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**The efficiency of small and medium enterprises in informal metal manufacturing in Zimbabwe:
Implications for stakeholders in the agricultural sector**

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Abstract

This study uses the structure–conduct–performance framework to examine the structure and efficiency of small and medium enterprises in the informal metal manufacturing sector in Zimbabwe. Small and medium enterprises provide a lifeline to the country’s resource-poor farmers, whose numbers increased exponentially after the agrarian reform in 2000. The study utilises nationally representative, enterprise-level data from five major towns (Harare, Chitungwiza, Bulawayo, Mutare and Rusape) in Zimbabwe. Various performance measures are applied at the industry level to assess efficiency, profitability and competitiveness; these include the Herfindahl-Hirschman index, concentration ratios, average yearly profits and Tobin’s q ratio. The results indicate that small and medium enterprises in Zimbabwe are modestly efficient, profitable and competitive. These findings highlight the need to integrate informal metal fabrication activities into Zimbabwe’s national economic development plans.

Key words: informal metal industry, structure–conduct–performance, efficiency, small and medium enterprises, agriculture, Zimbabwe

1. Introduction

Small and medium enterprises (SMEs) are an essential component of the economic fabric in developing countries and play a fundamental role in furthering growth, innovation and prosperity (McIntyre, 2001). In most developing countries, SMEs serve as an entrepreneurial seedbed, create new jobs, manufacture goods and services, and thus contribute to the gross domestic product (GDP) (Le Roux & Bengesi, 2014; McPherson, 1996). The SME sector could potentially help transform the economies of developing countries facing sluggish growth.

Policymakers, the donor community and other stakeholders have recognised the importance of SMEs in developing countries; this has contributed to the sector's ability to attract funding (Le Roux & Bengesi, 2014). Given the importance of the sector, issues affecting the dynamics of these enterprises (e.g. their performance, viability and efficiency) need to be analysed in depth. In Zimbabwe, as in other developing countries, there is evidence of a growing underground or informal economy (AfDB, 2013; *The Express Tribune*, 2011; World Bank, 2008). Many SMEs operate in this informal sector.

By definition, the informal sector refers to the market-based production of goods and services, whether legal or illegal, that is not included in the official estimates of GDP (Smith, 1987). In Zimbabwe, the operations of formal players in the supply chain have contracted, and informal SMEs play a critical role in closing the resulting market gap. They are also seen as a cheaper alternative source of implements and equipment for resource-poor farmers. Despite the proliferation of informal SMEs in developing countries, they remain largely unrecognised and are not integrated into national economic development plans (Chirisa, 2007).

The main focus in this study is the growth of SMEs in the informal metal manufacturing and service sector, which contributes significantly to the supply of agricultural equipment and implements in Zimbabwe. Using nationally representative, enterprise-level data from five major towns (Harare, Chitungwiza, Bulawayo, Mutare, and Rusape), the study uses the structure–conduct–performance framework to assess the efficiency of SMEs in the informal metal sector after the fast-track land reform programme launched in 2000¹. Its main contributions are, first, the focus on Zimbabwe, an important but insufficiently studied case in the literature. Second, it tests the hypothesis that informal metal fabrication plays a key role in the supply chain of agricultural implements and equipment in Zimbabwe. Third, it uses the results from this framework to assess the production and supply of agricultural equipment, implements and tools, arguing that informal metal fabrication SMEs are competitive.

Zimbabwe is currently facing a shortage of intermediate technologies among the new crop of resource-poor farmers, following the agrarian reform that replaced large-scale commercial farms with smaller,

¹ The fast-track land reform programme was a government policy aimed at addressing pre-colonial land imbalances. It was premised on extensive, compulsory land acquisition and redistribution. Compulsory acquisition largely affected white commercial farmers, private companies and absentee landlords. Following the land redistribution, the country saw an exponential increase in the number of smallholder farmers (Moyo, 2011).

family-run farms (SADC, 2008; Sadomba, 2008, 2011, 2013; Moyo & Yeros, 2005). The collapse of the formal sector that traditionally supplied both large-scale and smaller farmers with farming equipment and implements worsened the shortages (Mafu, 2011). Results from the analysis provide insights into the industry and allow better policies to be crafted.

2. Growth of the informal sector in Zimbabwe

The informal sector existed long before Zimbabwe attained independence in 1980, but was closely controlled through strict laws and legislation, such as the Town and Country Planning Act, 1946; the Vagrancy Act, 1960; the Urban Councils Act, 1973; and the Vendors and Hawkers by-laws, 1973 (Dhemba 1999). After independence, the informal sector grew significantly, mainly because rural people migrated to urban areas in the hope of escaping poverty. Since the 1990s, the growth of this sector has been dynamic. Scholars have offered different explanations for this sudden development. One school of thought argues that it resulted from the economic structural adjustment programme introduced in 1991, which might have brought about more suffering than solutions, especially for the urban population (Dhemba, 1999). Another school contends that the mobilisation of the liberation war heroes (war veterans) against settler and international capital aimed to stir a revolution, but it blew itself out at the end of that decade (Sadomba, 2011). Given that government support was focused on the rural poor at the expense of the urban poor, it proved increasingly difficult for urban households to make a decent living. The job market continued to shrink, absorbing less than a fifth of new graduates each year (Dhemba, 1999). The unemployed had only one option – the informal sector. During this period, the informal sector became a key socio-economic activity, and brought food to the tables of many starving Zimbabweans. However, its important role is yet to be fully recognised, as many stakeholders still consider the informal sector to be inefficient (Chirisa, 2007).

The macroeconomic challenges of the early 2008 provided further impetus to the growth of the informal sector across the country. There is consensus in the literature on the strong and positive relationship between the economic downturn and the growth of the informal sector (Chidoko et al., 2011; Sadomba, 2013; Chidoko & Makuyana, 2012). The growth of informal metal fabrication is believed to contribute significantly to the production and supply of metal equipment for various sectors, including agriculture, mining and manufacturing, as well as the general livelihoods of households in the country.

3. Structure–conduct–performance paradigm

Bain (1951) developed the structure–conduct–performance paradigm, based on the neoclassical theory of the firm. This approach has become central to industrial economics, as it provides insight into industrial organisation. It stipulates causal relationships between the structure of the market, the conduct of firms in the market, and their economic performance. In other words, the paradigm argues that the success of an industry in producing benefits for consumers depends on the behaviour of sellers and buyers in that particular market, which in turn depends on the factors determining the competitiveness of the same market. This analytical approach is used to study how the structure of the industry and the

behaviour of firms influence the performance of markets, and consequently the overall welfare of the country. The different aspects of the structure–conduct–performance paradigm can be explained as follows:

- *Structure* refers to the environment of the industry in which the firm is operating, or how producers or sellers interact with other producers, buyers and potential entrants. The structure also defines the product in terms of the potential number of variants in which it can be produced. The major elements of the structure describe the ways in which markets depart from the conditions of ‘perfect competition’. They include the number of competing firms in the industry, the market shares of firms, the homogeneity of products, the costs of starting a business, barriers to entry, vertical integration, and diversification.
- *Conduct* refers to the set of strategies that firms implement to gain a competitive advantage over their rivals or, simply, their actions in the market. It also includes the decisions they made and how they made them. Significant aspects of conduct in the model include pricing and price-setting behaviour, advertising and product development, research and development, plant investment, legal practice, mergers, cartels, and collusion.
- *Performance* refers to the success of the industry in producing benefits for consumers, or whether the operations of the firms enhance economic welfare. Outcomes ought to be efficient, as firms attempt to avoid a wasteful use of scarce resources in satisfying consumer demands. Performance has two dimensions – that of individual firms and that of the industry as a whole. Important aspects of performance include profitability, market growth, price levels, product quality, and technical progress.

4. Methodology

4.1 Sampling and data collection

A nationwide survey was designed with representation of both rural and urban players, in order to eliminate potential biases caused by different economic environments. Other factors that influenced selection and sampling were proximity to the capital city, Harare, and to neighbouring countries, such as South Africa and Mozambique. Sampling also considered different categories of dominant industries, such as agro-industry, forestry, manufacturing and mining, and aimed to collect data from areas dominated by these industries. One example is the Eastern Highlands, which is known for forestry and large-scale tea and sugar plantations. All major towns and cities were selected and studied as clusters, including their rural peripheries.

A multi-stage sampling approach was developed by first identifying provinces and then selecting cities, towns, rural growth points, and mining and agro-industrial centres. From these, specific sample units that had a high concentration of informal metal manufacturers were identified for data collection. The survey covered all firms in the identified clusters. Three questionnaires were designed, for manufacturer,

worker and consumer respondents. Interviews were conducted with identified manufacturers to provide in-depth information on the production cycle and the supply chain. Consumers and employees of the selected firms were also interviewed.

From this broad national study, the following process was followed for this paper: a descriptive and exploratory research design was used, with a multi-stage sampling method. Major cities (Harare, Chitungwiza, Rusape, Bulawayo and Mutare) were selected as the main clusters. Purposive sampling was used to identify areas in the clusters that were dominated by informal metal manufacturing, with the aim of achieving 100% cover. Study units within these areas were selected by simple random means. The simple random sampling was performed in identified areas within the five clusters across the country to generate a sample of 200 informal metal manufacturing SMEs. The sampling distribution within clusters is shown in Table 1.

Insert Table 1

To minimise any potential biases, the sample of the informal metal manufacturers was homogeneous. The firms were of almost the same size and were involved in the same type of metal fabrication. Three approaches were used to collect data, namely key informant interviews, direct observations and formal questionnaire interviews with firm owners. The main tool, the questionnaire, was administered to the sample of 200 SMEs and sought information on firm characteristics and the socio-economic characteristics of the owners. Most questions related to the structure, conduct and performance of the firms. For the qualitative data, interviews and direct observation were used as supplementary sources of information. The data was gathered from July 2012 to April 2013.

4.2 Analysis and methods

Quantitative data was processed and analysed using SPSS and STATA. The study used the structure–conduct–performance model to test the hypothesis that SMEs are efficient. Various measures were used to assess the structure of the informal industry’s market and its performance, such as the Herfindahl-Hirschman index, concentration ratios, average yearly profits and Tobin’s q ratio.

Market concentration ratios and the Herfindahl-Hirschman index were used to classify the market of the industry. The concentration ratio, which has limited data requirements, shows how much of the market share is concentrated in the hands of a small number of firms (Porter, 1998). The Herfindahl-Hirschman index complements the concentration ratio and is even considered a better indicator, as it gives more weight to large firms and reflects the distribution of market shares (Hause, 1997).

The concentration ratio is defined as the percentage of industry output contributed by the *x* largest firms in the industry. In this study, the concentration for the *x* largest firms was calculated by adding the market shares of the same *x* firms, using the following equation:

$$CR_x = \sum_{i=1}^x S_i \dots\dots\dots (1)$$

where CR_x is the concentration ratio for the x firms and S_i is the percentage market share of firm i . The value of this measure ranges from 0 (minimum concentration) to 1 (maximum). Sales volumes per year were used as a proxy for market shares and to calculate the concentration ratios. Two-firm (CR_2), four-firm (CR_4), and eight-firm (CR_8) concentration ratios were calculated.

The Herfindahl-Hirschman index is calculated as the sum of the squares of the market shares of all firms in the industry, as per equation (2):

$$HHI = \sum_{i=1}^n S_i^2 \dots\dots\dots (2)$$

where S_i is the market share of firm i , n is the number of firms, and HHI is the index. The index is close to 0 if competition is high, while it reaches 1 in the case of a pure monopoly.

Market performance refers to the success of a market in producing benefits for consumers and producers. Structure–conduct–performance studies typically focus on the profitability of firms as a measure of performance (Sawyer, 1985). In order to measure performance in the informal metal sector, profitability measures were used, complemented by an assessment of prices in the sector. This is because market performance is also evaluated in terms of the prices, supply, costs and margins in the sector (Korir, 2005; Kosgei, 1998), since both producers and consumers prefer stable prices for planning purposes. This study measured profits, profit margins and Tobin’s q ratio as follows, based on data for 2012:

Profits were measured as the difference between sales revenue (TR) and the total cost (TC) of production:

$$\pi = TR - TC \dots\dots\dots (3)$$

Firms were deemed to be doing well if they had positive profits, and badly if profits were negative (i.e. losses).

Profit margins were calculated as the ratio of profit to sales revenue, multiplied by 100:

$$Profit\ margin = \frac{Profit}{Sales\ Revenue} \times 100 \dots\dots\dots (4)$$

The margins show how much of every dollar of sales the firms retained in earnings.

Tobin’s q ratio was calculated as the ratio of the market value of firms’ assets to their replacement value:

$$Tobin's\ q = \frac{market\ value\ of\ assets}{replacement\ value\ of\ assets} \dots\dots\dots (5)$$

The ratio predicts the potential of the firms in the industry and of the industry itself. A ratio less than 1 would be negative, implying that firms lack potential, while a ratio of 1 would mean equilibrium. A ratio greater than 1 would imply that firms had excessive potential. Precisely, a high q (greater than 1) implies that the value of the firms stock is more expensive than the replacement cost of its assets, which implies that the stock is overvalued.

5. Results

Insert Table 2

Table 2 provides statistics on the structure, conduct and performance measures used in the study; the outcomes are explained below.

5.1 Structure of the industry

The concentration ratios, CR_2 , CR_4 and CR_8 , suggest that the industry is highly competitive and concentration is limited:

- $CR_2 = \sum_{i=1}^2 S_i = 0.0615$ – the two largest firms controlled only 6.15% of the market.
- $CR_4 = \sum_{i=1}^4 S_i = 0.1107$ – the four largest firms controlled only 11.07% of the market.
- $CR_8 = \sum_{i=1}^8 S_i = 0.182$ – the eight largest firms controlled only 18.2% of the market.

The Herfindahl-Hirschman index gave a similar result, with $HHI = 0.01077$. These results confirm that the informal metal industry comprises a large number of small firms, since CR_2 , CR_4 and CR_8 were less than 40% and HHI was very close to zero. The results closely mirror a perfectly competitive model: the industry has many sellers, and the role or market share of each entrepreneur is so small that his or her activities cannot significantly influence supply, demand or prices in the market.

The survey results also showed that there were few barriers to entry into the industry. The capital costs of entry were very low; on average, entrepreneurs started their businesses on a budget of about US\$473. Most respondents used their own savings and/or were funded informally through social networks (e.g. relatives and friends). The vast majority (95%) did not have to pay licence fees; the 5% who paid licences operated in some council-designated areas. None of the firms were registered with the registrar of companies.

5.2 Behaviour of firms in the industry

Firms in the informal metal industry relied primarily on three price discovery methods: charging a flat percentage mark-up on the cost of production (52% of firms), bargaining or haggling with customers (38%), and basing their prices on those of their competitors (10%). Open market pricing was found to be the dominant price-setting behaviour. Prices were determined through supply and demand, and collusion in setting prices was uncommon. Apart from these price-setting behaviours and price discovery methods, a small portion of firms (6%) tried to gain a competitive edge through aggressive tactics, such as exclusionary or predatory pricing (i.e. selling products below survival or market prices to undermine the competition).

Group marketing of output was uncommon. Most firms (71%) made independent marketing decisions, which again confirms that collusion is limited. In addition, 31% of firms had contracts with some of

their clients and were manufacturing on behalf of well-established, formal firms. This was not a common practice, as securing such contracts generally required proof of registration of the firm.

Advertising and research and development were also uncommon. Only 20% of the firms spent money on advertising and 22% on research and development. The most common marketing strategies were displays (97%), after-sales service (40%), and pricing (22%). Almost all firms displayed their products at a farm gate or at accessible places nearby, and many assisted customers after the sale, for instance by loading products into their vehicles.

The main form of information and communication technology used in the industry were mobile phones (used by 98% of firms), the Internet (24%) and computers (8%). Social networks, such as Facebook and WhatsApp, were also used, as were emails.

5.3 Performance of the informal metal sector

The small and medium enterprises in the informal metal industry are profitable, as shown by their net annual profits of US\$4112, US\$4286 and US\$4051 in 2010, 2011 and 2012 respectively. The standard deviations from the mean were quite large, indicating the existence of outliers; thus, the mean is not a true reflection of net profits. The distribution of net profits shows that more than 60% of the firms made net profits of up to US\$5000 per year and more than 85% made up to US\$10 000. Very few firms (<5%) made more than USD20 000 a year.

The profit margins of the firms in the sample show that the average firm kept 47 cents out of every dollar of its sales as profit in 2012. More than 90% of the firms had profit margins of between 20 and 80 cents, again confirming the profitability of the industry.

Another measure of firm performance, in particular the expected future performance, is Tobin's q ratio. The q ratio for firms in the industry is 0.98, which is not very far from equilibrium ($q=1$). This implies that the replacement costs of assets is slightly less than the value of stock. The ratio is more likely to improve in future making future investment meaningful. At present, replacement value of firm assets and the value of stock are almost the same.

Prices in the industry were generally lower than those of their main competitors in the formal sector selling the same products. The prices of three products sold in both formal and informal industries were compared, namely scotch carts, mouldboard ploughs and wheelbarrows. Prices in the informal sector were much lower, by a margin of at least 23%. Informal entrepreneurs gave various reasons for charging less: lower labour costs (62.7%), not having to pay taxes (16.0%), poorer customers (16.0%), and a lower-quality product (5.3%). This suggests that these firms are well informed about their competition and their customers' purchasing power, and that they consider a number of factors before setting prices, including their own needs and those of their customers. Basically, they charged lower prices to gain a competitive edge.

Producers in the informal sector received at least 80% of the final price, while those in the formal metal sector received less than 55% (CZI, 2012). This mainly reflects their (lack of) marketing. Firms tended to market their products at the point of manufacture and at the farm gate, and therefore did not incur marketing costs or the costs of middlemen and sales people.

6. Discussion of results

The analysis implies that the informal metal industry approaches the perfectly competitive model. The industry has a large number of small firms, very different from before 2000 when the formal industry dominated the sector. There are many sellers and their market shares are small, thus each firm's production and selling activities do not significantly influence market supply, demand or prices (Gwin, 2001; Ferguson, 1993). Entry into and exit from the industry are not restricted, as licensing fees and capital cost requirements at entry are minimal. The results imply that there is discipline in the market because of competition (Simmons, 2004). Market conduct was competitive and collusive behaviours in production and marketing were limited, and prices were determined by demand and supply. The industry was profitable and satisfied consumer needs, as demonstrated by its net profits, profit margins, prices, and expected future profitability. These results are not surprising, given how close the industry is to a perfectly competitive model. Under perfect competition, firms have no market power and are price-takers (Gwin, 2001; Simmons, 2004). As a result prices tend to be low, there are no economic profits, and the market is efficient. The hypothesis that informal metal firms are inefficient was therefore rejected. Instead, informal metal firms are playing an important role in the production and supply of metal equipment, especially in providing intermediate technologies to smallholder farmers.

7. Implications and recommendations

7.1 Implications for agriculture

Broadly, this study illustrates that despite the collapse of the formal metal industry after the land reform, a vibrant informal industry has emerged that sustains the production of agricultural equipment. These firms are aligned with the changing structure of the agricultural sector, focusing on supplying smallholder farmers and filling the critical gap caused by the flight of international and settler capital. The low levels of concentration, as well as the low barriers to entry and exit, imply that the industry is very competitive. There is also discipline in the market, as new entrants can enter without difficulty, thereby increasing competition and, hence, efficiency. The outcome is likely to be lower prices for consumers and higher levels of customer satisfaction. Since resource-poor farmers are among the major clients for this sector, they enjoy the benefits of almost perfect competition. They can therefore afford more products with their limited incomes.

The metal manufacturers deliberately focus on the intermediate technologies required by smallholder farmers. This complementary response to the land revolution created synergies in the economy and partly explains how Zimbabwe survived under economic siege for almost two decades. Metal manufacturing, a critical industry for agriculture, was reconfigured through structural changes that were

conducive to the broader transformation of the economy. This assisted resource-poor farmers in obtaining affordable capital equipment and the necessary tools for agricultural production. The perfect market conditions, without monopolistic or oligopolistic settler and international capital, resulted in prices that bring marginal costs and marginal revenue into equilibrium. Such price determination is not based on the excess profits that characterise monopolistic conditions.

Firms earn positive but not excessive profits, their profit margins are high, and prices in the industry are relatively low, all of which contribute to the sustainability of the informal metal manufacturing sector. This implies a high likelihood of continuity in the sector, which would stimulate growth. This should ensure better supplies of products in future, benefiting both smallholder farmers and other stakeholders.

7.2 Recommendations

It is recommended that the government, through the relevant ministries, financial institutions and the private sector, examine the possibility of accommodating informal metal manufacturing enterprises in the country's development agenda. This would enhance the orderly utilisation of the urban space; improve the aesthetic appeal of informal sites; increase the viability of the firms; and enhance their efficiency. However, such integration should not entail formalising all their activities, as this would deprive them of their current benefits (e.g. low costs) and increase the chances of firm closure. The government also needs to promote competition in the industry by keeping barriers to entry and exit low. Keeping the industry close to perfect competition would encourage firms to be innovative, improve the quality of their service, provide customers with more information (allowing them to make better choices), and be efficient in production; this would in turn contribute to overall economic welfare. The farming community and other stakeholders would be more likely to reap maximum benefits from a perfectly competitive industry.

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Table 1: Sample distribution by cluster

Cluster (n=200)	Frequency (percentage)	Areas covered
1. Harare	80 (40)	Mbare (Magaba), Gazaland, Mbudzi
2. Chitungwiza	20 (10)	Makoni and Seke
3. Bulawayo	40 (20)	Makokoba, Renkini industrial area
4. Mutare	40 (20)	Green market, Dangamvura
5. Rusape	20 (10)	Mabvazuva, Rusape Musika area, Vengere

Source: Survey data (2013)

Table 2: Summary statistics on structure, conduct and performance measures

Structure (n=200)					
Concentration	CR ₂ =6.15%	CR ₄ =11.07%	CR ₈ =18.2%	HHI=10.77%	
	Observations	Mean	Standard deviation	Minimum	Maximum
Capital (US\$)	200	473.34	416.5453	0	2 000
Conduct					
Collective action	Proportion		Standard error		
No	0.73		0.0317307		
Yes	0.27		0.0317307		
Advertising	Proportion		Standard error		
Yes	0.20		0.0286062		
No	0.80		0.0286062		
Mobile phone use	Proportion		Standard error		
Yes	0.98		0.0100238		
No	0.02		0.0100238		
Research and development	Proportion		Standard error		
Yes	0.22		0.0296202		
No	0.78		0.0296202		
Performance					
	Observations	Mean	Standard deviation	Minimum	Maximum
Profit 2010 (US\$)	200	4 111.818	5 301.016	100	30 000
Profit 2011 (US\$)	200	4 286.222	5 257.624	150	30 000
Profit 2012 (US\$)	200	4 051.001	4 761.294	150	30 000
Tobin's q ratio	200	0.9833709	0.2863946	0.4	2.7

Source: Survey data (2013)