

Full Length Research

Impact of Local Project Environment on Inter Firm Subcontracting

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Subcontracting relationship does not occur in a vacuum. This is because business environment is usually characterized with several patterns of subcontracting relationship representing system input-output parameters. The environmental input and output usually determines the degree of subcontracting arrangement possible with an industrial region. The study examined the impact of local project environment on inter-firm subcontracting. The overall objective of this research is to critically examine the impact of local project environment on inter-firm subcontracting: Evidence from Agbara Industrial Estate, Ogun State. The primary method was used in collection of data; the data were collated and analyzed. One hundred (100) copies of questionnaires were administered out of which ninety (70) copies were retrieved and only (50) were collated for the analysis representing 71.43%. Research objectives were set along-side four hypotheses that were formulated and tested using regression and correlation. This result shows that there was a significant positive impact of energy (electricity) for production activities on production capability of the companies studied even as it is widely accepted that there is a strong correlation between socio-economic development and availability of electricity and production energy, also that company's distribution intermediaries with reference to inter-industry marketing influences the production capability of a company, this means that the rate at which intermediary is willing to accept and disperse products will determine the extent to which companies will need to improve their production capability or otherwise. This study therefore shows that efficacy of the road transportation system has a wide impact on determining the production capability. Recommendations were that that it is pertinent for companies to take into consideration their local project environmental variables before engaging in subcontract-offering or subcontract receiving because local project environment has a significant positive impact on subcontracting relationship. It is also recommended that companies should subcontract some of their production operations in order to focus on the production of more strategic components since the cost of powering their machines for production of other component parts of their products say packaging could prove expensive. They should also take into consideration the rate at which their transportation fleet distribute products as well as control the performance of the fleet in order to regulate production capability so as to ensure their operations are balanced.

Key words: Environment, Inter- firm subcontracting, Inter-industry marketing, Energy.

INTRODUCTION

The high degree of both vertical and horizontal integration and cooperation are common in business relating within established industrial estates nonetheless, a modern business enterprise may still not be self-

sufficient in all of its activities. Many companies appear to depend upon other producers to provide at least some additional activities and services. Reflecting on the extent of this dependence, "the extremely important role in intermediary relationship has been attributed to subcontracting. Thus, the role of subcontracting plays in industry has been recognized in the past few years as never before (Sammet and Kelley, 1980). In particular, many

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observers (Williamson, 1985, Piore, Sabel, 1984, Otokiti, 1988) point out that subcontracting is extensively used in the industries and/or industrial districts such as Japanese tool makers, Italian textile firms and Indian textile manufacturers, all of which acknowledged the flexibility of manufacturing technologies. There has been a shift in the locus of studies and policy proposals in recent years, especially after the publication of the influential book by Piore and Sabel (1984) on flexible specialization. The emphasis is now on networking and clusters, usually formed by SMEs. International organizations like UNIDO (Ceglie and Dini, 1999), the ILO (Pyke, 1992) and UNCTAD (1994) now support networking initiatives and the development of industrial districts. It is suggested that 'on the account of the common problems they all share, small enterprises are in the best position to help each other' (Ceglie and Dini, 1999). They can do so through horizontal cooperation (they can collectively achieve scale economies), vertical cooperation (they can specialize in their core activities and develop the external division of labour), and networking among enterprises, providers of business development services, and local policymakers.

The Nigerian experience shows that production subcontracting linkages started in the early 1960s, the post-independence period. The earliest stage in the adoption of production subcontracting as an industrial production technique in Nigeria was characterised by insignificant growth and rapid growth thereafter. However, there was marked improvement and variation in the adoption of production subcontracting by industry groups after the fourth development plan (Ajayi 1998, 2002).

Many literatures have also discussed the costs and benefits associated with subcontracting and ancillarization arrangement (Berry and Levy, 1999). Accordingly, subcontracting and outsourcing occur mainly because a firm may find them less profitable or considered complete in-house operations as uneconomical, essentially, it has been suggested that "a firm should concentrate on its core competencies and strategically out-source other activities" (Quinn and Hilmer 1994), and "not one company builds an entire flight vehicle, not even the simplest light plane, because of the exceptional range of skills and facilities required" (Britannica online, 1996). Therefore, it is relevant to appreciate and consider the impact of the immediate project environment on factors in improving subcontracting strategy which ultimately promotes inter-linkages between different firms. Relevant research works have shown that not one company engages in the production of a whole product or the provision of a service.

There is the view that 'work can be done most anywhere'. The Mazda MX5 (Miata) car and for example, was designed in California, financed in Tokyo and New York, tested in the UK, assembled in Michigan and Mexico using components designed in America and

made in Japan. Shipbuilding- a predominantly based project environment has faced competition coming from parts of the world that twenty years ago had little or no capability in this area. Traditional not-for-profit organizations (including many health services) are now required to meet performance targets and individual activities are being subjected to previously unthinkable commercial constraints therefore resulting to additional need for subcontracting.

Within the expanding European Union and WTO, trade barriers have fallen and the numbers of international collaborative ventures have increased. Projects have become more complex as businesses are becoming more complex since it is less likely for a company to provide a commodity, product or service but to provide a 'package' which meets an entire need rather than just part of that need. The change in the competitive environment in which the majority of organizations operate has necessitated a major rethink of the way in which projects are managed. The effects of the changes on projects and their managers is not elusive to the fact that rates of change in technology and methods have increased not only is the change continuing, but the speed at which changes are occurring has been increasing. In addition to this, organizations are having to become customer focused and exceed rather than just meet customer expectation. There is therefore a need to cultivate a trend towards integration and openness between customers and suppliers. Company information that would previously have been closely guarded secrets is now being shared in a move towards partnership led cost reduction process found in many industries outside the industrial estate rather than adversarial relationships.

Statement of Research Problems

Subcontracting relationship does not occur in a vacuum. This is because business environment is usually characterized with several patterns of subcontracting relationship representing system input-output parameters. The environmental input and output usually determines the degree of subcontracting arrangement possible with an industrial region. The poor performance of national government in the provision of public goods and inadequate efforts in promoting inter-industry relationships has caused slow emergence of industry associations to substitute for the state (Brautigam, 1997). In line with this, many factors such as energy, raw material supplies are considered as essential industrial requirement and cost saving factors, which when effectively shared or distributed are capable of facilitating productivity in inter-industry relationship within an Industrial estate. This research therefore seeks to examine the impact of energy distribution within the industrial estate and possible impact on production capability of firms operating in the estate.

Hypothetically, the local business environment exerts a great deal of influence on inter-firm linkages, even as the transportation networks and policy of different companies regulates and influence to a large extent the rate and cost of production, available evidence has shown close relationship between transportation cost and market price of finished goods. And that such high or low cost have inverse relationship on cost reduction strategy and in effect the production capability of firms. Consequently, firms within an industrial estate either order raw material together or pull resources on transportation via a leasing arrangement both of which have been established as having cost impact on production capability. It is against this background that the study seeks to examine the possible impact of road transport on participants' production capability.

Subcontractors operating within an estate sometimes have the assurance of a secure market for their products; this enables them to sell the products without difficult marketing efforts and to focus on other aspects of production and managerial processes of the organization (Seleshi, 2001). This is applicable to either production or distribution subcontracting both of which are likely to benefit the firms. This leads to significant relationship which exists between the production system and capability of market to absorb produced goods. This position has therefore sparked research interest in examining the influence of inter-industry marketing on efficiency of subcontracting amongst companies in Agbara Industrial Estate. According to Hondai (1992), subcontracting agreements enables SME's to reduce information and transaction costs through easy and cheap acquisition of new technologies, product designs, production processes, management methods, marketing and input materials from large scale client. An example is Higher-layered supplier firm in Indonesian motorcycle industry who fostered its subcontractors through provision of production facilities and training programmes on technology and management (Sato, 1998). Therefore, this research in addition to above stated problems identified the dynamics of large firms operating within an estate as capable of providing and transferring technologically advanced product design and processes to smaller participants within inter-firm subcontracting relationship and decided to examine the impact of both vertical and horizontal production technologies available to participants and its effect on subcontracting efficiency as a result of divisibility in operations.

Objectives of the Study

The broad objective of the study is to critically examine the impact of local project environment on inter-firm subcontracting.

The specific objectives are to:

- i. Examine the effect of energy sharing on cost reduction

and production capability in inter-firm relationship.

- ii. Ascertain if road transportation cost of products or raw materials improves production capability of participants and subsequently the expansion of subcontracting arrangement of firms in Agbara Industrial Estate.

- iii. Find out the influence of company's inter-industry marketing on efficiency and production capability in inter-firm relationship amongst selected companies of Agbara Industrial Estate.

- iv. To investigate the nature of production technologies transferable in inter-firm relationship and its effects on subcontracting efficiency as a result of divisibility in operations of other smaller firms or industries.

LITERATURE REVIEW

Determinants of Subcontracting Relationships

The determinants or factors influencing subcontracting relationships according to Yoshi Takahashi (2009) consist of the following:

Firm Size: This is a factor that determines which contractor will be a subcontractor and the one that will remain as a contractor. It has been observed that large firms tend to subcontract a larger proportion of their production while small firms tend to be subcontractors.

Wage: Taymaz and Kilicaslan (2005) confirmed that high wage textile firms usually subcontract a larger part of their production to other companies. High-wage firms in engineering industry have a higher subcontracting approach to their operations and this is because there is no one manufacturer that can successfully manufacture a product.

Skilled Labour: Skilled labor is one important determinant of subcontracting behavior. The evidence from literature provides that skilled labor has negative impact on subcontract receiving model. This implies that firms using less skilled labor tend to be subcontractors in textile industry. On the other hand, engineering firms that have a big ratio of skilled labor tend to subcontract a bigger part of their production (Taymaz and Kilicaslan, 2005).

Capital Intensity of the Production Process: Kimura (2002) posited that capital-labour ratio is negatively significant with the probability of firms using subcontractor. He argues that labor intensive firms tend to work as subcontractors while capital intensive firms may use subcontractors.

Ownership: The evidence from literature suggested that foreign-owned share is positive in the probability of working as subcontractors (Kimura, 2002).

Firm Growth: Although Taymaz and Kilicaslan (2005) discovered that the growth rate of a company has a positive effect on subcontracting-offering in both textile and engineering industries. They stated that a rapidly growing firm is likely to subcontract out a part of the production process.

Benefits and Challenges of Subcontracting

Broadly, subcontracting can satisfy the need of traders and producers to reap the gains of specialization and low cost of production. Most importantly, subcontracting may offer an improvement over the original situation of a small producer. The most interested groups in such arrangements are persons with less skill and abilities. The major advantages of subcontracting according to Seleshi (2001) include the following:

- i. Subcontracting links smaller enterprises, which relatively provide higher employment ratios than their larger counterparts.
- ii. Enables greater flexibility of production and adjusting easily to changing demand patterns.
- iii. Allows better supervision of the production process and greater efficiency in the use of plant and machinery. Thus, combined with substantially lower overheads can contribute to higher production.
- iv. Subcontracting can help facilitate the development of local entrepreneurship.
- v. Helps to compensate for fluctuations in the seasonal income patterns of MSEs and reduce their entrepreneurial risks. This may facilitate their entry into another, more risky line of production in which they could not have dared to attempt.
- vi. Subcontractors have the assurance of a secure market for their products. This enables them to sell the products with difficult marketing efforts and to concentrate on other aspects of production and management process.
- vii. Subcontracting provide an important channel for transfer of technology and know-how.
- viii. In addition, the obvious benefit of raising efficiency and competitiveness, subcontracting and other forms of inter-linkages provide an important possibility for the emergence of new business opportunities and creation of guaranteed markets.

Morcós (2003), a UNIDO intern described the benefits of subcontracting to involve contractors as cost reduction, higher quality, an efficient mechanism to respond to demand fluctuations, accessing regions with potential growth prospects. The benefits of subcontracting to subcontractors according to Morcos (2003) are

Higher Productivity and Efficiency: Subcontracting leads to a specialization in the completion of specific

components or parts. This type of specialization enables the subcontractor to achieve a higher level of efficiency and skill and thereby higher levels of capital and especially labor productivities. According to Hondai (1992) quoted in Hayashi (2002), subcontracting agreements enables SME's to reduce information and transaction costs through the easy and cheap acquisition of new technologies, product designs, production processes, management methods, marketing and input materials from large-scale clients. Berry and Levy (1999) explained that subcontracting agreements provided SME's in Indonesia with an important opportunity to learn new technology. Harianto (1996) found benefits of sme's with from intensive technical linkages in subcontracting ties while Sato (1998) illustrated a case in which a higher-layer supplier firm in the Indonesian motorcycle industry fostered its subcontractors through the provision of production facilities and training programs on technology and management. The availability of products or raw materials is an additional reason why companies decide to source internationally. In order to meet product demands, companies can add international suppliers to their portfolio of domestic suppliers (Sato, 1998). According to a study undertaken by Hayashi (2002), cost advantages were the first and by far most important reason for Dutch companies using international production facilities. The creation of these linkages is essential between various sectors of the industry. Other reasons included higher flexibility, risk reduction, environmental policies, raising quality or entry into new technology.

Subcontracting Theory

According to Kongmanila and Takahashi (2009), there are three different theories in analyzing subcontracting which are the dualistic approach, development approach and network and clustering approach. Dualistic Approach which is also known as the unequal power relationship views subcontracting as an unequal power relationship. Originally, this theory is based on the concept of 'dualistic economy', which involves two different sets of enterprises, the large firms (multinational corporations), and the small firms (Piore and Sabel, 1984). The basic understanding of this theory is that large contractors realize the benefit at the expense of small contractors. Development Approach as formulated by development economists. It considers subcontracting as a relationship between large and small firms, but emphasizes a positive role of it: subcontracting can smooth the path of small firms to grow and make them a suitable tool for mass employment generation in developing countries that are committed to industrialization. Watanabe (1971), in one of the leading articles on subcontracting, claimed that "subcontracting can smooth the path of small enterprises and make them a suitable instrument for mass employment creation in developing countries that are committed

to industrialization'. In a similar manner, UNIDO also called for the promotion of industrial subcontracting (UNIDO, 1974). The main idea behind advocating the development of subcontracting is based on the benefits a small subcontractor derives from a large firm in the form of guaranteed markets, secured raw materials, and technical assistance. Large firms that adopt modern technology would diffuse modern production techniques (the control of production processes, quality control, etc.) to subcontractors. Large firms outsource their activities to small firms not as a search for low wages, but to improve their competitiveness through focusing on core competencies, accessing to world class capabilities, sharing risks, etc. (Pyke, 1992).

Network and Clustering Approach supports networking initiatives and the development of industrial cluster (Pyke, 1992; UNCTAD, 1994). Ceglie and Dini (1994) suggest that on the account of all firm's share, small firms in the best position to help each other. They can do this through horizontal cooperation (they can collectively achieve economies of scale), vertical cooperation (they can specialize in their core activities and develop the external division of labor) and networking among enterprises, providers of business development services and local policy makers. Rama and Calatrava (2002) posited that the cluster approach is the important factor for establishing subcontracting relationships. They argue that clustering accrues significant benefits to subcontractors, particularly small or local firms. Moreover, patterns of subcontracting as a specific form of networking are associated with specific types (subcontracting relationships) of industrial clusters (Rama et al., 2003). Under these circumstances, there are some firms working as both subcontractors and contractors at the same time.

Several studies have been conducted as regards the effect subcontracting arrangements and strategy on the environment and even particular industries, however very few studies have focused their objectives on finding how much wallop and optima the local project environment has on subcontracting relationship. This therefore represents the main focus of this study. The outcome of various related researches have been somewhat relative since they are geographically limited in their scope. According to Hal Hill (1985), assembler-supplier subcontracting relationships are generally weak and spasmodic; and the linkages- in terms of financial, raw material, labour, and technology flows have on the whole been minimal and despite some increases in local content ratios and greater technology spin-offs in a few areas, the government programs targeted at improving local content in the Philippines have met with only limited success. However, subcontracting is a widely utilized type of inter-firm linkage, it allows for effective collaboration and information sharing between firms. According to Seleshi (2001), the subcontracting strategy in some selected countries of the world was considered. The

countries used for the empirical framework are Kenya, Japan, Taiwan, Slovakia and Korea. Taymaz and Kilicaslan (2005) posited that capital intensity of production process can reveal the relationship between technology and subcontracting behavior. In the case of labor intensive industry such as garment industry, machineries and their utilization are also important factors determining subcontracting behavior but they cannot be operated well without appropriate skill and knowledge. Labor issues have also been highlighted to be relevant in subcontracting arrangements; skilled-labor should be one important determinant of subcontracting behaviour. The evidence from literature suggests that skilled labor has negative impact on subcontract receiving model. This implies that firms employing less skilled labor tend to be subcontractors in the textile industry. On the other hand, engineering firms that have a big ratio of skilled labor tend to subcontract a bigger part of their production (Taymaz and Kilicaslan, 2005).

It is of logical import that as the demands of the domestic market on industries rise, the firms in such industries will have to improve their capacity and their size as well as if they aim at retaining a proportionate market share, it is in line with this that Kimura (2002) in his investigation of subcontracting and the performance of small and medium firms in Japan argued that small firms tend to work as subcontractors while large firms may use subcontractors. He found that firm size was negatively significant with the probability of firms working as a subcontractor. On the contrary, this variable was positive but insignificant with the probability of firms using subcontractors. Kongmanilla and Takahashi (2009) based on their analysis of 42 subcontractors located in Vcc, Lao Pdr (garment industry), they found that firm size, capital intensity of the production process and foreign ownership and skilled labor are important factors that determine subcontracting or subcontract-offering behaviour. In contrast, they observed that wage, female workers, technology and sales growth are not important determinants in explaining subcontract-offering behaviour.

RESEARCH METHODS

The data analyzed in this paper were collected through a survey of workers in the selected organizations in Agbara Industrial Estate, Ogun State, Nigeria. The quantitative and cross-sectional research design was used which entailed the collection of data at a particular period of time as well as to minimize cost and time expended on the research work. The survey was administered in 2011, under the auspices of a well trained research assistant. The purposive sampling method which according to Newman (2004) amongst other reasons was to be used when selecting unique cases of respondent that are especially informative; was adopted. For the purpose of

Table 1. Rate of Response to Questionnaire.

Questionnaire	Respondents	Percentage
Returned	50	71.43
Not returned	20	28.57
Total distributed	70	100

Field Survey, 2011.

Table 2. Frequency of Respondents by Company.

	Frequency	Percent	Valid Percent	Cumulative Percent
Unilever	11	22.0	22.0	22.0
Glaxo Smithkline	8	16.0	16.0	38.0
African Fertilizer	14	28.0	28.0	66.0
Beloxxi	5	10.0	10.0	76.0
Vitamalt	7	14.0	14.0	90.0
Pace Heritage	5	10.0	10.0	100.0
Total	50	100.0	100.0	

Field Survey, 2011.

this research work, the population represents the total number of companies in Agbara Industrial Estate which are 45 as was derived from the personal visit made to the industrial estate by the researchers and also a correlation of available secondary data that was sourced from Manufacturer's Association of Nigeria, Ogun State chapter. The companies in Agbara Industrial Estate have been classified by the researcher based on the Standard International Trade Classification (SITC). For the purpose of convenience as well as accessibility to data, only six companies which included a sole proprietorship establishment were deliberately selected for this research work.

The surveys were addressed to the core workers in the organizations. The respondents were asked to provide the following data regarding their jobs and personal histories: age; gender; years and area of education; professional memberships; professional conferences attended in the previous 4 years; job title, whether their job was full-time or part-time; the number of years employed in their current position; previous rate of turnover in their position; and their salary and associated benefits. Questionnaires were distributed only to those who qualified and agree to participate in the study. The researcher then briefly explained the nature and requirement of the survey before the respondent filled up the questionnaire. Typically, assessment of reliability in terms of internal consistency cannot be computed for single-item measurement (Soderlund and Ohman, 2003). Though Churchill (1979; Ojo, 2003) argued that single items are unreliable, Pallant (2005) opposed this by demonstrating that the main issue is the validity problem rather than reliability problem. The study adopted a five-point Likert scale. The statistical package for social science, Windows version 17.0 (SPSS 17.0)

was used to analyze the data collected.

ANALYSIS AND DISCUSSION

Table 1 shows that from the 70 questionnaires that were administered, only 50(71.43%) were filled and returned to the researcher for analysis whilst 20(28.57%) of the questionnaires were not returned to the researcher.

Table 2 reveals the rate of response to the administered questionnaires according to companies selected for this research purpose. The majority of respondents were from African Fertilizer with 28% respondents whilst the lowest ranked is Beloxxi and Pace Heritage with 5%.

Table 3 shows that the status of respondents to the questionnaire. From the 50 respondents, 4 (8.0%) hold top managerial positions, 33 (66%) are departmental heads and 13(26%) are supervisors. This shows that most of the respondents were departmental heads. This is because the researcher administered most of the questionnaires to departmental heads since they would have relevant information about their company's operations.

Test of Hypothesis 1

Research Objective 1- Examine the effect of energy sharing on cost reduction and production capability in inter-firm relationship.

Research Question 1- To what extent will energy sharing between contractor and the subcontractor affect the structure of cost reduction and production capability of both contractors and contractees in inter-firm relationship

Table 3. Status of Respondent(Analysis of Personal Data).

		Frequency	Percent	Valid Percent	Cumulative Percent
Unilever					
Valid	Departmental Head	6	54.5	54.5	54.5
	Supervisor	5	45.5	45.5	100.0
	Total	11	100.0	100.0	
Glaxo Smithkline					
Valid	Top Mgt	4	50.0	50.0	50.0
	Departmental Head	2	25.0	25.0	75.0
	Supervisor	2	25.0	25.0	100.0
	Total	8	100.0	100.0	
African Fertilizer					
Valid	Departmental Head	9	64.3	64.3	64.3
	Supervisor	5	35.7	35.7	100.0
	Total	14	100.0	100.0	
Beloxi					
Valid	Departmental Head	5	100.0	100.0	100.0
Vitamalt					
Valid	Departmental Head	7	100.0	100.0	100.0
Pace Heritage					
Valid	Departmental Head	4	80.0	80.0	80.0
	Supervisor	1	20.0	20.0	100.0
	Total	5	100.0	100.0	
CUMMULATIVE					
Valid	Top Mgt	4	8.0	8.0	8.0
	Departmental Head	33	66.0	66.0	74.0
	Supervisor	13	26.0	26.0	100.0
	Total	50	100.0	100.0	

Field Survey, 2011.

within Agbara Industrial Estate?

Null Hypothesis 1- There is no significant impact of shared energy cost on production capability between selected contractors and contractees in Agbara Industrial Estate

Table 4 shows the model summary. It shows how much variance in the dependent variable (production capability) is explained by the model (energy). In this case, the R square value or the coefficient of determination is 0.444. Expressed as a percentage, this means that the model (energy) explains 44.4% of the variance in production capability. The standard error estimate shows 1.00935 which indicates the error term that was not captured by the model.

Table 5 shows the assessment of the statistical significance of the result. The ANOVA table tests the null hypothesis to determine if it is statistically significant. From the result, the model in this table is highly statistically significant (Sig. =0.000) at 1%, using the F-statistic also shows that F-calculated is 8.990 whilst the F-tabulated as derived from residual (v1) under regression (v2) i.e. 4 under 45 is 2.58. Based on the F-test assumption that if F-calculated is greater than F-tabulated, the null hypothesis (There is no significant impact of shared energy cost on production capability between selected contractors and contractees in Agbara Industrial Estate) should therefore be rejected.

Table 6 shows which of the variables included in the model contributed to the prediction of the dependent

Table 4: Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.666(a)	.444	.395	1.00935

Field survey (2011)
a Predictor: Energy

Table 5: ANOVA^b.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.635	4	9.159	8.990	.000(a)
	Residual	45.845	45	1.019		
	Total	82.480	49			

Field survey (2011)
a Predictors: Energy
b Dependent Variable: Production Capability

Table 6: Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	5.036	1.826		2.758	.008
	Extent to which electricity is supplied in the estate	-.504	.146	-.472	-3.453	.001
	The voltage of electricity supplied meets plant requirement for production	-.253	.240	-.346	-1.054	.297
	The voltage of electricity supplied has caused increase in cost of operations beyond a reasonable limit	.998	.220	.893	4.529	.000
	Your company has resolved to the use of other source of energy because of the rate of electricity supplied	-.961	.323	-1.019	-2.976	.005

Field survey (2011)
a Dependent Variable: Production Capability.

variable. In comparing the contribution of each independent variable, the standardized coefficients are used because the values under the different variables have been converted to the same scale in order to aid comparison, the negative sign in front of the values will be ignored. The highest value -1.019 which means that company's usage of other sources of energy because of the rate of electricity supplied makes the strongest contribution to explaining the dependent variable which is production capability.

The research finding shows that the sharing of energy cost between contractors and contractees in Agbara

Industrial Estate significantly influences production capability of selected companies.

Test of Hypothesis 2

Research Objective 2- Ascertain if road transportation cost of products or raw materials improves production capability of participants and subsequently the expansion of subcontracting arrangement of firms in Agbara Industrial Estate.

Research Question 2- Does cost of road transportation of

Table 7: Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.770(a)	.593	.557	.86365

Field survey (2011)

a Predictors: (Constant), Road

Table 8 ANOVA^b.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48.915	4	12.229	16.395	.000(a)
	Residual	33.565	45	.746		
	Total	82.480	49			

Field survey (2011)

a Predictors: (Constant), Road

b Dependent Variable: Production Capability

Table 9. Coefficients^a.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	7.815	1.312		5.958	.000
	The Vehicles used by your organization are efficient for product transportation	.448	.495	.172	.905	.370
	Usage of vehicles for transportation of raw materials is efficient	-1.246	.456	-.483	-2.731	.009
	The vehicles in your fleet are sufficient for transportation of output	-.614	.234	-.285	-2.618	.012
	Bad roads outside the industrial estate reduces speedy delivery of products	.539	.112	.540	4.801	.000

Field survey (2011)

a. Dependent Variable: Production Capability

products and raw materials affect the production capability of selected companies in Agbara Industrial Estate and subsequently expansion of subcontracting relationship?

Null Hypothesis 2- Road transportation of products and raw material by a contractor for a subcontractor (contractee) in inter-firm relationship does not significantly affect both participants' production capabilities and cost in inter-firm relationship.

Table 7 shows how much of variance in the dependent variable (production capability) is explained by the model (road). In this case, the R-square value is 0.593. This means that the model explains 59.3% of the variance in the dependent variable (production capability).

Table 8 shows the assessment of the statistical significance of the result. From the result, the model in this table is highly statistically significant (0.000), with F-statistic, if F-calculated is greater than f-tabulated; the null hypothesis is to be rejected. In the table, f-calculated is 16.395 whilst f-tabulated as derived from the F-table i.e. residual under regression is 2.58. The f-calculated is greater than f-tabulated and therefore, the null hypothesis (Road transportation of products and raw material by a contractor for a subcontractor (contractee) in inter-firm relationship does not significantly affect both participants' production capabilities and cost in inter-firm relationship) should be rejected.

Table 9 shows all the variables that contribute to the prediction of the dependent variable. In comparing the

Table 10. Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.732(a)	.535	.482	.93345

Field survey (2011)

a Predictor: (Constant), Distribution Intermediary

Table 11. ANOVA^b.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44.142	5	8.828	10.132	.000(a)
	Residual	38.338	44	.871		
	Total	82.480	49			

Field survey (2011)

a Predictors: (Constant), inter-industry marketing

b Dependent Variable: Production Capability

contribution of each independent variable, the standardized coefficients are used. With 0.540, reduction of speedy delivery of products due to bad roads outside the estate makes the strongest contribution in explaining the dependent variable (production capability).

The result obtained above does signify the rate at which products and raw materials are transferred by road by a contractor for a subcontractor (contractee) in inter-firm relationship determines participants' production capability and cost in inter-firm relationship.

Test of Hypothesis 3

Research Objective 3- Find out the influence of company's inter-industry marketing on efficiency and production capability in inter-firm relationship amongst selected companies of Agbara Industrial Estate.

Research Question 3- To what extent and magnitude will inter-industry marketing facilities available in Agbara Estate business environment affect the production capability of participants?

Null Hypothesis 3- Availability of inter-industry marketing facilities in industrial estate has no significant effect on the efficient production capability of inter-firm participants.

Table 10 shows how much variance in the dependent variable (production capability) is explained by the model (inter-industry marketing). The R square value used for evaluation is 0.535. Expressed as a percentage, this means that the model explains 53.5% of the variance in the dependent variable (production capability).

Table 11 shows the regression model which reveals the statistical significance of the result, the model is highly statistically significant at 0.000 and the null hypothesis should therefore be rejected. Using the F-statistic also, shows that F-calculated is 10.132 whilst the F-calculated

as derived from residual (v1) under regression (v2) i.e. 5 under 44 is 2.43. Based on the f-test assumption, if f-calculated is greater than f-tabulated, the null hypothesis (Availability of inter-industry marketing facilities in industrial estate has no significant effect on the efficient production capability of inter-firm participants) should be rejected. The null hypothesis should therefore be rejected.

Table 12 shows that the highest value is -0.792 since the negative sign is to be ignored in analyzing with standardized coefficient. This means that the increase in sales of the company's products caused by selected intermediaries makes the most contribution in explaining the dependent variable (production capability). From the aforementioned findings, it is concluded that inter-industry marketing influences the production capability of the company, this means that the rate at which inter-industry marketing is being utilized will determine the extent to which companies will need improve their production capability or otherwise.

Test of Hypothesis 4

Research Objective 4 - To investigate the nature of production technologies transferable in inter-firm relationship and its effects on subcontracting efficiency as a result of divisibility in operations of other smaller firms or industries.

Research Question 4 - What effect will production technology available and transferrable between large-highly technical companies (contractors) and the small firms (contractees) have on subcontracting efficiency as a result of divisibility in operations in inter-industry relationship within an industrial estate.

Null Hypothesis 4 - There is no significant impact of technology transferred by contractors on subcontracting

Table 12. Coefficients^a.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	6.218	3.375		1.842	.072
	Intermediary that your company uses to supply products	.226	.339	.093	.667	.508
	The selected channel has increased sales of your company	-1.331	.268	-.792	-4.970	.000
	The selected channel of intermediary is an improvement on previous means of distribution used by your company	1.074	.244	.748	4.407	.000
	Your company warehouses finished products so as to meet demands of its intermediary	.266	.137	.269	1.941	.059
	The warehousing of products has increased total cost of operations	-.642	.609	-.162	-1.054	.297

Field survey (2011)

a Dependent Variable: Production Capability

Table 13. Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.364(a)	.133	.076	.58768

Field survey (2011)

a Predictors: (Constant), Production Technology

Table 14. ANOVA^b.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.433	3	.811	2.348	.085(a)
	Residual	15.887	46	.345		
	Total	18.320	49			

Field survey (2011)

a Predictors: Production Technology

b Dependent Variable: Subcontracting Efficiency

efficiency as regards the divisibility of recipient companies (contractees) in Agbara inter-industry relationship.

Table 13 shows the model summary which reveals how much variance in the dependent variable (divisibility of operations) is explained by the model (production technology). The R square value is 0.133 which means that the model explains 13.3% of the variance in the dependent variable.

From Table 14, the model is not significant (sig.=0.85), therefore the null hypothesis should not be rejected. Using the F-statistic, the assumption is that if F-calculated is greater than F-tabulated, the null hypothesis should be rejected and if otherwise, the null hypothesis (There is no significant impact of technology transferred by contractors on subcontracting efficiency as regards the divisibility of recipient companies (contractees) in Agbara inter-firm relationship) should not be rejected. In this case, the F-calculated as shown in the ANOVA table

Table 15. Coefficients^a.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	7.106	1.197		5.935	.000
	Your organization has sufficient equipment for production activities	-.401	.156	-.448	-2.569	.014
	There is need for improvement in your organization's current production technology	-.147	.093	-.257	-1.587	.119
	Your firm possess the same equipment as similar companies in the estate	-.065	.111	-.089	-.581	.564

Field survey (2011)

a Dependent Variable: Subcontracting Efficiency

is 2.348 whilst the F-tabulated as derived from residual (v1) under regression (v2) i.e. 3 under 46 is 2.81. F-calculated < F-tabulated, therefore the null hypothesis should not be rejected.

The highest contributor to the determination of the dependent variable (subcontracting efficiency) is the sufficiency of organization's sufficiency of equipment for production activities at -0.448. This report is however not significant as obtained from the ANOVA in Table 15.

Appraisal of the above results shows that the divisibility of operations which makes for efficiency in subcontracting in inter-industry relationship is not affected by the production technology transferability of the companies. This means that it is most likely because of the cost implication that firms will have to subcontract and not because they cannot access the technology for producing.

Policy Recommendations

The findings of this research have provoked the following recommendations to large and small businesses in industrial estates or clusters as well as outside them as a way to make them efficient in their operations. The results from the research implies that it is pertinent for companies to take into consideration their local project environmental variables before engaging in subcontract-offering or subcontract receiving because local project environment has a significant positive impact on subcontracting relationship. Also, companies should subcontract some of their production operations in order to focus on the production of more strategic components since the cost of powering their machines for production of other component parts of their products say packaging could prove expensive. They should also take into consideration the rate at which their transportation fleet

distribute products as well as control the performance of the fleet in order to regulate production capability so as to ensure their operations are balanced. Furthermore, company inter-industry marketing should be one of the determinants for regulating the production capability of the organization. Also, it is pertinent for government and administrative agencies to make room for an effective subcontracting framework which should either be based on developmental approach whereby small firms can benefit from the efficacy of large firms and also advance to becoming large firms themselves. The other favourable approach is for companies in the same industry to work within a cluster and therefore strengthen business relations.

In a situation where subcontracting administrative agencies are set up to initiate and monitor subcontracting relations, it is pertinent that only legitimate companies are allowed to enter into such subcontracting arrangement and the large companies should not be allowed to differ payments of the smaller firms which could lead to instability in such subcontracting framework even as it was the case in Kenya as was shown in the work of Seleshi (2001). Finally, large companies should make subcontracting arrangements with small companies based on a long term approach wherefore trust can be established amongst them which will in turn create a win-win situation between the contractor and the subcontractor, the reason being that small companies will get paid a fair price and the large companies will be able to influence production process of the small companies and their quality-control mechanism as it is the case in the development approach to subcontracting.

Conclusion

The research has added to the knowledge on the impact

of local project environment on inter-firm subcontracting. The outcome of the study shows that there is a significant and positive impact of local project environmental variables on level of inter-firm subcontracting. The implication from the findings indicates that government as well as administrative bodies should strive to develop subcontracting frameworks that adopt the developmental approach such that small companies can be subcontracted to by big-sized companies and by that, the level of development will be enhanced even as the government of other countries like Taiwan, Korea, and Slovakia have adopted this method to enhancing their industrial development (Seleshi, 2001). The study discovered that there was a significant positive impact of energy (electricity) for production activities on production capability of the companies studied even as it is widely accepted that there is a strong correlation between socio-economic development and availability of electricity and production energy. Also, information garnered from respondents shows that efficacy of the road transportation system has a wide impact on determining the production capability.

In addition to this, it was discovered that company's distribution intermediaries with regards to inter-industrial marketing influences the production capability of a company, this means that the rate at which intermediary is willing to accept and disperse products will determine the extent to which companies will need to improve their production capability or otherwise. In conclusion, it was ascertained from this study that subcontracting efficiency as a result of divisibility of operations in inter-industry relationship is not affected by the production technology of the companies, this is commensurate with the findings of (Kongmanilla and Takahashi, 2009) that technology is not an important determinant in explaining subcontract-offering behaviour.

Suggestions for Further Study

Subcontracting strategy represents a pivotal means by which companies get things done faster and more effectively most times at a reduced cost, therefore, in promoting subcontracting relationship, the following suggestions for further studies are provided to fill the gaps and shortcomings of this research work.

The scope of the research variables were limited, it is relevant for further studies to consider environmental variables like wages, skills of workers and capital intensity of production system. Also, there should be an increase in sample size for future research. The scope of the research was limited to study of manufacturing firms, further studies can also carry out this study on service industry like banks and telecommunication companies because firms like this also engage in subcontracting some of their operations to other service companies as well as manufacturing companies.

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