THE USE OF SUPPLY CHAIN AMONG INDUSTRIAL ENTERPRISES IN CAMEROON

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Abstract

This paper aims to address challenges posed to industrial enterprises as they work to produce manufacturer goods in order to satisfied domestic individual well-being. This prompted our research work. A field survey, using multiphase sampling technique, was conducted to select samples for detailed analysis. Two sets of questionnaires were administered on the ninety-six (96) industrial operators' in Douala and Yaoundé, to collect information on their characteristics, supply chain resources and mode of operations; sources and uses of supply chain, inventory, production and distribution, demand and supply planning in the company of collaboration. Levels of supply chain of members, products packaged and delivered, warehouse management costs, transportation costs generated as well as delivery on-time and forecast accuracy were measured. The results showed that five categories of industry operate in Cameroon namely: Mining and Oil Refining Industry (MORI), Agro-Industry (AI), Wood Processing Industry and Textile Industry (WPITI) or other industries, Energy and Water (EW), Buildings and Public Works (BPW) each with its unique features and mode of operations. As to the main activities engaged by industrial enterprises, equipment ranks first followed by sales, human resources, and raw materials respectively. With regards to problems and constraints to their supply chain they ranked demand planning, performance management, transportation planning and vehicle scheduling, sales and operations planning (S&OP), supply planning problems in the fore front. Suggested solutions were made. Overall, it is evident that industrial enterprises in Cameroonian economy are profitable, resourceful and could be sustainable if the identified problems and constraints are addressed by manager/stakeholders and suggested solutions are adhered to.

Keywords: Supply, Supply Chain, Industrial Sector, Enterprises, Equipment, Performance

INTRODUCTION

A supply chain consists of all activities and information associated with the transformation flow of goods and services from the raw material stage till the final product reaches the consumer. Since the transformation of individual products and services normally involve the interactions of independent firms, several industries are typically involved in the supply chain. In a typical supply chain, raw materials are procured and items are produced at one or more factories, shipped to warehouses for intermediate storage, and then shipped to retailers or customers. Consequently, to reduce cost and improve service levels, effective supply chain strategies must take into account the interactions at the various levels in the supply chain. Examining the supply chain developed by Cameroonian industries showed different process originality to cater to the needs and satisfaction of the end consumers. In this country, many enterprises have developed their own supply chain in a context different from the traditional supply chain presented in literature (Cao and Zhang, 2011; Sukati et al., 2013; and Djoda, 2016).

This paper documents the use of supply chain or Supply Chain Management (SCM) in Cameroonian industrial sector. The use of supply chain is a critical factor of success in development and growth of enterprises across the country. This is more prominent in industrial enterprises where resources supply to a large extent, determine production and sales to the majority of entrepreneurs among construction, electricity, gaz and water for investment and adoption of improved technologies; value addition among local food crops, livestock, fishing; trader, artisans, craftsmen, etc.

SCM is the process by which industrial firms effectively and efficiently uses its resources and capabilities to accomplish productive activities necessary to the delivery of goods and services to the ultimate customer in order to meet the firm's goals of profitability and sustainability. In this way, Hugos (2003) identified five drivers of supply chain. These are production, transportation, inventory, location, and information. SCM aims to deliver goods/service to its customers with the least cost at the right time and with the right quality. Each participant in the supply chain is considered a customer of the preceding entity. The firm is the customer of the supplier and the distributor is the customer of the firm.

SCM is also a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system wide costs while satisfying service level requirements. This explanation leads to several observations: (i) SCM take into consideration every facility that has an impact on cost and plays a role in making the product conform to customer requirements: from supplier and manufacturing facilities through warehouses and distribution centres to retailers and stores. Indeed, in some supply chain

analysis, it is necessary to account for the suppliers' suppliers and the customers' customers because they have an impact on supply chain performance. (ii) The objective of SCM is to be efficient and cost-effective across the entire system; total system wide costs, from transportation and distribution to inventories of raw materials, work in process, and finished goods, are to be minimized. Thus, the emphasis is not on simply minimizing transportation cost or reducing inventories but, rather, on taking a systems approach to supply chain management. (iii) Because SCM revolves around efficient integration of suppliers, manufacturers, warehouses, and stores, it encompasses the firm's activities at many levels, from the strategic level through the tactical to the operational level.

Traditional and few formal sources together form the main sources of SCM and identified as critical to the success of any management policy goals (Spina et al., 2015). SCM packages are meant to facilitate acquisition and use of new technologies for industrial production, processing, and marketing for consumption or export of agro-based commodities. It is also an assemblage of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers (Ganeshan and Harrison, 1995). Major technological models acquired using such chain by producers for instance include manufacturing, wholesaling, distribution, purchasing organizations, equipments, mechanical services and inputs as well as commodity value-added activities. The latter include processing; packaging, storage and sales. Acquisition and use of supply chain resources are expected to lead to increase in production and specification of customer zones, selection of manufacturing and distribution facilities, and allocation of product families to these sites, but also with the prioritization of capabilities to be developed and retained internally, and the forging of new partnerships with other entities.

The current SCM packages considered by industries have in-built mechanisms to ensure broader participation among suppliers and users as well as enhance the flow of productive investment into the agro-industrial sector. It is claimed that sub-suppliers, suppliers, internal operations, trade customers, retail customers have all engaged in the provision of transforming goods in Cameroon without serious documented research on their supply chain performances and the future sustainability of their activities especially when material flow are no longer available. This calls for an investigation into their performance. Efficiency and profitability among industries largely depends partly on the ability of these organization industries to procure and effectively utilize cheap chain and channel them to consumers with minimal recovery risks, among others (Burgess et al., 2006; Chavez et al., 2012) and partly on the ability to identify and remove operational constraints. This study aims to discover the main sources of supply for

industries and how the supply are used and finally address constraints that limit their management in industrial sector.

The main objective of our paper is to analyze the use of supply chain by Cameroonian industrial enterprises. Specifically the subsidiary objectives are to: (i) categorize the types of industrial enterprises and their activities in the sector; (ii) classify the main sources of supply chain in the industrial sector; (iii) determine the outreach among industrial organizations operating in the sector; and (iv) identify the main constraints and propose solutions to the supply chain in the sector.

METHODOLOGY

Sector of Study

Industrial sector is selected for this study. This sector is defined as the set of the manufacturing sector that processes raw materials and intermediate products derived from primary sector. The choice is made because the industrial sector is one of the priority sectors for the revival of economic growth and fight against poverty. It is the industrial sector that should produces most of the goods and services in a developing economy. This is because the secondary sector is highly mechanized and adapts easily to technological changes. Cameroon's ambition in vision 2035 is to transform from a primary phase to a secondary import substitution phase with the manufacturing industry. The manufacturing industry accounts for 26 percent of the Gross Domestic Production (GDP). More than 55 percent of industrial production is realised by about twenty companies which employ more than 5,000 workers, and account for 75 per cent of salaries, 65 percent of the turnover of the sector and more than 50 percent of exports. From the outset the transformation of products highlights the critical role that industry plays in supply chains. At the same time, the roles that industry sector is playing are changing over time, and the distinction from other sectors is becoming less clear as technologies cut across industries (e.g. biotechnology). Moreover, industries are increasingly using inputs that they have not traditionally employed.

Sampling Design

The study was carried out principally in the Cameroonian industrial sector. To evaluate the size of sample a pre-survey was conducted to determine the main operators in the sector. The sampling frame was made up of a good level of enterprise, formal and informal, in the area of study. Five categories of industry can be identified in the Cameroonian sub-sector namely Mining and Oil Refining Industry (MORI), Agro-Industry (AI), Wood Processing Industry and Textile Industry (WPITI) or other industries, Energy and Water (EW), Buildings and Public

Works (BPW) each with its unique characteristics. Each type of industrial firms is represented and the actual number of enterprises was first determined to find those actively engaged in providing transforming good to the clients.

In the sub-sector of MORI, the main exported product is oil, but Cameroon also possesses bauxite, diamond, and uranium. It is also important to note that the reserves of gas amount to 110 billion cubic meters (Omc, 2001). From 1993 to 2008, the value added of this sub-sector dropped from 821.61 billions Fcfa to 500.25 billions Fcfa. The MORI has also observed a downward trend since 2007 because of the drying up of main operational wells. Besides, this sub-branch of industry is the one which undergoes most external shocks. For example, in 2009 and 2016, the revenue of petroleum oil exports fell by 39 percent and 70 percent. On the other hand, the quantity of petroleum oil exports declined by 4 percent and 13.1 percent in 2008 (Mineplat, 2010).

The AI is dominated by the production of the following products; sugar, flour, refined oil, brewery and soap products. This sub-sector has observed a relative expansion because its products are largely consumed by Cameroonians. From 1993 to 2008, the value added of this sub-sector has passed from 304.10 billions FCFA to 525.91 billions FCFA. Specifically, the production and the turnover of agro-brewery industries have increased respectively by 14 percent and 19.1 percent; for wheat, the volume produced and the sales have increased respectively by 9.4 percent and 8.5 percent in 2009 (Minfi, 2010).

In WPITI the value added of wood processing industries and textile industry passed from 566.47 billions FCFA to 961.39 billions FCFA between 1993s and 2008. But the production of by-products of wood and textile suffered the effects of the 2008 global crisis. This way, the quantity of sawed wood fell by 38 percent in 2009, notably because of the shortfall in demand in the international market. The textile industry experienced on the other hand an activity surge of 10.3 percent in 2009, due to increase sales of factual loincloths, particularly those used for the visit of the Pope in March, 2009 (Mineplat, 2010).

Concerning EW, the value added of the sub-sector hardly doubled as it passed from 38.41 billions FCFA to 67.28 billions FCFA From 1993 to 2008. But the production of electricity fell by 0.3 percent in 2009. This decline is explained by the decline of 2.5 percent in hydraulic production which was not compensated by the increase in thermal production (38.1 percent) thanks to the two new thermal power factories. In 2010, electricity production should increase in Cameroon due to renovation and rehabilitation works of the hydroelectric power factory of Edéa. The production of water fell by 2 percent in 2009 because of unfavourable climatic conditions. The government of Cameroon intends, in 2010, to build waters processing factories in the suburbs of Yaoundé and Douala. It is expected that these new factories will raise the production

of water to 165 000 m3/day in the economic capital (Douala) and to 150 000 m3/day in Yaoundé. Combined with the other works of rehabilitation, extension and densification of the system of supply, the rate of water supply should pass from 35 percent to 60 percent at the national level in 2015 (Mineplat, 2010).

In the sub-sector of BPW, this sub-sector has observed a surge in her activity as a result of the improvement of inputs supply. Indeed, the improvements in the production capacities of cement as well as the increase of import quota have permitted to reduce the deficit of cement. The production and the sale of cement recorded respectively an upswing of 26.5 percent and 12.2 percent between 2008 and 2009. In 2010, the cement factory of Cameroon envisages to increase production to about 13.8 percent. For demand, the continuous construction of road and real estate, the construction of the Lom Pangar dam and the deep sea port in Kribi allows us to expect a favourable evolution of activities in this sub-sector (Mineplat, 2010).

Given the aforementioned scenario, our sampling frame was made up of some industries in the production market. After the pre-survey, the multiphase sampling technique was adopted to determine our sample of 96 formal, semi-formal and informal units. The division of the sample is 19 for MORI, 22 for AI, 18 for WPITI, 07 for EW, 30 for BPW. The features of the participating enterprises/organizations were further studied with respect to additional characteristics. In the second or main phase of the inquiry selected manufacture were categorized into five main groupings to ease collection of information.

Data Collection

Both primary and secondary data were collected from the industrial enterprises as well as other stakeholders involved over a three year period (2013 to 2015) as extracted from the last three years published pecuniary statements of the enterprises concerned. In addition, interviews were conducted using structured questionnaire in which detailed information on the specific aspects of the manufacture window operated by the industries were collected from the head quarter of the industries or their representatives.

Analytical/Measurement Tools Used

Descriptive statistics such as mean, range, percentage, frequency distribution, standard deviations, variance, charts and others, were used to attain objectives relating to the characteristics/behaviour of the main decision unit, the industry, identified their mode of operations and main sources of supply chain. In addition for the companies their purpose, mode of operations, sales in terms of logistics environment, nature of supports provided, management of material and as well as other peculiarities is analyzed using similar tools of analysis.

The Student "t-test" was used to determine whether some categories of industry are the same with respect to level of SCM and resources planning. The Student "t-test" was conducted using data generated from the SCM records of the members of the five categories over the last three years. Similarly, for the SCM data collected is used to compare the five categories.

EMPIRICAL FINDINGS

The five broad categories of industry identified below engage in a wide range of practices across the economy. Prominent operators in the area of study include Cameroon Development Corporation (CDC) in agro-industry, national oil company (SNH calling Société Nationale des Hydrocarbures) and the national refinery company Ltd (SONARA) in MORI, the national water corporation (SNEC) and the electricity company (ENEO) in EW, the sugar (CAMSUCO), rubber (HEVECAM) and part of the palm oil sector (SOCAPALM) in AI, etc. Because of lack of modern methods of production, agro-pastoral, vegetal, animal, fishery and forestry producers did not participate in this survey even though records from ministry of industry and ministry of agriculture suggest the great reality of such organizations. Three main categories of sources of supply chain for use by industries were identified giving rise to the multi-tiered supply relationships within the economic environment. The multi-tiered supply relationships among industry reveal that most of them leverage on inventory, production and distribution followed by demand and supply planning and least on collaboration as in Table 1.

Table 1: Proportion of Collaboration, Demand and Supply Planning, Inventory, Production and Distribution Among Industrial Enterprises

	Types of industrial enterprises range in % and averages								
	MORI	Mean %	AI	Mean %	WPITI	Mean %	EW	Mean %	BPW	Mean %
Inventory, production and distribution	9	47.4	10	45.5	6	33.3	3	42.9	12	40.0
Demand and supply planning	5	26.3	7	31.8	6	33.3	3	42.9	8	26.7
Collaboration	5	26.3	5	22.7	6	33.3	1	14.2	10	33.3
Total	19	100	22	100	18	100	07	100	30	100

Proportion of Supply Chain and Mode of Practice

There is a wide gap in the fraction of SCMs practices among industrial enterprises and even within each category. The data reveals that production goods and industrial services have increased by 10.9 percent on average per year between 2010 and 2015, moving for example from 2.840 billion Fcfa in 2010 to 4.245 billion Fcfa in 2014. Goods account for 77 percent on

average in relative terms. Supply of goods and services have increased by 9.9 percent on annual average, representing 4.780 billion Fcfa in 2014, up from 3.215 billion Fcfa in 2010. Goods account for 73 percent on average in relative terms. In 2015, there has been a slight increase of resources allocated to supply chain compared to those of 2014. Total expend have grown at 3.4 percent. This is the result of the increase of goods on agro-industry products (+34.5 percent); products from pulp industry (+33.5 percent); chemical products (+17.9 percent) and others manufacturing products (+21.8 percent). The diminishing observed on some products such as petroleum products (-25.0 percent), farm produce (-51.0 percent) and products from the electric appliance manufacturing industry (-45.2 percent) is significant.

Repartition of SC Performance Reached By Industrial Units

The combined spend to all concerned charges by industrial enterprises over the three year period (2013, 2014 and 2015) in percentage show different levels of performance among the three categories. From Table 2 it is clear that manufacturing structure care about transportation costs than delivery on-time actions. This skewed the results in favour of transportation costs among their supply chain architecture. On the other hand both MORI and AI categories concentrated mainly on transportation costs, in fact three of the industry sub-sectors deal only with transportation costs while two deals almost exclusively with delivery on-time actions, and only one with days in inventory. Thus, while the average for all AI stands at 47.4 percent, the other fourth categories had over 54.6 percent transportation costs. Thus, in terms of depth of performance, MORI have deeper penetration followed by MORI, WPITI, EW and BPW is the last.

Table 2: Actual Performances Reached by Industrial Enterprises

Industries	Delivery on-time	Forecast accuracy	Days in inventory	Warehouse management costs	Transportation costs	Total	Transportation costs (%)
MORI	3	1	2	4	9	19	47.4
AI	2	3	3	2	12	22	54.6
WPITI	4	2	1	4	7	18	38.9
EW	1	0	3	1	2	7	28.6
BPW	11	2	1	10	6	30	20.0
Total	21	8	10	21	36	96	37.5

Amount Spend

The estimation amount of supply chain disburses over three year period showed remarkable growth. The average amount per unit increases from 110,200 per day in 2013 to 198,300 Fcfa per day in 2015, corresponding to an increase of 12.5 percent on average per month, while the

average value added increases from 62,400 Fcfa per month in 2013 to 95,900 Fcfa per month in 2015, i.e. an increase of 9.0 percent on average per year. In terms of industries, the sub-industry of AI, EW and BPW have most improved their economic performance between the two periods. The transportation costs attracted more than the half of the total supply chain amount over the period representing 61 percent.

Table 3: Total Amount of SC used by Selected Industrial Enterprises (2013-2015)

Industries	Amount			Total
	2013	2014	2014	
MORI	32,500	45,500	58,000	136,000
AI	28,710	28,800	35,790	93,300
WPITI	13,430	22,740	39,400	75,570
EW	10,000	15,400	19,900	45,300
BPW	15,560	43,160	45,210	103,930
Total	110,200	155,600	198,300	464100

Equipment Sharing in Industry Activities

Over 50 percent of resources used by MORI and BPW were made to equipment beneficiaries for a wide range of activities including information, stock, sales, equity or credit, financing for the acquisition of capital assets among others as seen in Table 4 on activities. All the industries provide fund for a wide range of activities. They finance multiple supply chain activities simultaneously.

Among the activities, sales, equipment and human resources tops the list, follow by raw materials, etc. Out of the seven main activities, five relate directly to the AI sub-sector. Specifically there is: stock, sales, equipment, human resources, and raw materials in industrial commodities. As to the main constraints that limit the growth of industry, the operators cited demand planning as the major constraints followed by performance management, then transportation planning and vehicle scheduling and sales and operations planning (S&OP) which together rank third. Fifth position was the supply planning problems which led to frequent misdirection on the industrial's policies. Customer collaboration surprisingly ranked sixth which means fewer manufacturer experience low Customer problems as shown in Table 5. As to the proposed solutions, industry operator's responses are reported in Table 6 with investment on plants and capacities solicited as a top priority followed by routing of raw materials and finished products, transportation strategies to be adopted.

Table 4: Types of Activities Covered by the Industrial Enterprises

Types of activities	Information	Stock	Sales	Equipment	Human resources	Raw materials	Equity or credit	Combination	All
Extractive industries	Y	Y	Y	Y	Y	N	Y	Y	N
Aluminums	N	Y	Y	Y	Y	Y	N	Y	N
Chemicals	N	Y	Y	Y	Y	Y	Y	Y	N
Sugar/palm oil	Y	N	Y	Y	Y	Y	Y	Y	N
Engineering Construction	Y	Y	Y	Y	Y	Y	Y	Y	N
Metal and mechanical	Y	Y	Y	Y	Y	Y	Y	Y	N
Industrial Machinery	Y	Y	Y	Y	Y	Y	Y	Y	N
Mill products	N	Y	Y	Y	Y	Y	Y	Y	N
Oil and gas	Y	Y	Y	Y	Y	Y	N	Y	Y
Textiles	N	Y	Y	Y	Y	Y	Y	Y	N
Cement	N	N	Y	Y	Y	Y	N	Y	N
BTP	Y	Y	Y	Y	Y	Y	Y	Y	N
Total	5N, 7Y	2N, 10Y	12Y	12Y	12Y	1N, 11Y	3N, 9Y	10Y	10N,1Y

Key: Y=yes; N=no.

Table 5: Problems Encountered for Administering Industrial Enterprises

Serial	Problems	Frequency	Percentage (%)	Ranking
01	Performance management	26	72	2
02	Demand planning and forecasting	28	82	1
03	Supply planning	5	16	7
04	Inventory planning	2	6	10
05	Distribution planning	3	10	9
06	Sales and operations planning (S&OP)	24	64	3
07	Customer collaboration	1	4	11
08	Supplier collaboration	5	16	7
09	Production planning and detailed scheduling	10	27	6
010	Transportation planning and vehicle scheduling	24	64	3
011	Sales order promising	12	45	5

Table 6: Solutions Suggested by Industrial Enterprises for Identifies Constraints

Serial	Solutions/Practices	Frequency	Percentage (%)	Ranking
01	Investment on plants and capacities	11	100	1
02	Routing of raw materials and finished products	10	90	2
03	Transportation strategies to be adopted	9	82	3
04	Scheduling of resources	9	82	4
05	Creation of a logistics network	8	72	5
06	Introduction of new products	7	64	6
07	Inventory policies to use	5	45	7
08	Procurement policies to be implemented	2	18	8

CONCLUSIONS AND RECOMMENDATIONS

The highlights of our findings lead to the following conclusions and recommendations, among others:

(i) Industries can be effective vehicles for urban transformation and value-addition goods providers, if effective supply chain support, guidance and supervision by manager and/or stakeholders could be mounted. Equipment which are costly seem to be the dominant sources of production therefore cheaper sources like raw materials and human resources could make industries more profitable and sustainable.

(ii) The manufacturing structure care about transportation costs than delivery on-time actions, while it is the reverse for BPW which concentrated mainly on delivery on-time and warehouse management costs with remarkable results.

(iii) The industrial enterprises have seen their activities increased by 10.9 percent on average per year during de study period. Supply of goods and services have also increased by 9.9 percent on annual average. It is important to note that there has been a slight increase of resources allocated to supply chain in 2015 compared to those of 2014. The average amount per unit of these funds increases from 110,200 per day in 2013 to 198,300 Fcfa per day in 2015.

(iv) As to the main constraints that limit the industrialization, the operators cited inadequate demand planning and forecasting as the major constraint followed by lack of performance management, then inconsistent transportation planning and vehicle scheduling and low sales and operations planning which together rank third. The Fifth position is the sales order promising problems which led to frequent misdirection on the enterprise policies. This reinforces the recommendation that with availability of cheaper sources of Investment on plants and capacities, more manufactured products could be extended to the Cameroonian markets. Routing of raw materials and finished products, transportation strategies to create an enabling environment are necessary support development and growth of industry organizations.

(v) Finally, in order to achieve improved performance it is recommended a better extension and provision of quality product to optimize purchasing and inventories policies. Supply chain must be efficient and integrated. The driver for this integration is logistics and supply chain management.

Enquiry about the supply chain in the industrial sector is also interesting for other reasons than its impact on penetrating strategies. It determines whether the structure of this sub-sector will have any effect on SCM. The structure may lead to standardisation and reduce the role of

relationships, particularly to the Cameroonian small and medium companies (Djoda, 2016). The manufacturing enterprises are not going through a quick technological revolution, principally in deep-water technology and in B2B (Business to Business E-commerce) which may discontinue SCM. Previous business practices may therefore change with the importance of supply chain linkage and the creation of consequent departments in enterprises to take care of it. These are questions to be addressed in subsequent papers.

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