EFFECT OF CLUSTERING ON PRODUCT INNOVATIVENESS AMONG SMALL AND MEDIUM ENTERPRISES (SMES) IN KISUMU COUNTY, KENYA

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ABSTRACT

Purpose – The aim of this study was to determine the effect of clustering on product innovativeness (PI) in the context of manufacturing SMEs. in Kisumu, Kenya.

Design/methodology/approach – To answer the questions this empirical study raised, a sample of 126 SMEs on the basis of the manufacturing hubs of Kisumu, Kenya.

Findings – This study provided evidence in support of cluster drivers on PI.

Further research is needed to confirm and extend the present results by replicating the principal features of this study with SMEs in other regions within Kenya.

Practical implications – The conclusions drawn from this study could inform efforts in designing different supportive actions for different cluster manufacturing SMEs based on their PI profiles within the wider innovation policy initiatives.

Keywords : Small and medium-sized enterprises, Manufacturing, Clusters, Product Innovativeness, Kenya

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1.0 Introduction

Over the last two decades, the role of clusters and regional innovation systems has received much attention in research (Frisillo, 2007; Karlsson 2007; Porter 2000). Despite the widely held view that clustering can play an important role in fostering incipient industrial development, especially in poor regions (Schmitz & Nadvi, 1999) and also enhance the ability to innovate (Frisillo 2007), little is known of the effect that clustering has on product innovativeness among manufacturing SMEs in developing countries such as Kenya. In order to remain competitive, SMEs do need to continually improve and enhance their products innovativeness (Salavou & Avlonitis, 2008). Most of the manufacturing SMEs in Kisumu County seem to be operating in clusters, manufacture similar products and target the same market, thus their product innovativeness levels seem to be low. This has resulted in an increased inter-firm rivalry since firms are competing for not only customers but also skills supply in the labour market. This therefore underscores the importance of undertaking a study on the effect of clustering on product innovativeness among manufacturing SMEs in Kisumu County, Kenya. The paper is organized as follows. Relevant literature is reviewed and synthesized first to develop a conceptual model, followed by research methodology. The results are then presented along with discussion. Finally, conclusion and implication are discussed.

2. Literature Review and Hypotheses

The concept of 'clusters' is used relatively broadly in the research literature. This may be due to the fact that 'clusters' and 'clustering' encompasses a wide range of dimensions and schools of thought. Due to the long history and the wide nature of the term, it goes by different names in the literature such as 'industrial districts', 'agglomerations' (Marshall 1920; Martin & Sunley, 2003)), 'knowledge communities' and 'dynamic knowledge systems' (Reve, 2009). Depending on the field of interest, scholars have offered competing definitions on the concept of clustering. Cortright (2006) argues that a cluster, in the most general form, consists of firms and related economic actors and institutions that draw productive advantage from their mutual proximity and connections. This is a general definition drawing on ideas from geographic, social and competitive studies. Andersen (2010) uses the term cluster when referring to firms in a region with high levels of agglomeration or geographically proximate or co-located.

Studying patterns of economic activities and co-location, the so-called industrial

agglomerations among industrial districts in England, Marshall (1920) explained business prosperity through the lens of economic geography. Marshall identified three main reasons why a certain set of firms within a given industry would be more productive if located in close proximity. These reasons are often referred to as the Marshallian Trinity and include knowledge spillovers, labour market pooling, and supplier specialization (Boja, 2011; Oshida, 2009).

2.1 Product Innovativeness

Ali, Krapfel and LaBahn (1995) defined product innovativeness as the uniqueness or novelty of a new product to the customer. According to Van de Ven (1986) product innovation refers to the development and implementation of a new product in the adopting firm or markets. Similar to Rogers' (2003) innovation characteristics of a new product (relative advantage, compatibility, complexity, observability, and trialability), product innovativeness refers to the radicalness, uniqueness, and meaningfulness of a new product. Based on the review of existing literature, this study operationalizes product innovativeness as the propensity of a firm to innovate or develop new products that meet and / or exceed customers' expectations or the extent of unmet market needs as reflected in its uniqueness in comparison to similar products offered in the market.

2.2 Theory and Hypothesis Development: Clustering and SMEs Innovativeness

2.2.1 Customer proximity of cluster SMEs

SMEs consider their customers and competitors as their biggest resource. Close customer proximity and hence detailed knowledge of individual customer (customer–orientation) accounts can lead to innovation in products that are primarily customer driven (Voss, 1998). According to Renko, Carsrud and Brännback (2009) customers can first, provide major inputs that improve the quality of innovation. Second, close partnerships with customers during product development may provide access to resources that the focal firm lacks in-house. Tang and Murphy (2012) posit that Knowledge of specific customer problems involves knowing what customers would prefer instead of other alternatives; in turn such knowledge is instrumental in developing new products in which potential customers will respond positively. Thus, customer proximity may lead to an advantage in terms of product innovation (Li & Calantone, 1998; Tsai, 2009) based on customer needs and wants.

Hypothesis 1: Customer proximity of cluster manufacturing SMEs has a positive effect on product innovativeness.

2.2.2 Supplier proximity of cluster SMEs

Mytelka (2002) avers that proximity facilitates informal knowledge flows that stimulate innovation in clusters. Proximity allows firms to interact face to face which in turn builds trust and a common process for exchanging ideas (Lan & Zhangliu, 2012; Pavlovich & Akoorie; 2005). The proximity to other firms and the direct contact with entrepreneurs in the same field reduces risks and durations of the innovation process because of direct or informal information transfer between partners, firms and their clients or between firms and research institutions (Boja, 2011). Close contacts with suppliers may help a firm acquire quality materials, good services, benefit from a supplier's know-how and achieve timely delivery. Similar ties with buyers may spur customer loyalty, sales volume, and reliable payment. According to RBV, these different types of ties may be regarded as valuable, unique, and intangible resources that are difficult to imitate, thus giving firms possessing such ties a significant advantage in developing innovative products.

Hypothesis 2: Supplier proximity of cluster manufacturing SMEs has an effect on product innovativeness.

2. 2. 3 Collaboration of Cluster SMEs

According to Najib and Kiminami (2011) collaboration among manufacturing SMEs in the cluster occurs when there are sudden cash shortages or when there are rush orders that need additional labour at short notice. Clustering facilitates joint marketing efforts by small entrepreneurs themselves. Large firms and traders tend to concentrate their sub-contracting networks on clustered enterprises (Oshida, 2009). Clustering of enterprises is frequently to the advantage of buyers, as there will be considerable transaction cost reductions if they can purchase products at only one cluster (Mancinelli & Mazzanti, 2007). Waits (2000) argued that the industry cluster concept has proved to be a powerful framework for firms to organize, collaborate, and work with the government to meet their needs and their interests. Within the cluster, firms tend to cooperate not only with other firms in the same cluster but with

governments, universities, and research institutions (Moyi & Njiraini, 2005). As Folta, Cooper and Baik *(*2006) noted, economies of clusters benefit firms in their ability to innovate by attracting alliance partners and private equity partners. Hence, the study hypothesizes that:

Hypothesis 3: Collaboration among cluster manufacturing SMEs has an effect on product innovativeness.

2.2.4 Knowledge Spillover of Cluster SMEs

Knowledge spillover has been widely discussed in research literature, and may be referred to as the positive externalities firms receive in terms of knowledge from the environment (Bougrain & Haudeville, 2002; Davenport, 2005); is a result of personal contact between individuals in a specific cluster (Aharonson, Baum & Feldman, 2007; Andersen, 2010). Marshall (1920, p.225) argues that shared knowledge occurred in a type of "industrial atmosphere" and that "the mysteries of the trade become no mysteries; but are as it were in the air". Hence, clustering would enable easier sharing of product knowledge, production technology, production process, and market information. Such knowledge spillover in cluster SMEs to a great extent occurs either voluntarily or involuntarily when carrying out knowledge activities. The rationale behind the concept of knowledge spillovers is that the spillovers are only available to the actors within the boundaries of the cluster, and that stand-alone firms will have a disadvantage relative to the firms within the cluster. It is therefore often termed as *localized knowledge spillovers*, and may allow firms operating nearby the knowledge sources to introduce innovations at a faster rate than firms operating outside a cluster (Bell, 2005). Hence, the study hypothesizes that:

Hypothesis 4: Knowledge spillover among cluster manufacturing SMEs has an effect on product innovativeness.

3. Research Methodology

3.1 Sampling and data collection

This study adopted a cross-sectional survey design. Cross-sectional survey provides a numeric description of the fraction of the population – the sample – through data collection process at one point in time. This procedure enables the researcher to generalize the findings from sample of responses to a population (Creswell, 2009).

3.2 Population and Sample

The focus of this study is at the firm level with the unit of analysis being the manufacturing SME .The sampling frame were all manufacturing SMEs registered and licensed within Kisumu County , Central Ward as contained in the Official Registry of SME Associations of Kisumu, (2011), The sample size was determined according to Krejcie and Morgan (1970) survey table of samples that recommend a sample size of 196 for a population 342, at 95% confidence with 5.0% margin of error. Purposive sampling was then used to select the 136 respondent owner-managers.

3.3 Data Analysis

Of all the questionnaires returned only 126 were found usable. Data were entered and were analyzed using SPSS version 20.0. Multiple regression analysis was used to examine the combined relationship of multiple independent variables with a single dependent variable (Creswell, 2002, p. 376). In the current study, the dimensions of clustering measures were the independent or predictor variables and the product innovativeness measures were the dependent or criterion variables. The result of the regression was used to indicate the degree and direction of any relationships between the independent and the dependent variables.

Reliability Analysis

The 24 items of the Cluster Drivers scale were subjected to principal component analysis (PCA). Prior to performing PCA the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of 0.3 and above. The Kaiser-Meyer-Oklin measure of sampling adequacy was computed as 0.865, exceeding the recommended value of 0.6 (Tabachnik and Fidell, 2007). Bartlett's sphericity test was used to verifying the applicability of PCA. The value was Chi-Square = 1374.669 and reached statistical significance (≤ .05), supporting the factorability of the correlation matrix (Field, 2009; Hair *et al*., 2010).

Since most items loading on Factor 1 seem related to customers, the researcher identified the factor as customer proximity - CUSPROX. The second factor loads on supplier proximity items and is called SUPPROX. The third factor constitutes Knowledge related items and so identified as knowledge spillover - KNOSPILL factor. Finally, the fourth factor loads on partnership aspects and so is called collaboration factor- COLLABO. The extracted factors were

saved as variables in order to be used as independent factors in the regression analysis model. The components resulted in Cronbach alpha (α) scores as follows: the customer proximity subscale consisted of 9 items (α=.930), the supplier proximity subscale consisted of 4 items (α = .649), the knowledge spillover subscale consisted of 3 items (α= 648) and collaboration subscale consisted of 3 items (α = .503).

4.0 RESULTS

4.1 Descriptive Statistics

The relationship between Cluster Drivers and Product Innovativeness (PI)

The descriptive statistics (means, standard deviations, and correlations) were calculated and are reported in Table 1.

Table 1: Cluster Drivers and PI correlation matrix

Variable	1	2	3	4	5
KNOSPILL	1				
SUPPROX	.278**	1			
CUSPROX	.314**	.554**	1		
COLLABO	.181*	.251**	.268**	1	
TPRODINNOV	.066	.539**	.607**	.327**	1
Mean	18.59	18.83	22.29	18.49	19.39
Standard deviation	3.77	3.40	7.48	3.21	5.96

Note. * p < .05; ** p < .01 (two-tailed)

Most factors are positively correlated at the .01 significance level save for KNOSPILL; the correlation coefficients ranged from .066 to .607. The means of factors pertaining to CUSPROX slightly higher than those of the other factors. An inspection of standard deviations also found that the responses to CUSPROX, COLLABO and KNOSPILL had a smaller range of deviation compared to the responses to the other constructs. Standard deviation is an indicator of how far the data vary from the mean. The relatively small standard deviations indicate that the data pertaining to cluster drivers and outcome variables tend to be homogeneous.

Based on the correlation coefficient shown in Table 1, it was apparent that all of the correlation coefficients between the independent and the dependent variables were Positive. This indicates that there are significant correlations between clustering drivers and PI as well as between EO and PI. In other words, SUPPROX tended to enhance PI ($r=.539^{**}$, $p< .01$); CUSPROX($r =. 607^{**}$, $p< .01$); COLLABO ($r =.327^{**}$, $p< .01$); KNOSPILL($r = .066$, $p = .460$).

Stepwise Regression Analysis of Cluster Drivers on Product Innovativeness (PI)

In this study, the relationships between the cluster drivers and Product innovativeness (PI) were examined by stepwise regression analysis of SPSS version 20.0. The variables with the absolute *t* value ≥ 2 were included in the regression equation. Levels of *F* to enter and *F* to remove were set to correspond to *p* levels of .05 and .1 respectively, to adjust for familywise alpha error rates associated with multiple significance tests. Four predictor variables were regressed on PI: CUSPROX, SUPPROX, KNOSPILL and COLLABO. The final model consisted of three variables, CUSPROX, SUPPROX and COLLABO. One variable, KNOSPILL was excluded because it did not have a low enough p value (0.05) to enter, due to the fact that their partial correlation with the dependent variable, Y (PI), with the effects of the other predictors held constant, was not significant, even though their zero order correlation with the dependent variable, Y, may have been.

Table 1: Results of Stepwise regression analysis of Cluster Drivers on Product Innovativeness

Model	R	R^2	Adj R^2	S.E of ß	Change Statistics				
					ΔR^2	Δ F	df1	df2	Sig.
1	.604[a]	.365	.360	4.76649	.365	71.259	1	124	.000
2	.638[b]	.407	.397	4.62450	.042	8.731	1	123	.004
3	.660[c]	.435	.421	4.53221	.028	6.060	1	122	.015

$p \leq 0.05$

a. Predictors: (Constant), CUSPROX.

b. Predictors: (Constant), CUSPROX, SUPPROX

c. Predictors: (Constant), CUSPROX, SUPPROX, COLLABO

d. Dependent Variable: TPRODINNOV

In stepwise regression, the variable with the strongest correlation that can meet the entry criteria was entered first, so model 1 contained only one predictor- CUSTPROX. The variable, by itself, explained 36 5 of the variation in PI. In model 2 SUPPROX elucidated an additional 4%t of variation in PI (ΔR^2 =.042). In model 3 COLLABO contributed an additional 35% of variation in PI (ΔR^2 =.028). No further variable was entered, as it would not contribute significantly to the regression. The results showed that CUSPROX, SUPPROX and COLLABO are statistically significant positive predictors of Manufacturing SMEs PI, F (3,122) = 31.322, p < .05.

Table 2: Standardized Coefficient Results of Clustering Drivers on Product Innovativeness

Model		B	S.E of ß.	ß	t	Sig
1	(Constant)	19.397	.425		45.679	.000
	CUSPROX	3.599	.426	.604	8.441	.000
2	(Constant)	19.397	.412		47.082	.000
	CUSPROX	3.599	.414	.604	8.701	.000
	SUPPROX	1.222	.414	.205	2.955	.004
3	(Constant)	19.397	.404		48.040	.000
	CUSPROX	3.599	.405	.604	8.878	.000
	SUPPROX	1.222	.405	.205	3.015	.003
	COLLABO	.998	.405	.168	2.462	.015

$\mathbf{R^2}$ for steps 1=.365: $\mathbf{\Delta R^2}$ for step 2 = .042: $\mathbf{\Delta R^2}$ for step 3 =.028 ($p \leq 0.05$)

The results of the regression indicated the three predictors explained 43% of the variance (R^2= .435, Adj R^2 = .421), F (3,122) = 31.322, p < .05F. It was found that CUSPROX significantly predicted PI (β =. 604, p<.001), as did SUPPROX (β = .205, p<.001) and COLLABO (β = .168, p<.001).

Discussion

In this study, the following outcomes were obtained: The correlation analysis showed that cluster drivers - CUSPROX significantly predicted PI, as did SUPPROX and COLLABO .This study also shows that KNOSPILL has no relationship with PI.

Effect of CUSPROX on PI

For hypothesis 1, this study found a significant positive effect of CUSPROX on PI, supporting Hypothec 1. This finding is in consonance with the studies of Grinstein (2008) and Laforet (2008) who found a positive link between customer orientation and innovativeness.

According to Dibrell, Craig & Hansen, (2011) customers are the information nerve centres of competition, as they not only provide benefits in identifying market opportunities, but also reduce the likelihood of poor design in the early stages of product development). Thus,

customer proximity may lead to an advantage in terms of product innovation (Li & Calantone, 1998; Tsai, 2009). It creates a knowledge base about customer needs and wants, emerging market trends, and also sharpens the firm's ability to add new value.

Effect of SUPPROX on PI

Hypothesis 2 assessed the effect of SUPPROX on PI.The finding showed that SUPPROX has a significant positive effect on PI. Boja, (2011) avers that the proximity to other firms and the direct contact with entrepreneurs in the same field reduces risks and durations of the innovation process because of direct or informal information transfer between partners, firms and their clients or between firms and research institutions. (Isobe, Makino, & Montgomery, 2008). According to RBV, these different types of ties are regarded as valuable, unique, and intangible resources that are difficult to imitate, thus giving firms possessing such ties a significant advantage in manufacturing innovative products.

Effect of COLLABO on PI

There was a significant positive effect of COLLABO t on PI, supporting Hypothesis 3 this finding This finding is consistent with that of Najib and Kiminami, (2011) who concluded that firms tend to collaborate in order to achieve the effect of synergy in various fields of operation and improve their performance in the competitive environment

Moyi and Njiraini, (2005). Within the cluster, firms tend to cooperate not only with other firms in the same cluster but with governments, universities, and research institutions As Folta, Cooper and Baik *(*2006) noted, economies of clusters benefit firms in their ability to innovate by attracting alliance partners and private equity partners.

Effect of KNOSPILL on PI

Hypothesis 4 investigated the effect of KNOSPILL on PI. Research finding showed that KNOSPILL has no significant effect on PI. This indicates that the greater the rate of

KNOSPILL, the less influence it will have on product innovativeness. Therefore, Hypotheses 4 is rejected.

A plausible reason could be that clustering enables easier sharing of product knowledge, production technology, production process, and market information. Such knowledge spillover in cluster SMEs to a great extent occurs either voluntarily or involuntarily when creative employees carry out knowledge activities.

Studies have shown that being connected to extra-local knowledge networks is key to upgrading the innovation capability of cluster firms. Presutti, Boar and Majocchi (2011) aver that the external knowledge spillover is involved in knowledge interaction between clustering firms with institutions outside the cluster, which is useful to update the cluster knowledge base critical to innovation. Indeed Bougrain and Haudeville (2002) holds that the knowledge networks provide the know-why, know-how, know-when, and know-what- necessary for entrepreneurial success. Therefore, networks allow SMEs to decode and appropriate flows of information .This reinforces the SMEs' competitiveness by providing them with a window on technological change, sources of technical assistance, market requirements and strategic choices made by other firms which could lead to development of novel and unique products.

Recommendations

Based on the foregoing research findings and their respective implications, the researchers recommend setting up of SMEs clustering policies that promote customers, and supplier collaborations. These partnerships form the information nerve centres of competition, as they not only provide benefits in identifying market opportunities but also reduce the likelihood of poor design in the early stages of product development.

Further, since innovation is influenced by collaboration, it would be advantageous for manufacturing SMEs to maintain their close "cooperative competition" to continue their product innovativeness. Given that firm-level innovativeness demands proactiveness in exploring new methods of doing business that may not necessarily reside in clusters, it would be prudent that manufacturing SMEs acquire new product knowledge, production technology, and market information.from partners and competitors alike in order to manufacture novel and unique products.

Limitation and future research

There are a number of limitations that influence the generalizability of this study. *First*, this study was limited only on the SME manufacturing industry. Future studies replicating this study across multiple industries and sectors would increase the understanding of SME clustering concept. *Second*, the sample represented a limited number of firms in the industry. *Third*, the study is based on a self-reported questionnaire. Therefore, there is a possibility of respondents answering questions in a way that is perceived to be more desirable or acceptable than what is actually experienced or believed. Thus, the results of this study should be considered indicative rather than definitive based on these limitations.

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