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Influence of Subcontract Offering on the Performance of Manufacturing Micro and Small Enterprises in Kenya

Prof. Roselyn W. Gakure, Peter Njuguna Kimemia, Dr. Gichuhi A. Waititu
(Jomo Kenyatta University of Agriculture and Technology, Kenya)
(Jomo Kenyatta University of Agriculture and Technology, Kenya)
(Jomo Kenyatta University of Agriculture and Technology, Kenya)

Abstract: *This study set out to investigate the influence of intensity of participation in subcontract offering on the performance of manufacturing micro and small enterprises (MSEs) in Kenya. The study used an exploratory research design targeting a population of 2450 MSEs from Kamukunji 'JuaKali' Association, Nairobi Kenya. A random sample of 180 firms returned 175 (97.2%) valid responses. Survey data was collected with a semi-structured questionnaire through face-to-face interviews. A pilot test on 20 firms helped to improve the instrument while the Principal Component Analysis (PCA) method extracted the factors with reliability cut-off value of 0.70. Factors loadings that were less than 0.40 were discarded. Descriptive statistics presented the responses in means and standard deviations. To sharpen inferences, ordinal regression analysis was performed using the Polytomous Universal Model (PLUM) of SPSS for Windows 19 location-scale model. Response frequencies of firm performance, ordered in 5-part Likert-type categories, were positively skewed, thus,the negative log-log link function was used. Model fitting information provided log likelihood ratio tests for the null hypothesis that the independent variable was statistically equal to zero. The study found that the intensity of participation in subcontract offering influences firm performance, positively and significantly.*
Key words*: Subcontract Offering, Firm performance, Micro and Small Enterprises, Manufacturing*

I. Introduction

The importance of micro and small enterprises (MSEs) in contributing to job creation and output growth is now widely accepted in both developed and developing countries. Of interest is the gradual and organic expansion of enterprises from the survival stage of micro and small into medium size. In particular, there is growing consensus that MSEs can grow through inter-firm linkages. MSEs can either achieve scale economies collectively (horizontal cooperation), specialize in their core activities and develop the external division of labor between upstream and downstream enterprises (vertical cooperation) or form networks of enterprises (Ceglie & Dini, 1999). Subcontracting, either as vertical or horizontal business to business (B2B) linkages, has received growing attention during the last few years as evidenced by an increasing number of publications and studies on the topic (Watanabe, 1971; Berry, 1997; Deardoff & Djankov, 2000; Taymaz & Kilicaslan; 2002; Grossman & Helpman, 2005 ; Gubik, 2005; Furlan, Grandinetti, & Camuffo, 2007; Tuan & Yoshi, 2010; Kongmanila & Takahashi, 2010).

There are two approaches to subcontracting in entrepreneurship development, namely: the traditional and the modern approaches (Watanabe, 1971; Berger & Piore, 1984; Holmes, 1986). The traditional approach looks at subcontracting as unequal, asymmetric power relationships between two different sets of enterprises: the large firms and the small firms (Berger & Piore, 1984; Holmes, 1986; Watanabe, 1971). The modern approach treats subcontracting as a network of cooperative inter-firm links among interdependent small firms forming a business ecosystem (Taymaz & Kilicaslan, 2002; Tilman, 2004; Ceglie & Dini, 1999; Rama & Calatrava, 2002).

Subcontracting can smooth the growth continuum of small enterprises as a channel for technology, knowledge and skills transfer that benefits the participating firms dynamically through change in characteristics of the labour force that results into productivity and efficiency in the long run (Wanatabe, 1971; Deardoff & Djankov, 2000). On subcontracting patterns among Japanese firms, studies show subcontracting has helped to bridge the bi-modal distribution of firms where only large and small firms existed but with an empty medium sized category. Japan succeeded by redesigning its SME strategies to focus on addressing the issues related to the "missing middle". These relations have evolved from arm's length tactics to relational contracting based on trust, stability and competence development. Among the factors that have contributed to the success of Asian firms is a high incidence of cooperative inter- firm relationships (Kimura, 2001, 2002; Subrahmanya, 2008; Yasuda, 2005). On its part, the African industry has experienced an increase in inter-firm cooperation (horizontal and vertical linkages) including subcontracting, with evidence from Nigeria, Zimbabwe and Kenya, according to Oyelaran-Oyeyianka (2004). Although gains in collective efficiency resulting from agglomeration

are reported (McCormick, 1999), little is known of subcontracting in terms of the extent of its uptake, intensity, motivation and value enhancement in production differentials (Oyelaran-Oyeyianka, 2004).

In Kenya, studies have shown appreciable subcontracting production linkages among vehicle repairers in Thika and Ziwani '*jua kali'* clusters, metal workers in Kamukunji, garment producers in Eastlands and the Lake Victoria fishermen at Uhanya Beach who establish *ad hoc* linkages to respond to specific demand and supply shocks (McCormick, 1999; Kinyanjui, 2006). The small firms coalesce into solidarity networks primarily to reduce risks and uncertainties, gain collective efficiency in joint action, knowledge and technology situations.

Firm performance is grounded in the Goal-Setting Theory (Chong, 2008; Locke & Latham, 2002). Goal setting is the mechanism by which a firm delivers results against its strategy on the extent to which there is clarity, challenge, commitment, feedback, and task complexity (Locke & Latham, 2002). Intensity of participation in subcontract offering is explained using the Network Theory (Berry, 1997; Taymaz & Kilicaslan, 2002). Rama and Calatrava (2002) suggest that networking is an important factor for establishing subcontracting relationships holding the 'inter-firm' relationship as an "intermediate" organization in which the market principle and the organizational principle coexist.

II. Research gap

Although there is widespread consensus that MSEs can grow through inter-firm linkages, scholarly assessments are neither unanimous on what factors determine subcontracting behaviors nor the influence subcontracting has on firm performance (Wanatabe, 1971; Ceglie & Dini, 1999; Kimura, 2002; Taymaz & Kilicaslan, 2005; Roses, 2005; Kongmanila & Takahashi, 2010). Some scholars (Berry, 1997; Yasuda, 2005; Marsall et al., 2007) suggest subcontracting has positive impacts on a firm's performance while Hu et al. (2011) contend there is insignificant relationship between such industrial linkages and firm performance. Given these positive and negative sides of subcontracting, it is uncertain how subcontracting influences firm performance. More research was recommended targeting interdependent small firms themselves because on account of the common problems they all share, small firms could be in the best position to help each other in small-small business ecosystems (Ceglie & Dini, 1999). Information on the key variables that interact to make subcontracting to emerge and/or become effective is not well-documented, thus necessitating the present study. Specifically, the study sought to investigate how the intensity of participation in subcontracting influences the performance of manufacturing MSEs in Kenya.

III. Research Methodology

The overriding purpose of the present study was to establish the influence of subcontracting on the performance of manufacturing micro and small enterprises in Kenya. A model encompassing the hypothesized interaction between the dependent variable and the explanatory variable was constructed. In order to test the null hypothesis, 'Intensity of Participation in Subcontract Offering has no Influence on Firm performance', the present study used an exploratory research design. The exploratory method offered the flexibility required in familiarizing with subcontracting and gaining insights about the phenomenon about which little is known among Kenyan manufacturing MSEs (Churchill & Iacobucci, 2005; Cooper & Schindler, 2003). The population of study was the manufacturing enterprises in Kamukunji '*Jua Kali*' Association, Nairobi Kenya, estimated at 2450. '*Jua kali'* is kiswahili for 'working under the hot sun'. The rationale for selecting the target population was that it was sufficiently representative of MSE manufacturers in Kenya because it was the most developed in Kenya, with comprehensive official statistics and a regularly updated list of membership. It seemed improbable that the subcontracting phenomenon would be stronger in other undeveloped clusters.

A sample of 180 firms was selected through simple random sampling. Sampling strategies and sampling design are constrained by the practical circumstances surrounding the target population, time and cost. The appropriate sample size for the population-based survey was determined largely by three factors: The estimated prevalence of the variable of interest – subcontracting in this instance (estimated at 15%); The desired level of confidence, 95% (standard value of 1.96) and; the acceptable margin of error, 5% (standard value of 0.05). The data relating to perceptions towards firm performance and intensity of participation in subcontract offering were collected with a semi-structured questionnaire through face-to-face interviews. The questionnaire was administered personally to ensure participation and to enhance response rate. A pilot test on 20 firms helped to remove ambiguities and improve the instrument as well as test for its reliability and validity. Close-ended questions asking respondents to rate various questionnaire items using an 5-part Likert-type ordinal scale representing a spectrum of subjective feelings and opinions with 1 implying the worst (or strong disagreement) and 5 the best (or strong agreement) were employed to solicit specific responses. A few open-ended questions elicited unique answers to general questions.

IV. Data Analysis Procedure

Data was analyzed with the Polytomous Universal Model (PLUM) function of SPSS for Windows version 19 that utilizes heterogeneous choice (location-scale) models. SPSS PLUM version 19 uses the location-scale terminology for its models, and it also makes it easy to estimate a broad range of models, choose different link functions that may be appropriate for the data and compute other quantities of interest using the cumulative distribution function (C*DF*) formulation (Norusis, 2012). The algebraic sign of the coefficients was of interest. Researchers suggest the heterogeneous choice (location-scale) models offer superior fit and are more parsimonious and interpretable for ordinal data than those estimated by non-ordinal methods (Allison, 1999; Hoetker, 2004; Williams, 2011).

With the normal distribution, the probability of observing an individual value of Y is given by the equation: Prob(Y= j) = Φ ($\alpha_j - \beta x$) –Φ ($\alpha_{j-1} - \beta x$), where Φ( ) denotes the standardized cumulative normal distribution function (C*DF*). In order that all the probabilities are positive, we must have: $0 < \alpha_1 < \alpha_2 < \ldots < \alpha_{j-1}$. The general cumulative link model is modified to a location-scale link format, thus: $G(\Pr(Y \geq i|X = x)) = -\log(-\log(\Pr(Y \geq i|X = x))) = \left(\frac{\alpha_i - \beta x}{\exp(\gamma x)}\right)$, i=1,...,I, where G is the negative log-log link function, *x* is a vector of explanatory variables; β represents a vector of unknown parameters associated with x, α_i are unknown threshold parameters-separating adjacent Y levels-to be estimated with β and γ is the scale associated with *x*. βx in the location component and γx represents the scale.

From the literature, Norusis (2012) points out five different link functions that were available in the Polytomous Universal Model or PLUM Regression procedure in SPSS, namely, the logit, probit, complementary log-log, negative log-log, and inverse Cauchy, as shown in Table 1. Norusis (2012) affirms the choice of link function in an ordinal regression analysis should be driven by the distribution of the response or the dependent variable, as in the present study the performance of manufacturing MSEs. The present study used the negative log-log link because the cumulative probability was considered more probable for lower categories, rather than the higher outcome frequencies.

The statistical estimation of the overall model was carried with the SPSS for Windows Version 19 PLUM, using location-scale model and the negative log-log link function. Model fitting information provided model fitting criteria, likelihood ratio tests (distributed chi-squared), LR χ^2, along with the degrees of freedom and probability, *p* values, with significance level set at 0.05, compared the final model (LL_m) and the intercept-only model (LL_o) to provide the test of the null hypothesis that the independent variable, was statistically equal to zero. The goodness-of-fit statistics, Pearson chi-square, χ^2, and the Deviance chi-square, with their observed significance levels tested the null hypothesis that the model fits the data at the set 0.05 significance level. The coefficient of determination, Pseudo R-Square, R^2, summarized the proportion of variance (Nagelkerke, R^2) in the dependent variable, FPERF that could be accounted for individually by IPSUB. The parameter estimates tables indicated where the individual respondents placed their firm performance in the ordinal 5-point Likert categories coded 1 to 5, and gave the thresholds of the ordinal categories, the coefficients (both location and scale), their standard errors, Wald test statistic with associated degrees of freedom and significance levels (*p* values or sig.), and the 95% confidence interval of the coefficients. The likelihood ratio test was the one used to test whether the inclusion of a variable in the location-scale equations did or did not significantly improve model fit.

Table 1: Link Functions

Ordinal Link	Function Form	Typical Application
Logit	$ln\left(\frac{p}{1-p}\right)=\alpha_i - \beta x$	Evenly distributed categories
Complementary log-log	$\ln(-\ln(1-p))=\alpha_i - \beta x$	Higher categories more probable
Negative log-log	$-\ln(-\ln(p))=\alpha_i - \beta x$	Lower categories more probable
Probit	$\Phi^{-1}(p) = \alpha_i - \beta x$	Analyses with explicit normally distributed latent variable
Cauchit (inverse Cauchy)	$\tan(\pi(p-0.5)) = \alpha_i - \beta x$	Outcome with many extreme values

V. Validity, Reliability and Factor Analyses for Study Variables

Validity, reliability and factor analyses tests were conducted on the data collection instrument comprising all items in the respective variables and their subscales, as compiled from the literature review and pilot test, was considered. Principal Component Analysis (PCA) method was used to extract the factors. The criteria states, as suggested by some scholars (George & Mallery, 2003; Hair et al., 2010), that Cronbach's Alpha of a scale should be greater than 0.70 for items to be used together as a scale while factor loadings greater than 0.40 are considered statistically significant for studies with sample size less than 200. Therefore, in the

present study, ±0.40 was used as the cut-off for loadings since the sample size of the study was 180. The higher the factor loadings were the closer they were related to the variable.

(i) Firm Performance

Firm performance was the dependent variable in the present study and in accordance with the literature, a combination of both financial and non-financial indicators led to a balanced performance measurement. The financial indicators were: *(i)sales growth* (ii) *growth in profits* (iii) *change in of assets by gross value plant and machinery*; (iv) *return on assets to measure capital efficiency.* The non-financial indicators were (i) g*rowth in market share*; (ii) *product success*; (iii) *increase in number of employees* and; (iv) *labour productivity* (Tuan & Yoshi, 2010, Kongmanila & Takahashi, 2009; Hu et al., 2011; Marimuthu et al., 2009; Ong'onga & Abeka, 2011). Likert-type scales elicit responses on the perceived performance relative to competitors' treated as ordinal under the assumption that the levels of firm performance status have five-point ordering (1 ="Significantly decreased" to 5="Significantly increased"),

Firm performance measures had a total of 8 items generated from literature comprising both the financial and non-financial indicators as shown in Table 2. The results indicate that with factor loadings of between .695 and .900, the construct of the 8 measurement items was valid for firm performance. The Cronbach's Alpha coefficient for the 8 items was α =0.921, which means the instrument had an excellent level of consistency, and fit for use in data collection.

Table 2: Factor Analysis for Firm Performance

Items	Factor Loading
Financial	
1. Growth in sales (volume)	.900
2. Growth in profit	.881
3. Gross value of capital(machinery)	.808
4. Return on assets	.779
Non-financial	
5. Growth in market share	.871
6. Product success	.760
7. Labour productivity	.708
8. Increase in workers	.695
No. of items	8
Cronbach's Alpha	.921

(ii) Intensity of Participation in Subcontract Offering

In the literature, subjective measures of the intensity of participation subcontracting offering were perceived as the share of subcontracted inputs in all inputs (Taymaz & Kilicaslan, 2002). The 'Intensity of Participation in Subcontract offering' was accounted for by the presence of at least one factor in each of the three groups (production activities, production supporting activities and ancillary activities) of sub-items, as Mazzanti et al. (2008). From the original list compiled from literature intended to measure intensity of participation of subcontract offering that comprised 17 items, three items with loadings less than 0.40 were discarded as shown in Table 3. Thus, 13 factors with factor loadings between .576 and .855 were subsequently considered valid as the constructs to represent intensity of participation in subcontract offering. Cronbach's Alpha for the 13 intensity of participation in subcontract offering items was $\alpha = .908$, which exceeded the reliability cut-off value of 0.70.

Table 3: Factor Analysis for Intensity of Participation in Subcontracting Offering

Item	Factor Loadings
Ancillary activities	
Inventories management	.633
Internal logistics	.690
Distribution logistics	.612
Janitorial services	.725
Plants maintenance	.662
Machinery maintenance	.142
Data processing	.529

Item	Factor Loadings
Production supporting activities	
Marketing	.702
Engineering	.830
Research & Development	.855
Labor consultancy	.815
Human resource management,	.807
Quality control	.660
Production activities	
Supply of intermediate products	.292
Production stages	.105
Products & Trademarks	-.020
Other production activities	.576
Number of Items	13
Cronbach's Alpha	.908

NB: The shaded factors were eliminated from further analysis.

VI. Description of Respondents

Out of the 180 questionnaires administered, 175 (97.2%) were considered valid, with no missing data. The response rate of 97.2% was, therefore, considered adequate for the study according to Mugenda and Mugenda (2003). The targeted enterprises were aged 11.5 years for the firms and 33.74 years for the owner/managers on average. About 92% of the firms were managed by men. The preliminary findings showed 75.4% of the respondents had attained primary level and below and 95.4% had attained product related skills training through apprenticeship and learning on the job. The uppermost manufactured products were metallic wood stoves (58.9%) and metallic boxes (36.0%) in a range of 24 different products. Regarding subcontracting practice which was the subject of the present study, 97.1% offered subcontracts. When asked about the importance of business partners by size, 94.3% of the respondents ranked other small firms above average as compared to 50.9% who regarded the large firms' importance as above average.

VII. Data Analysis of Study Variables

a. Firm Performance

Firm performance, the dependent variable in the present study, was measured in both financial and non-financial indicators. The respondents were asked to evaluate their firm's performance by rating various indicators of their business operations in the last five consecutive years on a scale of 1 to 5, where 1 represented 'significantly decreased' and 5 represented 'significantly increased'. The descriptive results on Table 4 show that 0.8% of the respondents had experienced significant increase while 39.1% had seen relative increase in firm performance in the last five consecutive years. Additionally, 20.9% and 0.3% had experienced relative decrease and significant decrease respectively. The data further show 39% recorded no change. The overall mean score suggest the majority of the firms showed some increase in performance (M=3.20, SD=.7). The respondents indicated they had achieved highest performance in product success (M=3.36, SD=.79) and least performance in gross value of capital, say machinery (M=2.98, SD=0.67).

The findings corroborated Kinyanjui (2006) that despite so much pooling of dynamism in the Kenyan '*jua kali*' sector, some firms do not seem to advance. The study found as expected that MSEs have little capital intensity and invest little in machinery and their strategy in subcontracting could be predominantly geared towards sharing equipment to guarantee short-term product success when they receive orders. It is expected that with low inventories of machinery and tools the spirit of cooperativeness would thrive. The small number of firms that experienced significant increase in performance was indicative of the overall underperformance of the Kenya manufacturing sector as reported in the Kenya Economic Survey 2012 (GOK, 2012).

Table 4: Response Frequencies for Firm performance

Item	Significantly decreased 1	Relatively decreased 2	No change 3	Relatively increased 4	Significantly increased 5	Mean *M*	Standard deviation *SD*
Firm Performance							
Financial							
1. Growth in sales (volume)	0.0	30.3	10.3	58.9	0.6	3.30	0.98
2. Growth in profit	1.1	29.7	16.6	52.6	0.0	3.21	0.86
3. Return on assets	0.6	21.7	53.1	24.6	0.0	3.02	0.68
4. Gross value of capital(machinery)	0.0	24.0	54.3	21.1	0.6	2.98	0.67
Sub-average 1	0.4	26.4	33.6	39.3	0.3	3.13	0.67
Non-financial							
1. Product success	0.6	12.6	39.4	45.1	2.3	3.36	0.79
2. Growth in market share	0.0	23.4	25.1	50.3	1.1	3.29	0.82
3. Increase in workers	0.0	10.9	53.1	35.4	0.6	3.26	0.79
4. Labor productivity	0.0	14.3	60.0	25.1	0.6	3.12	0.77
Sub-average 2	0.2	15.3	44.4	39.0	1.2	3.26	0.74
Grand average	0.3	20.9	39	39.1	0.8	3.20	0.70

i. Distribution of Ordinal Categories of Firm Performance and Choice of Link Function

Firm performance, FPERF, was treated as ordinal under the assumption that respondents placed themselves in a five point ordering (1= 'significantly decreased' and 5='significantly increased'). Figure 1 depicts the distribution of the different categories of firm performance. The frequencies for the categories of firm performance 0, 1, 2, 3, 4 representing the 5-point Likert scale (1= "significantly decreased" and 5= "significantly increased") were 21.7%, 20%, 46.9%, 10.9% and .6% respectively. At a glance, Figure 1 shows the ordinal frequencies were positively skewed and clearly shows that lower performance categories were more probable. According to Smith and McKenna (2012), when observations are positively skewed, with about 40%, 30%, 20% and 10% of the outcome frequencies appearing on the low to high continuum, the low categories are then considered to be more probable. Checked against Smith and McKenna's (2012) criteria on Table , a negative log-log function was imposed as the appropriate link function for the ordinal regression in instances where lower categories are more probable. However, as expected, the frequencies at various adjacent levels differ from the observations made on Table 4, where the performance statuses were placed at 0.3%, 20.9%, 39%, 39.1% and 0.8% for categories 1, 2, 3, 4, and 5 respectively.

The findings agreed with the literature that in ordinal categories, the distances between adjacent levels are unknown, and it would be naïve to treat ordinal data otherwise (McCullagh, 1980; Norusis, 2012; Smith & McKenna, 2012).

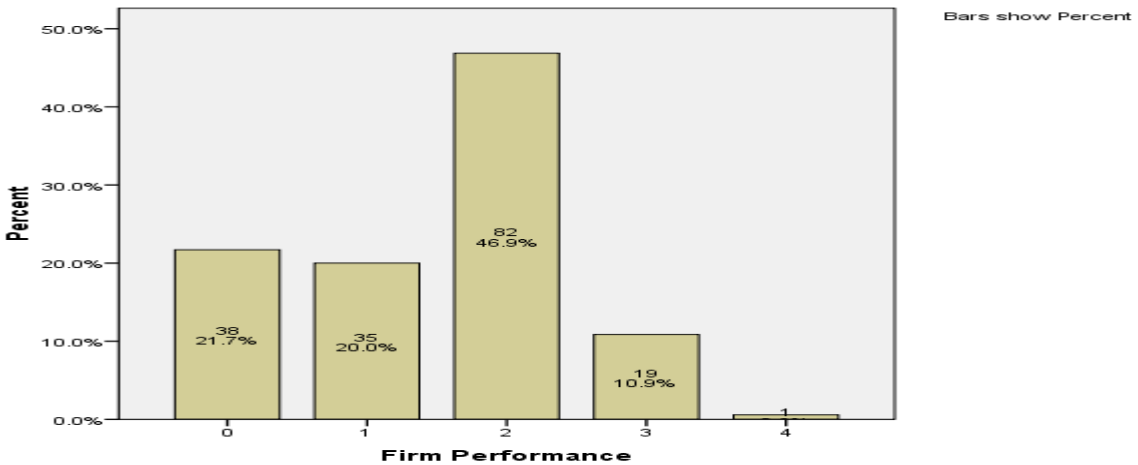

***Figure 1*: Distribution of Ordinal Categories of Firm Performance**

b. Intensity of Participation in Subcontract Offering

i) Descriptive Analysis for Intensity of Participation in Subcontract Offering

In line with the literature, the owner/managers' opinions were sought in assessing the proportionate ratio of subcontracted output to the total output to measure the intensity of participation in subcontract offering as suggested by Mazzanti, Montressor and Pini (2008) and Taymaz and Kilicaslan (2002). The subcontracted activities were grouped as ancillary, production supporting or production activities as functional criterion that could be subcontracted out (Mazzanti et al., 2008). The respondents were asked to rate intensity of subcontract offering in terms of the increase in the relative number of activities which are subcontracted by or to a certain firm three consecutive years on a five-point Likert-type scale ranging from 1 = "no extent at all" to 5 = "very large extent". Table 5 presents the survey results on where the respondents placed their choices of intensity of participation in subcontract offering on a 5-Point Likert scale, 1= 'no extent at all' and 5= 'very large extent'. The results on Table 5 showed the overall mean score for intensity of participation in subcontract offering was 1.60 (*SD*=0.28), suggesting that the firms offered subcontracting to a small extent. The mean scores for the sub-scales were: ancillary activities (*M*=1.53, *SD*=0.26), production supporting (*M*=1.48, *SD*=0.27) and production activities (*M*=1.80, *SD*=0.38). Thus, the results indicated that the intensity of participation in subcontract offering was relatively higher in production activities than in production supporting or ancillary activities respectively.

The results of the present study agree with Diaz-Mora and Triguero-Cano (2012) who examined the determinants of subcontracting intensity using firm-level panel data for Spanish manufacturing industries and found exploitation of scale and scope economies in the production of intermediate inputs or components helps to improve firm efficiency. Small-sized enterprises have more difficulties to get the minimum efficient scale, and opt to engage in subcontract offering more intensively to get complementarities through scale and scope economies to increase firm's capacity (Diaz-Mora & Triguero-Cano, 2012). Another study by Pieters, Moreno-Monroy, and Erumban (2010) focusing on Indian manufacturing firms in the context of informal sector dynamics observe that firms engage in subcontracting primarily to minimize costs, maximize quality and minimize risks. Firms subcontract a percentage of their output to enhance performance. Mhende (2012) studied small furniture manufacturing firms in Tanzania and found that MSEs cooperated among themselves through subcontracting to enhance their production.

Previous studies by McCormick (1999) and Kinyanjui (2006) in Kenya, among vehicle repairers in Thika and Ziwani '*jua kali'* clusters, metal workers in Kamukunji, garment producers in Eastlands and the Lake Victoria fishermen at Uhanya Beach, established that subcontracting were mainly in *ad hoc* production linkages in response to specific demand and supply shocks. Therefore, at a glance, subcontracting was a pervasive phenomenon among the sampled firms and the present study concluded that intensity of subcontract offering among Kenyan MSE appeared to be motivated by the desire to enhance production involving the sharing of orders as a rational practice to achieve better performance.

Table 5: Response Frequencies for Intensity of Participation in Subcontract Offering

Activity	No extent at all	Small extent	Some extent	Large extent	Very large extent	Mean	Standard deviation
	1	2	3	4	5	*M*	*SD*
Ancillary activities							
1. Inventories management	78.9	13.7	4.0	3.4	0.0	1.32	0.31
2. Internal logistics	37.7	27.4	27.4	7.4	0.0	2.04	0.30
3. Distribution logistics	42.9	23.4	26.9	6.9	0.0	1.98	0.29
4. Janitorial services	69.1	25.1	4.6	1.1	0.0	1.38	0.31
5. Plants maintenance	83.4	13.7	2.3	0.6	0.0	1.20	0.35
6. Data processing	81.7	13.1	4.6	0.6	0.0	1.24	0.33
Sub-average 1	65.6	19.4	11.6	3.3	0.0	1.53	0.26
Production supporting activities							
7. Marketing	26.3	45.1	20.6	7.4	0.0	2.11	0.34
8. Engineering	66.9	23.4	6.9	2.9	0.0	1.46	0.27
9. Research & Development	72.0	24.6	2.3	0.6	0.0	1.34	0.32
10. Labor consultancy	77.7	17.7	4.0	0.6	0.0	1.28	0.32
11. Human resource management	75.4	21.1	1.7	1.1	0.0	1.30	0.32
12. Quality control	72.6	20.0	6.3	0.6	0.0	1.37	0.30
Sub-average 2	65.2	25.3	7.0	2.2	0.0	1.48	0.27
Production activities							
13. Other production activities	36.9	47.1	15.4	0.6	0.6	1.80	0.38
Sub-Average 3	36.9	47.1	15.4	0.6	0.6	1.80	0.38
Grand Average	55.9	30.6	11.3	2.0	0.2	1.60	0.28

ii) Inferential Analysis for Intensity of Participation in Subcontract Offering

Figure 2 shows the relationship that existed between intensity of participation in subcontract offering (IPSUBO) and firm performance (FPERF). As expected, the relationship was non-linear. The Model Fitting Information on Table 6 show intensity of participation in subcontract offering was statistically and significantly different from zero and the final the model with IPSUBO was an improvement to the model with intercept only, LR $\chi^2(2, 175) = 11.133$, $p = 0.004$, which was significant at 0.05 level. The goodness-of-fit statistics, Pearson Chi-Square, χ^2, tested whether the observed data were consistent with the fitted model. The null hypothesis was that the model fitted the data well meaning if the *p* values were greater than .05 for both χ^2 and D then the model does fitted the data well. From the results, the model with intensity of participation in subcontract offering fitted the data well, since χ^2 was large, and non-significant, $\chi^2 = 476.263$, $df=578$, $p = .999$.

The coefficient of determination, Pseudo R-Square, R^2, summarized the proportion of variance (Nagelkerke, $R^2 = 6.7\%$) in the dependent variable, FPERF, that could be accounted for individually by IPSUBO. The Nagelkerke, R^2 of 0.067 suggest that individually, IPSUBO explained 6.7 % variance in firm performance, FPERF. On the overall, since the likelihood ratio Chi-square test showed IPSUBO was significant, LR $\chi^2(2, 175) = 11.133$, $p = 0.004$, only the algebraic signs of the location coefficients were of interest from the parameter estimates in Table 7. SPSS PLUM models the cumulative distribution function (C*DF*) of the response from the "bottom up" or in ascending order. This parameterization meant that a negative value of the regression coefficient was associated with higher predicted probabilities of being in higher performance response categories. Therefore, the interpretation was that for a one unit increase in IPSUBO, FPERF was expected to change by .022 while the other variables were held constant ($\beta = -.022$). The null sub-hypothesis 'intensity of participation in subcontract offering has no influence on the performance of a firm' was, therefore, rejected.

The study found intensity of participation in subcontract offering influenced firm performance and thus corroborated various past findings in the literature. Kongmanila and Takahashi (2010) observe among garment manufacturing firms in Lao PDR that engaging in subcontracting leads to increased efficiency and productivity. Ongong'a and Abeka (2011) examine how informal social, support and inter-firm networks determine performance and sustainability of MSEs in Kenya and observe MSEs with better networks perform better. Grossman and Helpman (2002) study outsourcing in a global economy and conclude that firms result into subcontracting to save on transaction costs and improve performance. From the theoretical underpinning of subcontracting in Network Theory (Berry, 1997; Rana & Calatrava., 2002; Taymaz & Kilicaslan, 2002), subcontracting links by MSEs generate collective efficiency, flexibility and economies of scale towards better performance. The study concluded that the intensity of participation in subcontract offering influences the performance of a firm, positively and significantly. Thus, implementation of subcontracting cooperative subcontracting links facilitated by proximate bilateral relations of MSEs enhances their performance.

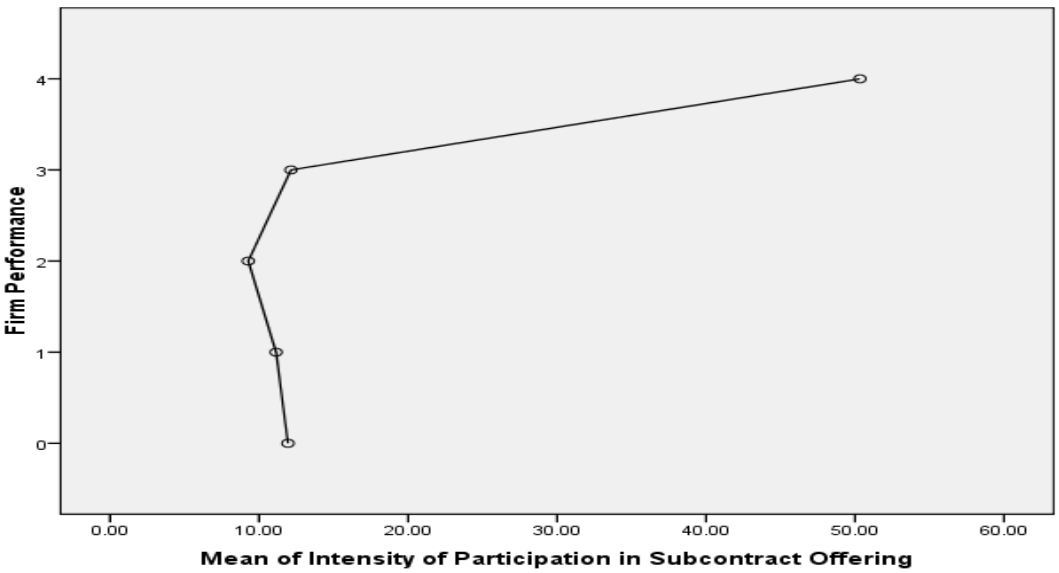

Figure 2: **Relationship of Intensity of Participation in Subcontract Offering and Firm Performance**

Table 6: Model Fitting for Intensity of Participation in Subcontract Offering

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept only	420.497			
Final	409.364	11.133	2	.004

Pseudo R-Square

Analog	Value
Cox and Snell	.062
Nagelkerke	.067
McFadden	.025

Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	476.263	578	.999
Deviance	388.982	578	1.000

Link function: Negative Log-log.

Table 7: Parameter Estimates for Intensity of Participation in Subcontract Offering

Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	*df*	Sig.	Lower Bound	Upper Bound
Threshold	[FPERF = 0]	-.820	.251	10.709	1	.001	-1.311	-.329
	[FPERF = 1]	-.028	.236	.014	1	.907	-.490	.435
	[FPERF = 2]	2.837	.547	26.902	1	.000	1.765	3.909
	[FPERF = 3]	9.846	3.736	6.945	1	.008	2.523	17.168
Location	IPSUBO	-.022	.024	.863	1	.353	-.070	.025
Scale	IPSUBO	.035	.013	7.066	1	.008	.009	.060

Link function: Negative Log-log.

VIII. Conclusion and Recommendations

The data and literature clearly supported the premise that intensity of participation in subcontracting positively influences the performance of manufacturing MSEs in Kenya. Keeping in view the findings of the study and conclusion drawn, the study recommended that micro and small manufacturing enterprises should engage in subcontracting more intensely; adopt firm-specific tactics to build up superior capabilities to be more competitive. Further research could help find answers to how the individual subcontracted tasks that formed the composite scales measuring intensity of participation in subcontracting influence firm performance. Another promising direction of further research would be a longitudinal quantitative examination of subcontracting from a small-small and small-large inter-firm context.

References

[1]. Allison, Paul. 1999. "Comparing Logit and Probit Coefficients Across Groups." Sociological Methods and Research 28(2): 186-208.

[2]. Berger, S., &Piore, M. J. (1984). Dualism and discontinuity in Industrial Societies. Cambridge: Cambridge University Press.

[3]. Berry, A. (1997). SME Competitiveness: The Power of Networking and Subcontracting. Http://www.economia.gob.mx/pics/p/p2760/cipi_1LNetworking.pdf Access 18/09/2012

[4]. Ceglie, G. &Dini, M. (1999): SME Cluster and Network Development in Developing Countries: the Experience of UNIDO, UNIDO.

[5]. Chong H 2008. Measuring performance of small-andmedium sized enterprises: The grounded theory approach. J of Business and Public Affairs, 2(1): 1-10.

[6]. Churchill, G. A., &Iacobucci, D. (2005). Marketing Research. Methodological Foundations (9th ed.). Australia, Canada, Mexico, Singapore, Spain, United Kingdom, United States: South-Western.

[7]. Cooper, D.R. & Schindler, P.S. (2003). Business Research Methods. Boston: McGraw Hill.

[8]. Deardorff, A., &Djankov, S. (2000). "Knowledge transfer under subcontracting: evidence from Czech firms". World Development, 28(10), 1837-1847.

[9]. Díaz-Mora, C. &Triguero-Cano, A. (2012). "Why do some firms contract out production? Evidence from firm-level panel data," Applied Economics, Taylor & Francis Journals, vol. 44(13), pages 1631-1644, May.

[10]. Furlan, A., Grandinetti, R. &Camuffo, A. (2007), "How do subcontractors evolve?" International Journal of Operations & Production Management, Vol. 27 No. 1, 2007 pp 69-89.

[11]. George, D. &Mallery, P. (2003). SPSS for Windows step by step: A simple guide and reference, 11.0 update (4th ed.). Boston: Alllyn& Bacon.
[12]. GOK..(2012). Economic Survey 2012, Kenya National Bureau of Statistics, Government Printer, Nairobi
[13]. Grossman, G. M. &Helpman E. 2005. "Outsourcing in a Global Economy," Review of Economic Studies, Wiley Blackwell, vol. 72(1), pages 135-159, 01
[14]. Gubik, A. 2005. New opportunities for SMEs founded by cooperation, European Integration Studies, Miskolc, Volume 4. Number 1. (2005) pp. 25-36.
[15]. Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2010). Multivariate Data Analysis. Seventh Edition. Prentice Hall, Upper Saddle River, New Jersey.
[16]. Hoetker, G. 2007. The use of logit and probit models in strategic management research: Critical issues. Strategic Management Journal, 28(4):331-43.
[17]. Holmes, J. (1986). "The organization and locational structure of production subcontracting". In A. Scott and M. Storper (eds.). Production, work, territory. Boston: Allen and Urwin, 80-106.
[18]. Hu, Z., Zheng, J., & Wang, J. (2011). 'Impact of industrial linkages on firm performance in Chinese development zones, Yangtze River Delta, Jiangsu Province, China', The Chinese Economy, vol. 44, no. 2, March–April 2011, pp. 78–105.
[19]. Kimura, F. (2001). Subcontracting and the performance of small and medium firms in, Japan. The World Bank. Paper No. 3719.
[20]. Kimura, F. (2002). "Subcontracting and the performance of small and medium firms in Japan". Small Business Economics, 18(1-3), 163-175.
[21]. Kinyanjui, N.(2006). "The Case of KamukunjiJua Kali Metalwork Cluster in Nairobi, Kenya", a background study for the World Bank, 2006.
[22]. Locke, E. A., & Latham, G. P. (2002). Buildingapracticallyusefultheoryofgoalsettingandtaskmotivation: A35-yearodyssey. American Psychologist. American Psychological Association.
[23]. Marimuthu M., Arokiasamy, L & Ismail, M. (2009). Human Capital Development And Its Impact On Firm Performance: Evidence From Developmental Economics. The Journal of International Social Research, Volume 2 / 8, Summer 2009, pp 265-272.
[24]. Marsall, D., McIvor, R., & Lamming, R. (2007). "Influences and outcomes of outsourcing: insights from the telecommunications industry". Journal of Purchasing & Supply Management, 13, 245260.
[25]. Mazzanti M., Montresor S. &Pini P. (2008). "Outsourcing, delocalization and firm organization: transaction costs vs. industrial relations in a local production system of Emilia Romagna," Working paper 16/2008, DEIT, University of Ferrara.
[26]. McCormick, D. (1999). "African Enterprise Clusters and Industrialisation: Theory and Reality." World Development Special Issue on Enterprise Clusters. 27(9): 1531-1551.
[27]. McCullagh, P. (1980). Regression models for ordinal data. *Journal of the Royal Statistical Society, Series B (Methodological),* 42, 109–142.
[28]. Norusis, J. M. (2012). IBM SPSS statistics 19.0 advanced statistical procedures companion. Upper Saddle River, NJ: Prentice Hall.
[29]. Ongong'a J. O. &Abeka E. O. (2011). Networking in the Kenyan informal sector: An attempt to manage the market failures. African Journal of Business Management Vol. 5(28), pp. 11323-11334, 16 November, 2011
[30]. Oyelaran-Oyeyianka, B. (2004). Networking Technical Change and Industrialization: The Case of Small and Medium Firms in Nigeria, ATPS Special Paper Series No. 20.
[31]. Pieters, J. , A.I. Moreno-Monroy, and A. A. Erumban. (2010). 'Formal-informal linkages and informal sectordynamics: evidence from India' Paper Prepared for the 31st General Conference of The InternationalAssociation for Research in Income and Wealth, St. Gallen, Switzerland, 22-28 August.
[32]. Rama, R., Calatrava, A. (2002), The advantages of clustering: the case of Spanish electronicssubcontractors, International Journal of Technology Management, 24, 764-791.
[33]. Smith, T. J. & McKenna, C. (2012). "An Examination of Goodness-of-Fit Indices used in Ordinal Regression", Multiple Linear Regression Viewpoints, 2012, Vol. 38(1), 1-7
[34]. Subrahmanya, B. (2008). Industrial subcontracting and structure in Japan: evolution and recent trends. Journal of Management History, Vol. 14 No. 1, 2008 pp. 23-38. Emerald Group Publishing Limited.
[35]. Taymaz E. and Kilicaslan Y. (2002). Subcontracting Dynamics and Economic Development: A Study on Textile and Engineering Industries, Middle East Technical University – Turkey, March 29, 2002.
[36]. Taymaz, E., &Kiliçaslan, Y. (2005). "Determinants of subcontracting and regional development: An empirical study on Turkish textile and engineering industries". Regional Studies, 39(5), 633-645
[37]. Tilman, V. (2004). Experience of SMEs with subcontracting in the ICT industry - The challenges faced by SMEs and their major needs, Paper prepared for the UNECE seminar – Fostering Internet Enterprise Development, 5 October 2004 – Brussels.
[38]. Tuan, N. P. & Yoshi, T. (2010) Vertical Linkage and Firm's Performance in Supporting industries in Vietnam. Asian Journal of Management Research, 1(1), 1-14.
[39]. Tuan, N.P & Takahashi, Y. (2010). Resources, Organizational Capabilities And Performance: Some Empirical Evidence From Vietnam's Supporting Industries, International Review of business Research Papers Vol. 5 No. 4 June 2009 Pp.219-231
[40]. Watanabe, S. (1971). "Subcontracting, Industrialisation and Employment Creation", International Labour Review, 104, 51-76.
[41]. Williams, R. (2009). Using heterogeneous choice models to compare logit and probit coefficients across groups. Sociological Methods and Research. 37 (4): 531-559
[42]. Yasuda, T. (2005). "Firm growth, size, age and behavior in Japanese manufacturing". Small Business Economics, 24, 1-15.