ARE SMALL-FIRM CLUSTERS EMERGENT PHENOMENA? EVIDENCE FROM ZIMBABWE'S SMALL FURNITURE- MANUFACTURING FIRMS

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Abstract
The purpose of this study was to explore the reasons behind the rapid growth and apparent dynamism of Zimbabwe's small-firm industrial clusters. The hypothesis behind the study was that these small-firm clusters are emergent phenomena. The study analysed the capital utilisation techniques of small firms located in a large industrial cluster in order to determine the factors that lead to the collective efficiency of such firms. The study found that, in comparison with large, stock exchange-listed firms, the cluster environment enables the small firm to operate from a relatively small capital base and also to use its capital more efficiently in creating revenues and profits. The individual firm does not have to invest its capital in a large assets base as this is done by a specialised group of firms within the cluster. Thus, the cluster has the characteristics of an emergent phenomenon.

Key Words: *Cluster, Emergence, Symmetry breaking, Total Assets Turnover, Return on Capital Employed*

JEL Classification: *O 520, O 570*

I. INTRODUCTION

An International Monetary Fund country report on Zimbabwe (IMF, 2003) notes that between 1999 and 2002 real output declined by about 30 per cent and that the real Gross Domestic Product (GDP) per capita declined by about 26 per cent during that period. The Confederation of Zimbabwe Industries (CZI) reports that in 2008 Zimbabwe's manufacturing sector was producing 30 per cent of what it used to produce in 2003 and more than 75 per cent of the firms in the manufacturing sector were operating at less than 50 per cent capacity, with only 4 per cent operating above 75 per cent, indicating very high levels of unemployment for the whole economy (CZI, 2008). This period of economic decline provided a window of opportunity for many small firms to informally take over a large part of the manufacturing activities which hitherto had been the domain of large established firms that had collapsed during the period (Chirisa, 2009; Fashoyin, 2008).

The most outstanding feature of this new form of entrepreneurship is "geographical agglomeration", whereby small firms carry out their manufacturing activities in a cluster which is located close to a residential area (Sedita , Lazzeretti and Caloffi, 2012**)**. A survey of the six largest cities in Zimbabwe shows that by May, 2013 there were over 2 700 small furniture making firms employing more than 8 000 people located in eight such clusters (Muponda, 2013). The main characteristics of these clusters are that there is a high density of firms located in very close proximity to each other and that the firms in a particular cluster are all engaged in the same industrial activity. For example, the Glenview Cluster in Harare had a total of 1 800 firms located in an area of only 12 hectares, implying that the average land size occupied by each firm was six square meters, and all the firms were engaged in the manufacture of household furniture.

II. 2. LITERATURE REVIEW

Entrepreneurship can be viewed from two "opposing" perspectives: the Neo-Classical perspective and the Austrian or Schumpeterian perspective (Grebel, 2004).

The basis of Neo-Classical empiricism is methodological individualism (Grebel, 2004; Heertje, 2004) in that it is anchored on the decision-making processes of the individual economic agent following objective laws of economics. This approach has been accused of ignoring the existence of entrepreneurship itself (Dopfer, 2006; Ebeling, 2007; Grebel, 2004). It is argued that entrepreneurship, like all social phenomena, cannot be understood on the basis of deterministic methodologies applicable to the natural sciences. Social phenomena such as entrepreneurial activity are neither constant nor predictable. Though the approach is basically heterodox in that it acknowledges the importance of the individual economic agent, the individual is taken as a passive observer. Thus,

it is *passive methodological individualism* in that it does not acknowledge that it is the individual economic agent who influences economic change (Dopfer, 2006; Ebeling, 2007).

Studies on some of the prominent and more successful small-firm clusters with a Neo-classical perspective to empiricism include a study by Altenburg and Meyer-Stamer (2009) on small firms located in the Third Italy" (or "Italian Distretti"). Other such studies also include a study by UNIDO (2006) in Brazil's Sinos Valley cluster consisting of small leather manufacturing firms which showed that between 1970 and 1990, Brazil managed to raise its share of world exports in leather shoes from less than one per cent to more than twelve per cent and in 1991 was exporting nearly 100 million pairs of shoes valued at $900 million a year. In Pakistan, near the town of Sialkot, a cluster of over 300 SMEs specializes in the production of surgical instruments such as scissors, forceps and other precision instruments from high-grade stainless steel. Over ninety per cent of its output is exported mostly to Europe and North America. The cluster accounts for over twenty per cent of world exports of surgical instruments (Nadvi, 1999).

Several such studies have also been carried out in Africa and elsewhere (eg Rabellotti, 1997; Sverrisson, 1997; Van Dijk, 1997; McCormick, 1998; and Bagachwa, 2001). The main conclusion from these studies is that the firms located in clusters are collectively more efficient in managing their operations than other firms that are not located in a cluster environment. The "collective efficiency" of the firms is usually attributed to the existence of "external economies of agglomeration" (Altenburg, and Meyer-Stamer, 2009).

The Austrian perspective represented mainly by Carl Menger, Von Mises and Kirzner (Grebel, 2004), though heterodox in that it takes entrepreneurship to be the result of individual decision-making processes, is based on what Dopfer (2008) calls the "complete form" of methodological individualism, or *active* methodological individualism. Not only does the economic agent respond to opportunities but he also actively takes part in creating these opportunities.

The Australian perspective is also associated with the Schumpeterian approach to entrepreneurship which takes entrepreneurship from the *operant* (local) to the *generic* (global) level by asserting that decisions made by individuals have an effect on the economy as a whole. He takes the view that the whole economic system is a complex adaptive system which evolves over time as a result of the activities of individual entrepreneurs. Thus, his perspective is said to be *evolutionary*. Schumpeter saw the entrepreneur as a "disturber of equilibrium", an *innovator*. The innovator is one who shows leadership in carrying out *new* combinations, which Schumpeter listed as: the introduction of new products or new product qualities and new production methods, the opening of new markets, the use of new raw materials or sources of semi-manufactures and the creation of a new industry organization (Grebel, 2004).

Schumpeter's ideas were based on the simple observation that change is brought about by energetic personalities. Change involves new ideas, and in this way, the energetic agent is an innovator. The entrepreneur is the individual who constantly comes up with new ideas and the primary *agens*, or source, of change is the energetic drive of these individuals (Spilling, 2008). Accordingly, the entrepreneur brings about *novelty* in the form of new ideas. Thus all important change, be it in political, economic or social life, is brought about by entrepreneurs. Entrepreneurship from the Schumpeterian perspective is therefore strongly critical of the Neo-Classical perspective which states that economic change can be explained on the basis of objective laws only in which the activities of individuals have no role to play. Instead, development is always propagated by the *agens* or energetic drive of the entrepreneur. There is no "automatic" economic progress. Thus, a proper understanding of economic phenomena such as entrepreneurship should be premised on an understanding of the cognitive process and behaviour of individual economic agents.

From the Schumpetarian perspective, the collective efficiency of small firms a cluster emanates from the *interaction* between firms within the cluster, rather than the characteristics of the individual firms themselves. Studies on complex adaptive systems (eg Kauffman, Lobo and Macready, 2000; Grebel, 2004; Bruun, 2004; Frenken, 2005 and Goldstein, 2008) describe such a system as one that exhibits "swarm intelligence" in that it has linear properties and yet the elements that make up the system itself have none-linear properties and appear to exhibit quasi-random behaviour. The emergence of a system with apparent "order" at the macro-level from a grouping of heterogeneous economic agents is what Grebel (2004) refers to as "symmetry breaking" (Figure 1).

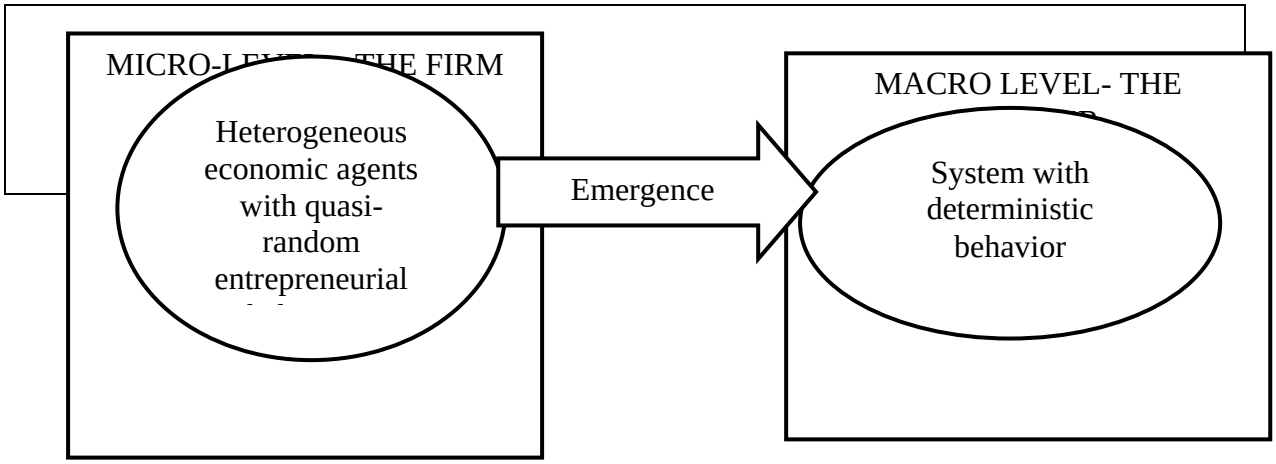

Figure 1: Symmetry breaking
Adapted from Grebel (2004: 64)

Symmetry breaking results in the birth of phenomena with "emergent properties". An emergent phenomenon is not the same as a "synergistic" phenomenon. Rather, it is a phenomenon whose characteristics are different from those of its constituent parts. It is a *complex* phenomenon whose characteristics are explained by the complexity of the interactions between its constituent parts. According to Corning (2002) there is also a clear distinction between "emergent" phenomena and "resultants" in that a resultant is either the sum of or the difference between *homogeneous* components and every resultant is clearly traceable back to its component parts. When the component parts are *heterogeneous,* however, the result of bringing them together *is emergent phenomena* that cannot be reduced to the sum of or the difference between its component parts.

Functionally-organizing emergent structures, patterns and properties at the macro level arise without being externally imposed on the system. It is a spontaneously occurring, bottom-up arising of a new order from a near-chaotic lower-order system (Goldstein, 2008). In the same vein, an agglomeration of firms in the form of a cluster, the emergent phenomena, seems to have a life of its own which is different from the individual firms that make up the cluster.

III. PURPOSE OF THE STUDY

The purpose of this study was to determine the characteristics of small-firm clusters by applying an evolutionary approach to empiricism in proposing that small firms operating within a cluster environment would operate more efficiently than other firms outside such an environment because the cluster as a whole is system with emergent properties.

IV. RESEARCH QUESTIONS

The study proceeded on the basis of the following questions:

- How much capital (equity plus loan capital) has been invested in each firm?
- How efficiently are the firms in the cluster utilising the capital invested in them?
- What are the drivers of efficiency?
- What strategy are the firms using to compete with other firms outside the cluster to gain market share?

V. RESEARCH METHODOLOGY

The study was based on a case study of 1300 small furniture manufacturing firms located in a cluster near Harare, the capital city of Zimbabwe. The primary data collection instrument for this study was a questionnaire that was administered to 248 firms located in the cluster. Secondary data for comparison purposes was also extracted from the published Annual Reports (2010) of large manufacturing firms that are listed on the Zimbabwe Stock Exchange (Table 1).

Table 1 A selection of stock exchange-listed firms in Zimbabwe

Company name	Brief description
African Distillers Limited	Manufacturer of wines and spirits
African Sun Limited	Management of Hotels and leisure resorts
AICO Africa Limited	Manufacturer of Agro-industrial products
DAIRIBOARD Limited	Manufacturer of milk and dairy products
CAFCA Limited	Manufacturer of electrical power cables
INSCOR Zimbabwe Limited	Manufacturer of foods and meat products
PG Industries Limited	Construction and timber merchants
National Foods Limited	Processor of agricultural foods
Murray and Roberts Limited	Large construction company

Source: Company Annual Reports, March 2010

1) Measuring efficiency in capital utilization

Efficiency in capital utilization was assessed using the measures shown in Table 2 below (Brigham and Gapenski, 2005; van Horne, 2006 and Atrill, 2009):

Table 2: Measures of efficiency in capital utilisation

Measure	How calculated
Return on Capital Employed (ROCE),	Operating Profit ÷ Total capital x 100
Total Assets Turnover Rate (TAT),	Sales ÷ Total Assets x 100
Gross Profit Margin (GPM),	Gross Profit ÷ Sales x 100
Operating Margin (OPM)	Operating Profit ÷ Sales x 100
Mark-up on cost (Mark-up)	Gross Profit ÷ Cost of Sales x 100

The ROCE was used as a measure of the efficiency with which the firm is utilizing its available capital to create profits. The TAT was used as a measure of the rate at which the capital was being used to generate sales. A low ROCE and TAT implied that there was insufficient use of the assets that had been financed by the available capital resources. The GPM, OPM and Mark-up were used as measures of operating efficiencies. They were used to indicate the amount of profit being generated from a dollar of sales. If these measures were low, the implication was that the operating expenses and production costs were too high relative to the level of sales being generated.

The relationship between capital utilization rates and operating efficiencies was summarized under the following equation (Brigham and Gapenski, 2005):

ROCE = TAT x OPM

This relationship was meant to show that the return on capital employed (ROCE) was driven by both the total assets turnover (TAT) and the operating margin (OPM). In order to maximize the efficiency with which it is utilizing the available capital resources to generate profits (ROCE), the firm must maximize both the amount of sales generated from a dollar capital invested in assets (TAT) and the amount of profit generated from a dollar of sales (OPM).

The relationship was also used to determine the approach that the firms in the cluster were taking to compete with other firms in the same industry but operating outside the cluster environment. Generally, two alternative approaches could be used (Kotler, 2006). Firstly A high asset turnover rate (TAT) relative to the operating margin (OPM) would indicate that the firms were using a *low-cost strategy* in which they would strive to minimise the production and operating costs in order to sell their products at the lowest possible price. Alternatively, a low TAT relative to the OPM would indicate a product differentiation strategy in which the firms would emphasize product quality and charge high prices.

VI. FINDINGS

With respect to the amount of equity capital contributed by the owners into the business, it was found that the average start-up capital introduced by the owner was $1 200. It was also reported that the firms usually ploughed back at least ten per cent of their net monthly earnings into the business after meeting all operating expenses, including salaries and commissions, for the purpose of financing their inventory requirements. The monthly net operating earnings per firm were reported to be $600 on average, of which $60 (ten per cent) would be ploughed back into the business, implying that the total annual profit ploughed back into the business was about $720 per firm. The average age of the firms in the Glenview cluster was reported to be about seven years, implying that the total profits that had been ploughed back since starting up the firms would be about $5 000 for the average firm.

Using these findings, the total equity of the owners of the firms, consisting of start-up capital plus profits ploughed back into the business over the years was therefore estimated at $6 200 per firm on average. The study also found that the firms in the cluster did not have any long-term liabilities in the form of loans from banks and other financial institutions. It was also found that very few of the firms had any short-term loans and all the firms reported that they purchased all their raw materials and other production inputs from the merchants located within the district on a cash basis and were not provided with any credit facilities. These responses indicated that the total amount of funds employed in each firm was $6 200, consisting only of the equity provided by the owners on the start-up of the business and the profits that were being ploughed back into the business.

When asked to list the assets that they considered "essential" in carrying out their production activities, the firms provided a list of machines and equipment indicated Table 3 below, including the purchase cost of each item.

Table 3: List of machines required for essential production routines

Item	Value of machine ($)
Lathe machine	3 500
Spindle molder	3 000
Thickness (surface) plane	4 000
Circular saw	1 000
Rip saw	1 000
Industrial sewing machine	300
Euro-bending machine	1500
Welding machine	150
TOTAL	**$14 450**

The study found that the firms that were directly involved in the manufacturing process invested a relatively insignificant amount of their capital in these assets, though they considered these assets to be "essential" for the operations of their businesses. It was found that role of providing capital for the purpose of buying plant and machinery was taken up other firms that were not directly involved in the manufacturing process but specialised in selling the machine time required to perform the necessary production routines. The total number of such firms was found to be 47, implying that the total capital invested for the whole cluster by these firms was about $679 000.

When requested to indicate the equipment that they did have, the firms that were directly involved in manufacturing, however, reported that their firms did have a small investment in small hand tools and equipment for the purposes of carrying out minor routines such as putting finishing touches to their products. The list of such tools and their values is contained in Table 4.

Table 4: Hand tools and equipment used for minor production routines

Type of tool/equipment	Average years in use	Replacement value ($)
Claw hammer	3	10.00
Router	5	20.00
Hand saw	3	10.00
Brace	2	35.00
Staple gun	1	10.00
Jake plane	6	15.00
TOTAL	**3**	**100.00**

It was found that the firms had invested in at least two of each of the items listed in Table 4 above. These responses implied that the total value of non-current assets held by each firm, on average, was only about $200, consisting mainly of small hand-held tools and equipment.

The study also found that the firms did not keep any significant stocks of raw materials. However they did keep some inventory in the form of work-in-progress and finished goods. Table 5 below contains details of the average value of inventory held by each firm.

Table 5: Average stock levels by product type

Firm cluster	Raw materials ($)	W-I-P ($)	Finished goods ($)	Total ($)
Wood cabinets	-	1 000	4 000	5 000
Sofa-sets	-	1 000	5 500	6 500
Base-beds	-	800	2 200	3 000
Kitchen units (wood)	-	1 000	3 500	4 500
Kitchen units (steel)	-	800	1 200	2 000
Average	**-**	**920**	**3 280**	**4 200**

It was reported that that the average credit sales for each firm per month were $1 700, resulting in annual credit sales of over $20 000 per firm. The average collection period was reported to be 30 days, thus the average level of debtors at any time would therefore also be $1 700. The average amount of cash, including the balance in the bank account (if any), held by each firm at any time was reported to be only $100.

Using this information, the balance sheet of the typical small firm in the district was drawn up as shown in Table 6.

Table 6: Balance sheet of a small firm located in a district

FUNDS EMPLOYED	**$**	**$**
Capital introduced	1 200	
Retained earnings	5 000	
Owners' equity		**6 200**
Non-current liabilities		-
Current liabilities		-
Total equity and liabilities		**6 200**
EMPLOYMENT OF FUNDS		
Non-current assets		200
Current assets		
Stock	4 200	
Debtors	1 700	
Cash	100	
		6 000
Total assets		**6 200**

Summary data that was reported with regards to monthly revenues generated and monthly costs and expenses incurred per firm are contained in Table 8 below.

Table 7: Monthly revenues, cost and expenses per firm

Revenue	Labour Costs	Materials Costs	Operating Expenses
$4 250	$1 200	$2 000	$2 000

Using this information, the monthly income statement of the typical small firm in the cluster was drawn up as indicated in Table 8.

Table 8: Monthly Income Statement of a small firm located in a district

	$	**$**
Sales		
Cash	2 550	
Credit	1 700	**4 250**
Cost of sales		
Direct labour cost	1 200	**-**
Direct material cost	2 110	**3 310**
Gross profit		**940**
Operating expenses		
Selling expenses	100	
Administration expenses	240	**340**
Operating profit		**600**

Applying the summary data in Tables 7 and 8 above to the measures explained in Table 2 resulted in the data contained in Table 9 below, showing the capital utilization data for the average small manufacturing firm located in the cluster.

Table 9: Efficiency in capital utilization by small firms located in the cluster

Return on Capital Employed	Assets Turnover Rate	Gross Profit Margin	Operating Margin	Mark-up on cost
10%	69%	22%	14%	28%

The summary data for other manufacturing firms in Zimbabwe that was extracted from the Annual Reports of these firms is also contained in Table 10 below.

Table 10: Efficiency in capital utilization by other firms in Zimbabwe

Company Name	ROCE %	TAT %	GPM %	OPM %	Mark-up %
AICCO	6	122	33	10	49
INSCOR	11	190	34	8	52
PG	-26	82	26	-15	35
AFRICAN DISTILERS	-21	104	24	-20	32
NATIONAL FOODS	2	210	24	1	31
MURRAY AND ROBERTS	-4	78	24	-8	41
Average	**-5**	**131**	**38**	**-4**	**40**

Source: Company Annual Reports, 2010

VII. 7. DISCUSSION OF THE FINDINGS

1) Efficiency in utilizing capital to create sales and profits

Though they were both operating from the same harsh economic environment, the return on capital employed and the total assets turnover rates show that the small firms were more efficient than the large stock exchange-listed firms in the manner in which they utilize the available capital to create revenues and profits. The small firms were operating from a very small capital base compared to the larger firms but they used it more efficiently.

The average ROCE for the small firms was found to be 10%, compared to the negative return of minus five percent for the larger firms, implying that the small firms were generating a return of $10,00 on every $100,00 of invested capital, whereas the large companies were losing $5,00 on every $100,00 of invested capital. At 69 per cent, the TAT for the small firms implies that they were generating revenues of $69,00 from every $100,00 of assets compared to $131,00 generated by the large firms.

2) Efficiency in generating profits from sales

Though the TAT for the large firms was considerably higher, this was not being translated into profitability as their operations were also being inefficiently managed. The large firms tended to compensate for their inefficiencies by placing higher mark-up percentages on their products compared to the small manufacturing firms. The mark-up for small firms shows that the small firms were charging $1,28 for a product that would have cost them $1,00 to make, whereas the large firms would charge $1,40 for the same product. This tended to result in higher gross profit margins for the large firms which are not reflective of the way in which the firms were managing their production costs (cost of labour, materials and production overhead expenses).

The inefficiencies of the large manufacturing firms relative to the small manufacturing firms are summarized in the data contained in Table 11 below which shows the way in which $100,00 of sales was being distributed and the resultant operating profit.

Table 11: Profitability: Small manufacturing firms versus large manufacturing firms

	Small-firm Cluster	Other firms in Zimbabwe
Sales	100,00	100,00
Cost of sales	(78,00)	(62,00)
Gross Profit	22,00	38,00
Operating expenses	(8,00)	(45,00)
Operating profit	14,00	-7,00

This table shows that the small firms generated more profit from a dollar of sales compared to the larger firms and were more efficient in managing the operating expenses. The small firms generated a profit of $14,00 per every $100,00 of sales whereas the large firms generated an average loss of $7,00. The operating costs for the small firms were only $8,00 per every $100,00 of sales but they were $45,00 for the large firms.

3) Drivers of efficiency

Applying the model equation to these data we get the results in Table 12 below which shows the drivers of efficiencies for small firms compared to large, stock exchange-listed firms.

Table 12: Drivers of efficiency for small firms and large firms

	ROCE	=	TAT	x	OPM
Small firm	0.097	=	0.69	x	0.14
Large firm	-0.053	=	1.31	x	-0.04

These results show that the main driver of efficiency for both large and small firms was total assets turnover. Due to the harsh economic environment, firms in Zimbabwe were being forced to 'sweat' the available assets by maximizing the amount of revenue generated per dollar of capital invested in assets as a result of the scarcity of investment capital. Large firms, for example, were found to be generating sales of $1.31 from every dollar of assets. The positive effects of high assets utilization rates for large firms, however, were eroded by the effects of operating inefficiencies and negative operating margins which resulted in the loss of capital invested. The relatively low assets utilization rates for the small firms were enhanced by superior operating efficiencies and positive operating margins, resulting in positive returns on invested capital. Though the capital invested in these businesses is relatively low, it was being employed more efficiently than is the case with other firms operating in isolation.

The figures in Table 12 also demonstrate that, though each firm does not consciously articulate its competitive strategy in relation to other firms, the cluster as a whole is using a *low-cost strategy* as evidenced by the relative importance of asset turnover (TAT) as the driver of the efficiency with which the firms were utilising investment capital to generate earnings (ROCE). Since the consumers of the products made by the firms in the cluster were reported to be low-income consumers and small retailers, it was natural for the firms to follow a 'low-cost' competitive strategy which required the firms to strive to produce their products at the lowest possible cost so as to minimise the selling price and gain market share.

VIII. CONCLUSIONS AND RECOMMENDATIONS

The results show the cluster was generating higher returns per dollar of invested funds compared to large firms because of its relatively superior capacity to utilize assets to generate sales and the effective management of operating and production expenses. The conclusion from these findings is that the cluster is a system with emergent properties. Though the firms could be heterogeneous in respect of their knowledge and expectations with regard to factors on the market place, the cluster as a whole had predictable and deterministic properties with regards to drivers of efficiency and competitive strategy. There is a deterministic element in the way in which the whole cluster has chosen to approach the market place: a conscious effort to compete through cost management and high assets utilisation.

This study has shown that the clusters of small firms in Zimbabwe have great potential provided that initiatives are put in place to leverage the many positive attributes that they possess and to eliminate the problem of "isolation" of the firms from other distribution channels, outside sources of technology and the capital markets. In this regard, it can be recommended that "mother-daughter" relationships be established between local clusters and other clusters outside Zimbabwe. An example of a successful relationship of this nature in Italy has been studied by Das (2008) who found that some firms in the clusters in North Eastern Italy transferred some of their production processes from their home clusters to clusters in the Timisoara region of Romania.

Traditionally, the government of Zimbabwe has assisted individual SMEs by providing subsidized credit facilities through the Small Enterprises Development Corporation (SEDCO) and the Ministry of Small and Medium Enterprise Development (MSMED. This approach has not achieved the desired outcomes (Morris and Barnes, 2003). Thus, it is suggested that more attention be paid to small firms in clusters due to their superior performance as a group.

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