MULTI-FACILITY ECONOMIC ZONES IN ZAMBIA: AN ASSESSMENT OF THE LOCAL MANUFACTURING INDUSTRY READINESS

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Abstract:

China's use of Special Economic Zones (SEZs) to spur its remarkable economic development was seen as the way to go, particularly for developing economies. Zambia, like most African countries, has established these zones with the help of the Chinese. In Zambia, the zones are called Multi-Facility Economic Zones (MFEZs), and are to operate as platforms for industrial development and creating value chains in addition to the much-needed jobs that they would create. Based on the Chinese experience and lessons, MFEZs are designed to be integrated into the domestic economy, as they are in China. It is envisaged that this approach would, through foreign direct investment (FDI), enhance the transfer to local industries the much-needed knowledge and technology, a prerequisite for modern industrialisation. If the MFEZs attract a critical mass of FDI, stimulate high value-added manufacturing activities, and generate productivity spillover, their impact on industrial development in Zambia would be dependent on the domestic linkages created and the technology transfer achieved, both of which are a function of the local manufacturing absorptive capacity. This paper reports on the results of a survey undertaken to assess whether the Zambian manufacturing firms had the capacity or "technological readiness" to adopt any spillover and/or absorb any technology transfer that takes place. The variables considered in this assessment were types of technologies and methods of production, manufacturing systems, and human resources development. The study established that there were low levels of advanced technologies, weaker innovative capacity and lower human capital (skills) threshold in local firms. To address these short-comings, recommendations in form of a two-pronged paradigm, involving the local manufacturing industry on one hand and Government on the other hand have been made.

Keywords*—Foreign Direct Investment (FDI), Local Manufacturing Industry, Multi-Facility Economic Zone (MFEZ), Value Addition.*

INTRODUCTION

A strong and competitive manufacturing sector is a foundation for any country's economic growth. The manufacturing sector in Zambia has generally performed below expectations for the past three decades due to low or lack of investment in advanced technologies and innovations needed to add value to raw materials (World Bank, 2009). Other barriers include insufficient infrastructure such as energy, transportation and telecommunications,

the high financing costs, macro-economic instability and administration (Micro-economics), crime and corruption (World Bank, 2009). The Forum on China–Africa Cooperation (FOCAC) held in 2006 presented an opportunity to address most of these constraints and long-term prospects for industrial development. At this FOCAC, the Chinese Government pledged to support the establishment of Special Economic Zones (SEZs) in Ethiopia, Mauritius, Nigeria, and Zambia (Davies, 2010). Böhmer and Farid (2010) present the internationally accepted definition of Special Economic Zones as "larger estates that could be considered cities on their own. They usually cover all industrial and service sectors and target both foreign and domestic markets. They provide an array of incentives ranging from tax incentives to regulatory incentives. In addition, they permit on-site residence".

Drawing from its own successful development experience, the Government of the Peoples Republic of China (PRC) proposed that Zambia develops its manufacturing sector through the establishment of the Multi-Facility Economic Zones (MFEZs) (World Bank, 2009). A MFEZ is a specific geographic area with quality physical and special infrastructure, where economic policies are more liberal than in the rest of the country in order to attract and facilitate establishment of world-class enterprises within the zones (Deborah and Tang, 2011). It is a business model which sets a platform for enhancing the competitiveness, diversification and stimulating industrialization in the economy, hence creating quality jobs for indigenous population, which is key to economic growth. The MFEZs, just like SEZs, blend the best features of the Free Trade Zones (FTZs), Export Processing Zones (EPZs) and the industrial parks (IPs) concepts and create the administrative infrastructure, rules, regulations that benchmark among the best dynamic economies. A MFEZ is a comprehensive laboratory in which fully-fledged economic reforms can be piloted and cover large areas such as an entire province or a city, while IPs or high-tech parks are a supporting component of MFEZs, but with an industrial focus encompassing only part of a city (Deborah and Tang, 2011). A MFEZ is a township in its own right incorporating factories, housing units, medical, schools and recreational facilities, with reliable road and rail linkages, uninterrupted electricity and water supplies, improved telecommunications infrastructure, and efficient waste disposal systems.

The MFEZ strategy is to cluster smaller, downstream manufacturing firms and industrial operations around major industries based in the zones. As these MFEZs adopt different preferential policies, they play the dual roles of "windows" in developing the foreign-oriented economy; generating foreign exchanges through exporting products and importing advanced technologies; and of "radiators" in accelerating inland economic development (Deborah and Tang, 2011). In Zambia, MFEZs are established under the ZDA Act No. 11 of 2006 (ZDA, 2006), and are broken down into two types, namely Production MFEZs (for manufacturing related businesses) and Export Trade MFEZs (for commercial trading, warehousing and many others to exploit export markets). The focus of this paper is on Production MFEZs, which are intended to cater for both domestic- and export-oriented industries utilizing mainly local raw materials, and sub-contracting sections of their production to local manufacturers. Table 1 shows five such type of MFEZs established in Zambia (GRZ, 2011).

TABLE 1
PRODUCTION MFEZS IN ZAMBIA

Name	**Location**	**Target Industries**
Chambeshi	Copperbelt: Chambishi	Copper and copper related industries,

MFEZ	- 12° 39′ 0″ South and 28° 04′ 0″ East of GMT	agro-processing, household appliances, motor parts, explosives.
Lusaka East MFEZ	15° 20′ 0″ South & 28° 24′ 0″ East. Near Kenneth Kaunda International Airport	Copper related industries, agro-processing, garments, electric, electronic, automobile and bicycle assembly.
Lusaka South MFEZ	15° 30′ 0″ South and 28° 22′ 0″ East Chifwema road, 1.8 km off Leopards Hill road	Garments, Information Communication Technologies (ICT), household appliances, tobacco, beverages, agro-processing, diagnostic/medical equipment
Lumwana MFEZ	11° 50′ 0″ South and 25° 08′ 13″ East, South-east of T5 road	Explosives, fishery, agro-processing, construction, electrical, electronics, chemicals, heavy machinery.
Sub-Sahara Gemstone Industrial Park	13° 01′ 20″ South and 28° 39′ 28″ East along Crompton road off Kabwe road	Lapidary, plastic, paper pulp, non-ferrous metals, wood, electro-winning, block manufacturing.

The success of Economic zones depends on the extent to which they create linkages with the local economy thereby generating employment and increasing transfer of know how (Böhmer and Farid, 2010). MFEZ approach to industrialisation is FDI-led and its implementation is anchored on supportive policies from Government to MSMEs and FDIs, in order to stimulate industrialisation through business linkages. It is generally accepted that sustainable industrialisation through MFEZs route is possible if the local industrial capital is able to replace foreign investment in management, technology, design, factory operations, logistics, quality management, and marketing (UNCTAD, 2006). Business linkages between TNCs and local manufacturing firms are a structured approach which foreign and local enterprises can use to support each other's economic performance, through concrete collaboration in areas such as skills and managerial development, technology upgrade, distribution and access to new markets (UNCTAD, 2006). The interaction of these major stakeholders in the MFEZ set-up must be supported by the flow of information among research and technology institutions like universities and colleges, industry and Government, as shown in Figure 1.

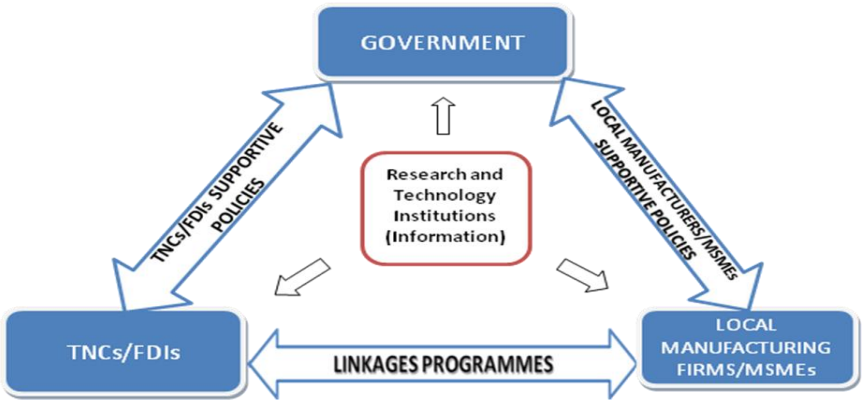

Figure 1: Stakeholders Interactive Triangle

There are two major policy areas on each side of the stakeholders that are relevant for building TNCs - local manufacturers/MSMEs linkages (UNCTAD, 2006), namely:

(i) "Improving the investment climate" and "attracting FDI strategically" on the TNCs' side;
(ii) "Strengthening the local absorptive capacity" and "developing domestic suppliers" on the local manufacturers/MSMEs' side.

Business linkages programmes can take different forms depending on what objectives the Government wants to achieve (UNCTAD, 2006). These include:

(i) *Forward linkages with customers* that allow marketing outlets to be outsourced;
(ii) *Backward linkages with the suppliers* that offer new market opportunities for local firms;
(iii) *Linkages with competitors* through which foreign investors may set new standards for local firms to compete with.
(iv) *Linkages with technology partners* through which TNCs may initiate common projects with indigenous MSMEs, including joint ventures, trade, licensing and strategic alliances.
(v) Other spillover effects: Labour migration; trained personnel may leave the investor to work with a local firm or set up their own MSMEs, resulting in human capital spillover.

To make the development of business linkages easy, local manufacturers (MSMEs) must be prepared, able, and interested to serve MFEZ firms in terms of quality, scale, price and delivery requirements (World Bank, 2008). Moran (2012) indicates that surveys show that foreign investors in SEZs tend to help indigenous suppliers set up production lines, train them in quality control, and coach them in management, strategy and financial planning. Further, they also provide advance payments and others kinds of financing and introduce their suppliers to export markets (Moran, 2012). Therefore, the scope and quality of linkages formed will depend on the existence of MSMEs which are able to meet high TNCs' standards, or at least have the potential to achieve such standards within a short period. When there is a good fit between the TNCs characteristics and MSMEs characteristics, more and better long-term partnerships that can potentially improve development tend to occur.

The question then is how ready is the Zambian manufacturing industry to participate in the Production MFEZs?

To answer this question, we considered the fact that to have any beneficial linkages between local manufacturers and MFEZ firms, local manufactures must possess technology and knowhow for quality, cost, flexibility, service, and delivery performance. These are embedded in such variables as human resource, knowledge and skills, processes, equipment, machinery and systems like Lean Production and Total Quality Management (TQM) which increase business performance. These were used as assessment parameters for company readiness in a study reported in this paper.

METHODOLOGY

The study was undertaken from March, 2011 to November, 2013 for data collection and industry visitations in selected sites. It utilised a questionnaire survey, a literature review, personal and telephone interviews (structured and unstructured), and observations of process lines during industrial visitations to collect both qualitative and quantitative data.

Survey Addressees and Study Population

The sampling frame covered areas which were selected for the establishment of the MFEZs such as Lusaka, Copperbelt, Southern and North-Western Provinces. The study targeted active manufacturing firms located in towns in these provinces, and included Lusaka, Kabwe, Ndola, Chambishi, Solwezi and Livingstone. The Primary sector (mining and minerals) was included for comparisons sake due to its backward and forward linkages. Eleven manufacturing sub-sectors, three Government departments in the Ministries of Labour and Social Security (productivity), Commerce, Trade and Industry (ZDA), and Finance (CSO) and three foreign missions to Zambia directly linked to MFEZ development (Japan, Mauritius and China), were purposively included in the sampling frame.

In order to ensure reliability and validity, a random sample size of 10 percent of the population was picked, which translated into 30 firms out of 297 active manufacturing firms. The companies chosen for study were a cross-section; included both foreign- and local-owned, and small- to large-scale. For qualitative data, purposive sampling was used on company executives and representatives and Multi-stage sampling for other stakeholders such as Government departments and foreign missions. Twenty-seven questionnaires were administered in person while three were e-mailed to the firms which could not be reached or as per their request.

Data Analysis

The quantitative and qualitative data was analyzed using Excel Spreadsheet format as well as the Statistical Package for Social Sciences (SPSS) software, in order to cross-tabulate and analysis the manufacturing sub-sectors and generate appropriate tables, graphs and charts which were used to display the trends on technology types, manufacturing management systems, human resources development and sources of inputs and modes of transportation.

SURVEY FINDINGS AND DISCUSSION OF RESULTS

To assess how easy it could be for the local manufacturing firms' strategic integration into MFEZ manufacturing networks, the collected survey data was analysed under three major themes, namely:

(i) Types of Technologies and Methods of production;
(ii) Technological Innovations, Best Practices and Manufacturing Systems; and
(iii) Human Resources Development (Skills, Managerial Capabilities and Employment Ratios).

In addition, respondents were requested to indicate what they considered would improve the situation to enhance their respective firm's competitiveness. Out of the 30 distributed questionnaires, 21 were returned, representing a 70 percent response rate, as shown in Table 2. This was deemed sufficient for analysis. The analyses of the results, shortened in this paper, are provided together with the presentation of results.

TABLE 2
SURVEY RESPONDENTS BY MANUFACTURING SUB-SECTOR

Manufacturing Sub-sector	Town/City	Province	Questionnaires	
			Issued	Returned
Food, Beverages and Tobacco	Lusaka	Lusaka/Kitwe	7	5
Chemicals and allied Products	Lusaka	Lusaka	4	2
Plastics and Rubber Products	Lusaka	Lusaka	4	4
Fabricated Metals and Products	Lusaka and Kitwe	Lusaka and Copperbelt	6	4
aper and paper products	Lusaka	Lusaka	2	1
Textiles, Apparel and Leather	Chipata and Livingstone	Eastern and Southern	3	2
Primary Metals/Mining	Kalulushi	Copperbelt	3	3
Non-metallic/Mineral Products, Paving, Construction	Lusaka	Lusaka	1	0
		Total	**30**	**21**

Types of Technologies and Methods of Production

Based on Figure 2, the study revealed that only firms in the Paper and Paper Products sub-sector had invested in PLC, Automated Part Identification (bar-coding) and Automated Vision-based Systems, while 20 percent, 60 percent and 40 percent of respondent firms in Food, Beverages and Tobacco sub-sector had installed CNC, PLC and bar-coding systems, respectively.

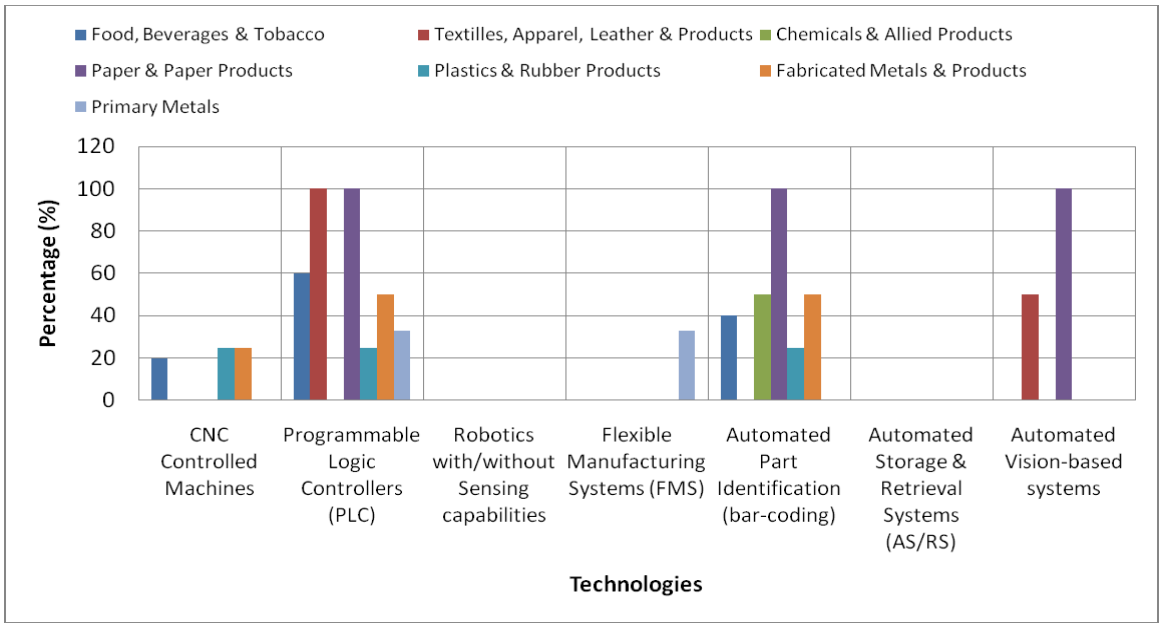

Figure 2: Existing Processing, Assembly, Material-handling and Inspection Technologies

Generally, there was substantial investment in PLC, except Robotics, FMS, Automated Storage and Retrieval Systems, Material-handling and Inspection Systems. However, 20 percent, 50 percent and 25 percent of the respondent companies in Food, Beverages and Tobacco, Textiles, Apparel and Leather, and Fabricated Metals and Products sub-sectors, respectively, indicated that they had planned to install these technologies in the next 2 years.

TNCs command an ever more important role in the economy of a host country. They possess technological capabilities to develop, search for, absorb, and exploit knowledge commercially (Fagerberg et al., 2009). They boast of advanced technologies in manufacturing operations such as designing, engineering, processing, assembly, material-handling and inspection. It is believed that for technology transfer and manufacturing growth to be realised, the technology gap between the TNCs and the local manufacturing firms must be narrow. This gap refers to the absorptive and sustainability capacity to acquire and work with the new technology. According to Blanco de Armas and Mustapha, (2002), when the host countries' level of technology is similar to that of the TNCs, the establishment of SEZs/MFEZs is likely to post economic growth. This is closely linked to host countries' human resources development. Nonetheless, the Zambian local manufacturing sector was characterised by outdated technologies with limitations. The absence of robotics, FMS and CIM systems, among other is a clear indication of lack of modern manufacturing approaches, which would hinder smooth integration of the local manufacturing companies into the MFEZ value chains

Technological Innovations, Best Practices and Manufacturing Systems

Referring to Figure 3, the survey revealed that all firms had installed almost all innovative systems in varying degrees with the exception of Lean Production in Chemical and Allied Products sub-sector (50 percent), Statistical Process Control (SPC) in Food, Beverages and Tobacco sub-sector (20 percent) and Process Re-engineering (BPR) in Textiles sub-sector (50 percent).

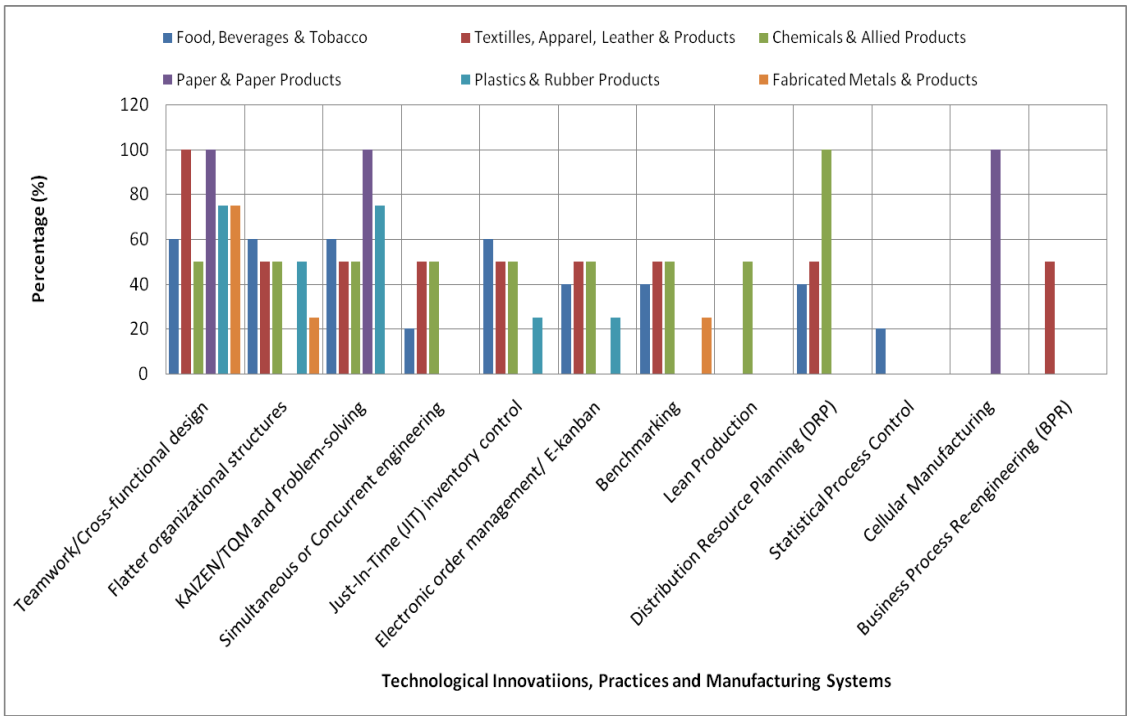

Figure 3: Innovations, Best Practices and Manufacturing Systems

For technology transfer and manufacturing growth to be realised, the 'technological gap' between TNCs and MSMEs must be narrow. However, given the prevailing low absorptive and weaker innovative capacities, the local firms were faced with challenges of integration into MFEZ value chain. Some firms were still using inherited mechanised machinery from privatised parastatals installed in the 1960s, and experienced constant breakdowns.

Recent innovation studies suggest that both technology transfer and local R&D capabilities are necessary conditions for technology upgrades in developing nations, which have the ability and motivation to absorb advanced technology and management know-how (Zhiqiang, 2002). Specifically, TNCs' presence must alter the innovative behaviours of a domestic firm such as R&D expenditure, and number of scientists and engineers (Galina and Cheryl, 2007). Nevertheless, from personal interviews conducted with CEOs and company representatives, the prevalent conditions especially in the plastics and rubber products and food, beverages and tobacco processing, depicted a weaker and porous conduit for technology and skills transmission from TNCs to local firms. The number of employees in R&D area remained negligible, about 0.12% of the total work-force.

Human Resources Development – Skills, Managerial Capabilities and Employment Ratios

Most companies' representatives indicated that they did not have medium- to long-term human resources development plans for their employees especially at shop-floor, as shareholders were more concerned with profit maximization. The average employment ratios of locals to expatriates in terms of specialization, across all manufacturing sub-sectors surveyed, were not inspiring. For instance, according to Figure 4, the 6 to 1 represents the ratio of workers employed in production department, while human resource and purchasing departments had a 4 to 1 ratio. Engineers' ratio was 5 to 1, with Technologists and Technicians' ratio standing at 7 to 1, while the Artisans' and craftsmen's ratio was the highest at 21 to 1.

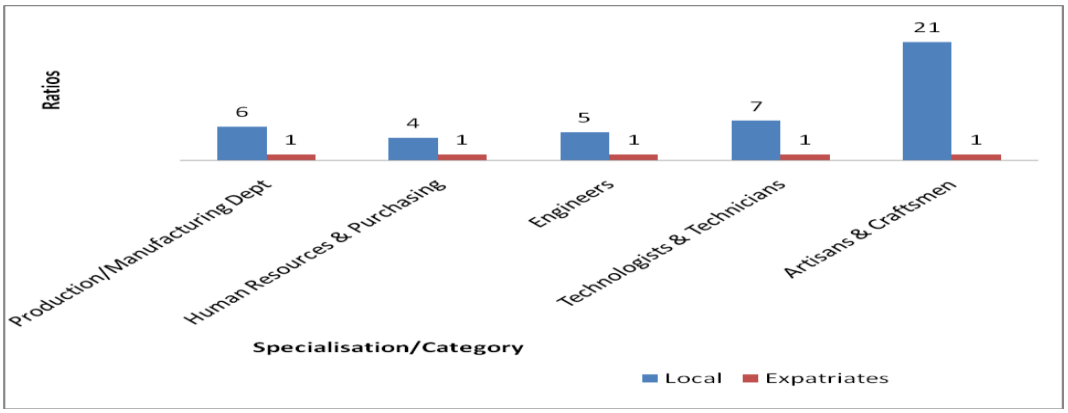

Figure 4: Employment Ratios (Locals to Expatriates) - Aggregated Manufacturing Sub-sectors

One striking feature worth noting is that 33 percent of the respondent firms in the Fabricated Metals sub-sector revealed that they were neither local Engineers nor Technologists employed, and the number of local Technicians was less than that of expatriates, standing at 1 to 3.

Further, the survey revealed that, like any other new project, the implementation of the MFEZ/IP is expected to face challenges such as Government's lack of clearly defined policy framework to buttress the implementation of the MFEZs/IPs concepts.

Besides technology, TNCs bring into the host country the needed complementary resources such as experience, entrepreneurial abilities and stock of knowledge, through formal training programs and learning by doing within foreign affiliates. There is a positive relation between FDI and Total Factor Productivity (TFP) growth when a host country has achieved a minimum threshold of human capital development. However, lack of highly skilled labour has often been identified as an impediment to economic growth on the African continent (Farole, 2011). Evidently, the research revealed that most local manufacturing firms did not meet the human capital threshold needed for effective technology and skill spillover, especially in metal fabrication industry where neither local engineers nor technologists were employed. Besides, there were more expatriate technicians than local ones which defeated the objective of local labour integration.

The survey also revealed the inability of the Zambian Government to provide equal opportunities for both foreign and local investors. A visible instance was the Chambishi MFEZ, where local vendors had been marginalized in business contraction. They complained that there were no regulations in place that compelled Chinese investors to source materials and services locally. Worse still, the investment threshold of not less than an equivalent of US$500,000 set for a manufacturing investor to operate in MFEZ/IP, was beyond the capacity of most local entrepreneurs, which would hinder their participation in the zones (ZDA, 2006). Under these circumstances, it is difficult to expect major positive outcomes from MFEZs and IPs.

Critical Factors in the Manufacturing Firm's Business Strategy

According to Figure 5, 62 percent of the respondent firms in aggregated manufacturing sub-sectors revealed that 27.3% of the critical factors (investments in advanced

technologies, cost reduction in manufacturing, improvements in the manufacturing processes, and developing new products) had 72.7% impact on the achievement of business strategies, hence called the 'vital few'. In addition, 38 percent of the respondent firms disclosed that 72.7% of the critical factors like using team-based manufacturing systems such as cross-functions, improvements in marketing activities, personnel strategies (staff training and pay-for-skills), entering new markets, added-value services, using new materials and investment in information technology systems had little effect (27.3%) on the performance of the manufacturing firms. These factors are usually referred to as 'trivial many'.

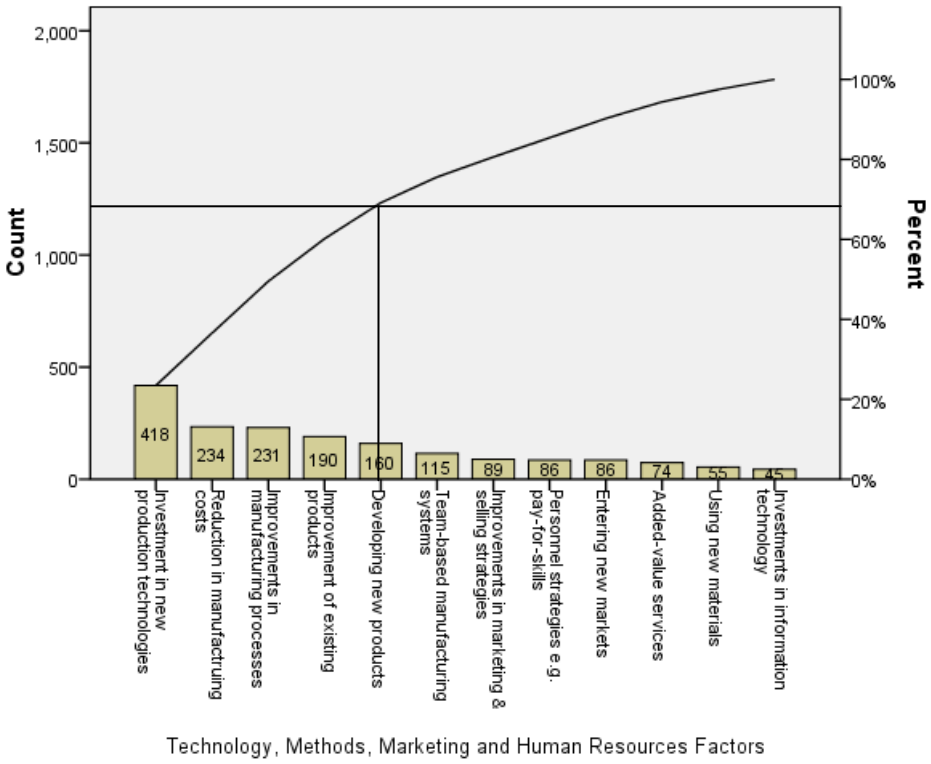

Figure 5: Pareto Curve of Critical Success Factors in the Firms' Business Strategy

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. The technological gap between TNCs and local manufacturing firms was wider hence, reducing the absorptive and sustainability capacity, especially in Engineering-related, Plastics, Rubber and Chemicals sub-sectors.
2. The local manufacturing sector had a weaker innovative capacity as best practices like Lean Production, CM, SPC and BPR were not widely appreciated. It was characterized by an inability to diversify into new high value-added and dynamic products.
3. Most local manufacturing firms did not meet the minimum human capital threshold required for technology and skills transfer such as management experience and entrepreneurial abilities, as the bulk of their workforce was unskilled. In addition, the average employment ratios of locals to expatriates in terms of specialisation especially

engineers, technicians and technologists, were too low to not only stimulate meaningful labour integration, but also animate internalisation and specialisation of skills. The current skills were only suitable for current lower levels and out-dated production technologies.

Recommendations

A. local Manufacturing Industry Prong:

1. Investment in advanced technologies such as CAD, CAE, CAM, FMS, PLC, Robotics, Field-bus among others will boost absorptive capabilities.
2. Investment in innovations and manufacturing systems like JIT, BPR, SPC, GT and Benchmarking will improve efficiency and productivity.
3. There is need for interactions among the firms, with academia, government and other stakeholders, in order to take advantage of synergy effects across the manufacturing sector.

B. The Zambian Government Prong:

1. The Government must enact an investment policy with a clear focus on technology up-gradation and transfer, job creation and human resources development. For instance, it must introduce such linkages promotion programmes as Singapore Local Industry Upgrading Programme (SLIUP) and the Ireland's National Linkage Programme (NLP) in order to identify and upgrade local enterprises that have the potential to add value to the locally available resources and either export or supply to TNCs within the local market. Created in 1986, and financed by Economic Development Board (EDB), SLIUP's objective seeks to encourage TNCs to second an engineer to local sub-contractors and suppliers who will assist them in improving overall operation efficiency and in acquiring new technological knowledge. During this stage, the EDB pays the engineer's salary (Sánchez-Ancochea et al., 2009).
2. The Government must establish think-tanks in respective industries, which are going to identify specific sectors and activities of investments to encourage production and entrepreneurship (capacity building) among native people. Furthermore, it must establish Business Incubators (BIs) in each province for strategic industries connected to native natural resources beneficiation. A BI refers to an economic development tool designed to accelerate the growth and success of entrepreneurial companies through an array of business support resources and services such as training, finance, quality and networking, among others.
3. The Government must offer incentives to TNCs which not only encourage in-house technical training and skills development, but also offer businesses to local suppliers, for instance double-deductions for HRD. In the same vein, it must enact enforceable policies that would facilitate exchange of technology and skills, like limiting the number of expatriates, preferably 1 expatriate to 10 locals.
4. Expansion of telecommunication systems, and improvement of the rural road network will help exploit investment opportunities and development of the manufacturing firms in relatively isolated areas (rural) which may be operating outside the MFEZs' and IPs' provisions.

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