerical and Operational staff) * Joint raw material purchase/ supply total
Cross tabulation**

		Joint raw material purchase/ supply total	
		71 – 80	Total
Labour (Auxiliary/ Operational staff)	Count	1	73
	% of Total	1.0%	70.9%
51 – 100	Count	0	24
	% of Total	.0%	23.3%
101 – 150	Count	0	1
	% of Total	.0%	1.0%
151 – 200	Count	0	2
	% of Total	.0%	1.9%
201 – 250	Count	0	1
	% of Total	.0%	1.0%
251 – 300	Count	0	1
	% of Total	.0%	1.0%
301 and above	Count	0	1
	% of Total	.0%	1.0%
Total	Count	1	103
	% of Total	1.0%	100.0%

**Labour (Auxiliary/ Clerical and Operational staff) * Joint raw material
purchase/ supply**

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APPENDIX LXIV

Crosstabulation of Labour (Auxilliary/Clerical Staff and Operational Staff) with Collaboration in Reasearch and Development.

Labour (Auxiliary/ Clerical and Operational staff) * Collaboration in Research and Development total Cross tabulation

		Collaboration in Research and Development total			
		< 11	11 - 20	21 - 30	31 - 40
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	9	14	10	23
	% of Total	8.7%	13.6%	9.7%	22.3%
51 – 100	Count	5	5	5	7
	% of Total	4.9%	4.9%	4.9%	6.8%
101 – 150	Count	0	1	0	0
	% of Total	.0%	1.0%	.0%	.0%
151 – 200	Count	0	0	1	1
	% of Total	.0%	.0%	1.0%	1.0%
201 – 250	Count	0	0	1	0
	% of Total	.0%	.0%	1.0%	.0%
251 – 300	Count	0	0	1	0
	% of Total	.0%	.0%	1.0%	.0%
301 and above	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
Total	Count	14	20	18	32
	% of Total	13.6%	19.4%	17.5%	31.1%

Labour (Auxiliary/ Clerical and Operational staff) * Collaboration in Research and Development total Cross tabulation

		Collaboration in Research and Development total			Total
		41 – 50	51 - 60	61 - 70	
Labour (Auxiliary/ Clerical < 51 and Operational staff)	Count	15	1	1	73
	% of Total	14.6%	1.0%	1.0%	70.9%
51 – 100	Count	1	0	1	24
	% of Total	1.0%	.0%	1.0%	23.3%
101 – 150	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
151 – 200	Count	0	0	0	2
	% of Total	.0%	.0%	.0%	1.9%
201 – 250	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
251 – 300	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
301 and above	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
Total	Count	16	1	2	103

Labour (Auxiliary/ Clerical and Operational staff) * Collaboration in Research and Development total Cross tabulation

		Collaboration in Research and Development total			
		41 – 50	51 - 60	61 - 70	Total
Labour (Auxiliary/ Clerical < 51 and Operational staff)	Count	15	1	1	73
	% of Total	14.6%	1.0%	1.0%	70.9%
51 – 100	Count	1	0	1	24
	% of Total	1.0%	.0%	1.0%	23.3%
101 – 150	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
151 – 200	Count	0	0	0	2
	% of Total	.0%	.0%	.0%	1.9%
201 – 250	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
251 – 300	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
301 and above	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
Total	Count	16	1	2	103
	% of Total	15.5%	1.0%	1.9%	100.0%

Labour (Auxiliary/ Clerical and Operational staff) * Collaboration in Research and Development

Chi-Square Tests

	value	Df	Asymp.sig. (2-sided)
Pearson Chi-Square	24.371 ^a	36	.930
Likelihood Ratio	22.445	36	.962
Linear-by-Linear Association	.261	1	.609
N of valid Cases	103		

a.329 cells (100.0%) have expected count less than 5
The minimum expected count is .01

APPENDIX LXV

Crosstabulation of Labour (Auxilliary/Clerical Staff and Operational Staff) with Joint Labour Supply

Labour (Auxiliary/ Clerical and Operational staff) * Joint labour supply total Cross tabulation

		Joint labour supply total			
		< 11	11 - 20	21 - 30	31 - 40
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	8	13	22	15
	% of Total	7.8%	12.6%	21.4%	14.6%
51 – 100	Count	7	2	7	6
	% of Total	6.8%	1.9%	6.8%	5.8%
101 – 150	Count	0	1	0	0
	% of Total	.0%	1.0%	.0%	.0%
151 – 200	Count	0	0	1	1
	% of Total	.0%	.0%	1.0%	1.0%
201 – 250	Count	0	0	0	0
	% of Total	.0%	.0%	.0%	.0%
251 – 300	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
301 and above	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
Total	Count	15	16	30	24
	% of Total	14.6%	15.5%	29.1%	23.3%

Labour (Auxiliary/ Clerical and Operational staff) * Joint labour supply total Cross tabulation

		Joint labour supply total			Total
		41 – 50	51 - 60	61 - 70	
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	9	4	2	73
	% of Total	8.7%	3.9%	1.9%	70.9%
51 – 100	Count	1	1	0	24
	% of Total	1.0%	1.0%	.0%	23.3%
101 – 150	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
151 – 200	Count	0	0	0	2
	% of Total	.0%	.0%	.0%	1.9%
201 – 250	Count	1	0	0	1
	% of Total	1.0%	.0%	.0%	1.0%
251 – 300	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
301 and above	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
Total	Count	11	5	2	103
	% of Total	10.7%	4.9%	1.9%	100.0%

Labour (Auxiliary/ Clerical and Operational staff) * Joint labour supply

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	29.676 ^a	36	.762
Likelihood Ratio	24.204	36	.933
Linear-by-Linear Association	.094	1	.759
N of Valid Cases	103		

a. 42 cells (85.7%) have expected count less than 5. The minimum expected count is .02.

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APPENDIX LXVI

Crosstabulation of Labour (Auxilliary/Clerical Staff and Operational Staff) with Joint Water Supply

Labour (Auxiliary/ Clerical and Operational staff) * Joint water supply total Cross tabulation

		Joint water supply total		
		< 11	11 - 20	21 - 30
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	12	43	17
	% of Total	11.7%	41.7%	16.5%
51 – 100	Count	1	19	4
	% of Total	1.0%	18.4%	3.9%
101 – 150	Count	0	0	1
	% of Total	.0%	.0%	1.0%
151 – 200	Count	1	1	0
	% of Total	1.0%	1.0%	.0%
201 – 250	Count	0	1	0
	% of Total	.0%	1.0%	.0%
251 – 300	Count	0	1	0
	% of Total	.0%	1.0%	.0%
301 and above	Count	0	1	0
	% of Total	.0%	1.0%	.0%
Total	Count	14	66	22
	% of Total	13.6%	64.1%	21.4%

Labour (Auxiliary/ Clerical and Operational staff) * Joint water supply total Cross tabulation

		Joint water supply total	
		31 – 40	Total
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	1	73
	% of Total	1.0%	70.9%
51 – 100	Count	0	24
	% of Total	.0%	23.3%
101 – 150	Count	0	1
	% of Total	.0%	1.0%
151 – 200	Count	0	2
	% of Total	.0%	1.9%
201 – 250	Count	0	1
	% of Total	.0%	1.0%
251 – 300	Count	0	1
	% of Total	.0%	1.0%
301 and above	Count	0	1
	% of Total	.0%	1.0%
Total	Count	1	103
	% of Total	1.0%	100.0%

Labour (Auxiliary/ Clerical and Operational staff) * Joint water supply

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.711 ^a	18	.862
Likelihood Ratio	12.503	18	.820
Linear-by-Linear Association	.169	1	.681
N of Valid Cases	103		

a. 23 cells (82.1%) have expected count less than 5. The minimum expected count is .01.

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APPENDIX LXVII

Crosstabulation of Labour (Auxilliary/Clerical Staff and Operational Staff) with Joint Waste Treatment

Labour (Auxiliary/ Clerical and Operational staff) * Joint waste treatment total Cross tabulation

		Joint waste treatment total			
		< 11	11 - 20	21 - 30	31 - 40
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	5	25	18	17
	% of Total	4.9%	24.3%	17.5%	16.5%
51 – 100	Count	6	5	6	4
	% of Total	5.8%	4.9%	5.8%	3.9%
101 – 150	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
151 – 200	Count	0	0	0	2
	% of Total	.0%	.0%	.0%	1.9%
201 – 250	Count	0	0	0	0
	% of Total	.0%	.0%	.0%	.0%
251 – 300	Count	0	0	0	0
	% of Total	.0%	.0%	.0%	.0%
301 and above	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
Total	Count	11	30	24	25
	% of Total	10.7%	29.1%	23.3%	24.3%

Labour (Auxiliary/ Clerical and Operational staff) * Joint waste treatment total Cross tabulation

		Joint waste treatment total		
		41 – 50	51 - 60	Total
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	7	1	73
	% of Total	6.8%	1.0%	70.9%
51 – 100	Count	3	0	24
	% of Total	2.9%	.0%	23.3%
101 – 150	Count	0	0	1
	% of Total	.0%	.0%	1.0%
151 – 200	Count	0	0	2
	% of Total	.0%	.0%	1.9%
201 – 250	Count	0	1	1
	% of Total	.0%	1.0%	1.0%
251 – 300	Count	1	0	1
	% of Total	1.0%	.0%	1.0%
301 and above	Count	0	0	1
	% of Total	.0%	.0%	1.0%
Total	Count	11	2	103
	% of Total	10.7%	1.9%	100.0%

Labour (Auxiliary/ Clerical and Operational staff) * Joint waste treatment

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	79.612 ^a	30	.000
Likelihood Ratio	31.400	30	.396
Linear-by-Linear Association	5.083	1	.024
N of Valid Cases	103		

a. 34 cells (81.0%) have expected count less than 5. The minimum expected count is .02.

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APPENDIX LXVIII

Crosstabulation of Labour (Auxilliary/Clerical Staff and Operational Staff) with Joint Security

Labour (Auxiliary/ Clerical and Operational staff) * Joint security total Cross tabulation

		Joint security total			
		< 11	11 - 20	21 - 30	31 - 40
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	6	25	31	9
	% of Total	5.8%	24.3%	30.1%	8.7%
51 – 100	Count	1	9	7	7
	% of Total	1.0%	8.7%	6.8%	6.8%
101 – 150	Count	0	0	1	0
	% of Total	.0%	.0%	1.0%	.0%
151 – 200	Count	0	1	1	0
	% of Total	.0%	1.0%	1.0%	.0%
201 – 250	Count	0	0	0	0
	% of Total	.0%	.0%	.0%	.0%
251 – 300	Count	0	0	1	0
	% of Total	.0%	.0%	1.0%	.0%
301 and above	Count	0	0	1	0
	% of Total	.0%	.0%	1.0%	.0%
Total	Count	7	35	42	16
	% of Total	6.8%	34.0%	40.8%	15.5%



Labour (Auxiliary/ Clerical and Operational staff) * Joint security total Cross tabulation

		Joint security total	
		41 – 50	Total
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	2	73
	% of Total	1.9%	70.9%
51 – 100	Count	0	24
	% of Total	.0%	23.3%
101 – 150	Count	0	1
	% of Total	.0%	1.0%
151 – 200	Count	0	2
	% of Total	.0%	1.9%
201 – 250	Count	1	1
	% of Total	1.0%	1.0%
251 – 300	Count	0	1
	% of Total	.0%	1.0%
301 and above	Count	0	1
	% of Total	.0%	1.0%
Total	Count	3	103
	% of Total	2.9%	100.0%

Labour (Auxiliary/ Clerical and Operational staff) * Joint security

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	43.844 ^a	24	.008
Likelihood Ratio	19.342	24	.733
Linear-by-Linear Association	2.124	1	.145
N of Valid Cases	103		

a. 30 cells (85.7%) have expected count less than 5. The minimum expected count is .03.

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APPENDIX LXIX

Crosstabulation of Labour (Auxilliary/Clerical Staff and Operational Staff) with Joint Telecommunication

Labour (Auxiliary/ Clerical and Operational staff) * Joint telecommunication total Cross tabulation

		Joint telecommunication total		
		< 11	11 - 20	21 - 30
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	20	48	4
	% of Total	19.4%	46.6%	3.9%
51 – 100	Count	13	10	1
	% of Total	12.6%	9.7%	1.0%
101 – 150	Count	1	0	0
	% of Total	1.0%	.0%	.0%
151 – 200	Count	0	2	0
	% of Total	.0%	1.9%	.0%
201 – 250	Count	0	1	0
	% of Total	.0%	1.0%	.0%
251 – 300	Count	0	1	0
	% of Total	.0%	1.0%	.0%
301 and above	Count	1	0	0
	% of Total	1.0%	.0%	.0%
Total	Count	35	62	5
	% of Total	34.0%	60.2%	4.9%

Labour (Auxiliary/ Clerical and Operational staff) * Joint telecommunication total Cross tabulation

		Joint telecommunication total	
		31 – 40	Total
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	1	73
	% of Total	1.0%	70.9%
51 – 100	Count	0	24
	% of Total	.0%	23.3%
101 – 150	Count	0	1
	% of Total	.0%	1.0%
151 – 200	Count	0	2
	% of Total	.0%	1.9%
201 – 250	Count	0	1
	% of Total	.0%	1.0%
251 – 300	Count	0	1
	% of Total	.0%	1.0%
301 and above	Count	0	1
	% of Total	.0%	1.0%

	% of Total	.0%	1.0%
Total	Count	1	103
	% of Total	1.0%	100.0%

Labour (Auxiliary/ Clerical and Operational staff) * Joint telecommunication

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.518 ^a	18	.819
Likelihood Ratio	14.362	18	.705
Linear-by-Linear Association	1.440	1	.230
N of Valid Cases	103		

a. 24 cells (85.7%) have expected count less than 5. The minimum expected count is .01.

UNIVERSITY OF IBRAHIM

APPENDIX LXX

Crosstabulation of Labour (Auxiliary/Clerical Staff and Operational Staff) with Joint Ports and Shipping

Labour (Auxiliary/ Clerical and Operational staff) * Joint ports & shipping total Cross tabulation

		Joint ports & shipping total			
		< 11	11 - 20	21 - 30	31 - 40
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	4	17	28	19
	% of Total	3.9%	16.5%	27.2%	18.4%
51 – 100	Count	4	7	7	6
	% of Total	3.9%	6.8%	6.8%	5.8%
101 – 150	Count	1	0	0	0
	% of Total	1.0%	.0%	.0%	.0%
151 – 200	Count	0	0	1	1
	% of Total	.0%	.0%	1.0%	1.0%
201 – 250	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
251 – 300	Count	0	0	1	0
	% of Total	.0%	.0%	1.0%	.0%
301 and above	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
Total	Count	9	24	37	28
	% of Total	8.7%	23.3%	35.9%	27.2%

Labour (Auxiliary/ Clerical and Operational staff) * Joint ports & shipping total Cross tabulation

		Joint ports & shipping total	
		41 – 50	Total
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	5	73
	% of Total	4.9%	70.9%
51 – 100	Count	0	24
	% of Total	.0%	23.3%
101 – 150	Count	0	1
	% of Total	.0%	1.0%
151 – 200	Count	0	2
	% of Total	.0%	1.9%
201 – 250	Count	0	1
	% of Total	.0%	1.0%
251 – 300	Count	0	1
	% of Total	.0%	1.0%
301 and above	Count	0	1
	% of Total	.0%	1.0%
Total	Count	5	103
	% of Total	4.9%	100.0%

Labour (Auxiliary/ Clerical and Operational staff) * Joint ports & shipping

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	24.052 ^a	24	.459
Likelihood Ratio	20.109	24	.691
Linear-by-Linear Association	.031	1	.860
N of Valid Cases	103		

a. 28 cells (80.0%) have expected count less than 5. The minimum expected count is .05.

UNIVERSITY OF IBADAN

APPENDIX LXXI

Crosstabulation of Labour (Auxilliary/Clerical Staff and Operational Staff) with Access to Financial Institution

Labour (Auxiliary/ Clerical and Operational staff) * Access to financial institution total Cross tabulation

		Access to financial institution total			
		11 – 20	21 - 30	31 - 40	41 – 50
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	5	10	22	23
	% of Total	4.9%	9.7%	21.4%	22.3%
51 – 100	Count	2	5	6	7
	% of Total	1.9%	4.9%	5.8%	6.8%
101 – 150	Count	0	0	1	0
	% of Total	.0%	.0%	1.0%	.0%
151 – 200	Count	0	2	0	0
	% of Total	.0%	1.9%	.0%	.0%
201 – 250	Count	0	0	0	0
	% of Total	.0%	.0%	.0%	.0%
251 – 300	Count	0	0	0	0
	% of Total	.0%	.0%	.0%	.0%
301 and above	Count	0	0	0	0
	% of Total	.0%	.0%	.0%	.0%
Total	Count	7	17	29	30
	% of Total	6.8%	16.5%	28.2%	29.1%

Labour (Auxiliary/ Clerical and Operational staff) * Access to financial institution total Cross tabulation

		Access to financial institution total			Total
		51 – 60	61 - 70	81 - 90	
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	9	3	1	73
	% of Total	8.7%	2.9%	1.0%	70.9%
51 – 100	Count	4	0	0	24
	% of Total	3.9%	.0%	.0%	23.3%
101 – 150	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
151 – 200	Count	0	0	0	2
	% of Total	.0%	.0%	.0%	1.9%
201 – 250	Count	1	0	0	1
	% of Total	1.0%	.0%	.0%	1.0%
251 – 300	Count	1	0	0	1
	% of Total	1.0%	.0%	.0%	1.0%
301 and above	Count	1	0	0	1
	% of Total	1.0%	.0%	.0%	1.0%
Total	Count	16	3	1	103

Labour (Auxiliary/ Clerical and Operational staff) * Access to financial institution total Cross tabulation

		Access to financial institution total			Total
		51 – 60	61 - 70	81 - 90	
Labour (Auxiliary/ Clerical and < 51 Operational staff)	Count	9	3	1	73
	% of Total	8.7%	2.9%	1.0%	70.9%
51 – 100	Count	4	0	0	24
	% of Total	3.9%	.0%	.0%	23.3%
101 – 150	Count	0	0	0	1
	% of Total	.0%	.0%	.0%	1.0%
151 – 200	Count	0	0	0	2
	% of Total	.0%	.0%	.0%	1.9%
201 – 250	Count	1	0	0	1
	% of Total	1.0%	.0%	.0%	1.0%
251 – 300	Count	1	0	0	1
	% of Total	1.0%	.0%	.0%	1.0%
301 and above	Count	1	0	0	1
	% of Total	1.0%	.0%	.0%	1.0%
Total	Count	16	3	1	103
	% of Total	15.5%	2.9%	1.0%	100.0%

Labour (Auxiliary/ Clerical and Operational staff) * Access to Financial Institution

Chi-Square Tests

	value	df	Asymp.sig. (2-sided)
Pearson Chi-Square	31.929 ^a	36	.663
Likelihood Ratio	24.767	36	.921
Linear-by-Linear Association	.525	1	.469
N of valid Cases	103		

a.43 cells (8.7%) have expected count less than 5

The minimum expected count is .01

Raw coefficients for the second variable set

	1	2	3	4	5
X111	0.1277	-0.0132	0.0837	-0.0322	0.0261
X222	-0.0000	-0.0014	0.0005	0.0024	-0.0008
X333	-0.0067	0.0323	0.0412	0.0224	-0.0234
X444	-0.0131	0.0122	-0.0040	-0.0074	0.0187
X555	-0.0006	-0.0003	-0.0002	-0.0005	-0.0004

Canonical correlations:

0.9009 0.8381 0.7650 0.5988 0.4607

Tests of significance of all canonical correlations

Prob>F	Statistic	df1	df2	F
Wilks' lambda 0.7810 a	.0117511	55	26.7309	0.7834
Pillai's trace 0.5930 a	2.67	55	45	0.9376
Lawley-Hotelling trace 0.9506 a	8.9076	55	17	0.5507
Roy's largest root 0.0344 u	4.30792	11	9	3.5247

e = exact, a = approximate, u = upper bound on.