

**SRIWIJAYA INTERNATIONAL JOURNAL OF DYNAMIC
ECONOMICS AND BUSINESS**

<http://ejournal.unsri.ac.id/index.php/sijdeb>

**Effect of Supply Chain Management on Managerial
Performance of The Private Manufacturing Enterprises
(PMEs) In South-East, Nigeria**

Ireoegbu Ngozi¹, Ann Ogbo², and Kifordu Anyibuofu Anthony³

¹University of Nigeria, Nsukka, Nigeria

² University of Nigeria, Nsukka, Nigeria

³ Edo University Iyamo, Nigeria

Abstract: The study aims to explore the effect of supply chain management on organizational performance focusing on Private manufacturing enterprises (PMEs) in South-East. The study used a questionnaire survey of the views of staff of selected companies on the subject matter with sample size of 553. The respondents interviewed as well as experts were approached face to face. Reliability of the research was tested using Crombach Alpha with a result of 0.91. Similarly, Pearson product moment correlation and Regression analysis was used to test the hypotheses. The main findings showed that training, technological know-how and security of investments enhance the development of innovative skills; also, opportunity identification positively promotes research and development significantly. The study concluded that firms need to ensure that their entrepreneurial abilities are developed consistently so that their survival will be ensured also that indigenous firm should engage in employment of qualified staff, though within their budget capacity.

Keywords: Development; Entrepreneurship; Indigenous; Firms; Training.

Introduction

Globally, a key paradigm shift in recent business management clearly portrays the fact that businesses no longer operate as autonomous entities but instead as collections in the form of supply chain. The Evolution of Business Management has reached a period of inter network rivalry,(Drucker, 1998). What we now find, is supplier – brand – store versus supplier– brand – store or supply chain versus supply chain in place of the traditional brand versus brand or store versus store (Lambert and Cooper 2000). The concept of Supply chain Management is the management of a network of all the entities and actions involved in delivering a product from the suppliers of raw materials through to the

customers. Also it includes the locating of raw supplies and parts, manufacturing and assemblage, warehousing and account tracking, order entry and management, distribution across all channels, delivering to the customers and the information system needed to screen all these undertakings (Adrian, O. S., Ketikedis, P. H & Choudhary, A. (2012).

Supply chain management historically has been varied and challenging to pin down precisely to an academic paternity (Andrews, D. C. & Stalick, S. K. (1994). Supply chain dates back to 1950s onward of systems theory and the related idea of holism (whereby, the entire is larger than the totality of the parts) (Bakker, F., Boehme, T. & Van Donk, D. (2012). Bakker, F., Boehme, T. & Van Donk, D. (2012) opines that supply chain existed before 1950s when logistics was thought of in military terms to centre on procurement, upkeep and carriage of military activities, materials and personnel. The phase before 1950s was mentioned to as logistic era, but then logistics was not seen as a part of strategic function. The preceding year 1950 ushered in change in logistics; physical distribution management in manufacturing firms was recognized as a discrete organizational task (Brindley, C. (2004).

Traditionally, supply chain under logistics was perceived as the movement of materials and goods, an excellent support function that helps organizations apply their strategies, but over time, the role became more strategic, that is, supply chain management became a means to improve key outcomes that drive firm performance with the focus of fulfilling customers` requirements and satisfaction (Burgess, K., Singh, P. J. & Koroglu, R. (2006). Supply chain management is about mutual trust, commitment and desire of two or more firms coming together to achieve a goal (Lalonde and Masters, 1994). In choosing the membership of the supply chain, not all entities in the chain are considered, because they may be too complex to manage. Only the entities that have strategic effect and add value to the products and performance are chosen, starting from the suppliers of raw materials to the ultimate consumer (Cardilhon, J.J., Fearnro, P.A., Tam, G.T.P., Moustler, P.,& Poole, D.N. (2005). These entities are called the primary members while others that assist are called the supporting members` (Lambert et al 2000).

Performance is no longer a function of occurrences and decisions in individual firms, because the collaboration and collectivity of the activities of all stakeholders are involved, contribute to the overall results of supply chain (Cassivi, L. (2006). The performance is seamless and it depends on the co-ordination of all stakeholders in the supply chain to ensure realization of the required conclusions. Chen, I.J. & Paulraj, A. (2004) observes that indication has revealed that supply chain management if applied properly reduces misalignment, promotes parties capabilities, opens uu more interaction that will ultimately lead to efficient and effective utilization of goals and objectives of the organization.

Child, (1972) contend that Private Manufacturing Enterprises as part of private sector to collaboratively synergise to achieve better operational performance. These are visible in terms of flexibility, high product quality and low cost, which will yield higher organizational performance as evidence in employment generation, infrastructural development among others. Against this backdrop, the paper would x-ray the influence of supply chain management on the organizational performance of these PME's in South-East, Nigeria.

Statement of the Problem

The global business environment is so turbulent that products` life cycle shrinks easily and new ones are introduced. This makes flexibility and responsiveness to customers` demand inevitable. Manufacturers keep trying different business strategies to remain competitive. Private enterprises in developed nations of the world have found the management of supply chain method a veritable approach to meet with the worldwide rivalry. Such private enterprises like Wal-mart retail shops, Georgia-Pacific Corp, leading manufacturers of building materials in North America, Japanese Toyota manufacturing industries, Dell, manufacturers of appliances, Whirlpool, Hewlett- Packard, Shoprite, Games and a host of other firms have leveraged on the gains of supply chain over competitors and peers and still hold market leadership in terms of profit.

Unfortunately in Nigeria, private business sector of the economy has been undergoing turbulent times. They have not been occupying their rightful place as catalysts for economic development and infrastructural provisions like their counter parts in developed economies. They cannot compete effectively in the world market as key players in terms of selling their products but as market for other nations` goods. Among the numerous reasons envisaged is the adoption of the archaic and traditional approach of mass-production to meet a schedule or forecast without a defined market. Their competition being at individual or brand versus brand level, poor identification and integration to their key business partners especially the suppliers of raw materials and customers. This failure hinders relevant information as well as the effective flow of raw materials about the market and other competitors. In fact this poor integration and collaboration with partners has caused untold wastage of raw materials and other goods.

Most worrisome is the standard organization of Nigeria (SON) and other agencies that see to the quality of goods produced or imported into Nigeria are seen to be ineffective by giving room for Nigerian market to be a dumping ground for sub-standard goods that are cheaper than made- in-Nigerian goods, for the vulnerable poor masses. The effect of the condition on the economy is so grave and adverse; the local manufacturers are out of the market, leaving the economy impoverished. We can observe that there is high mortality rate of these firms in this sector where many do not survive beyond two-five years of their inception. Many of the numerous firms around us can attest to this fact. This untimely extinction, affects adversely the individual owners in particular and the economy in general. The loans borrowed are not repaid, the staff of the organizations laid off, increasing the unemployment rate and the terrible consequences on the economy.

For Nigerian PME's to compete effectively in the global market as key players, their products must be competitive in quality, low cost, trendy (responsive to current demand) and always available. It is of serious note that these indices of excellence and competitiveness in business arena are associated with supply chain management approach. Therefore, the objectives of this study are, to assess the effect of Supply chain integration on product availability of PME's and to examine the effect of lean and agile strategies on cost reduction and productivity of the PME's

Research Questions

- To what extent does supply chain integration affect product availability?

- To what extent do lean and agile strategies affect cost reduction and productivity of the PMEs?

Literature Review

The Concept of Supply Chain (SC)

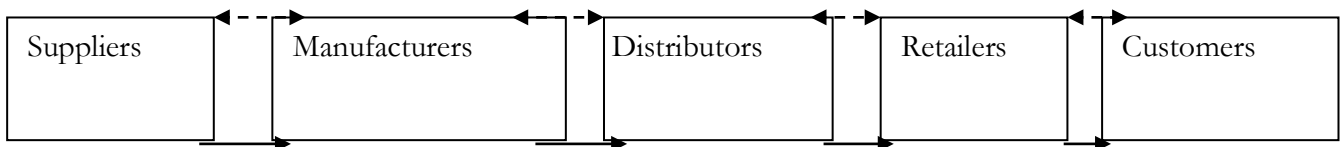
Conceptually, management of supply chain is a link involving organisations who are stakeholders participating both in the up and down streams towards a coordinated production of goods and services for the satisfaction of customers needs (Christopher, 1994). The chain comprises the suppliers- manufactures-distributors- retailers – customers (Chopra and Meindl, 2001). The basic chain looks like a pipe but in reality the chain looks more like an uprooted tree than a pipe in structure because it is linked with partners horizontally and vertically (Lambert and Cooper, 2000).

The Concept of Supply Chain Management (SCM)

The term SCM lacks a universal definition; this is traceable to its development from different bodies of literature representing different points of view (Multidisciplinary origin and evolution) (Croom, 2002). Stock and Boyer (2009), predicated their description on the syntheses of other definitions and thoughts of researchers, practitioners and hybrid sources deconstructing the commonalities. SCM is therefore “the setting up of interrelated relationship networked around interconnected business organisations with all the sub systems and stakeholders towards information and production process management for customer’s satisfaction. This definition moves from chain analogy to network analogy.

The firms in the chain share tasks with the aim of sustaining and achieving competitive advantage with minimal cost for customers’ satisfaction (Cooper, M.C. & Ellram, L.M. (1993). Ultimately, the goal is to get a right mix of ability in the general network and expected relationship (Drucker, 1998). An example of a basic supply chain is shown below.

Figure 1. **Flow of Goods**



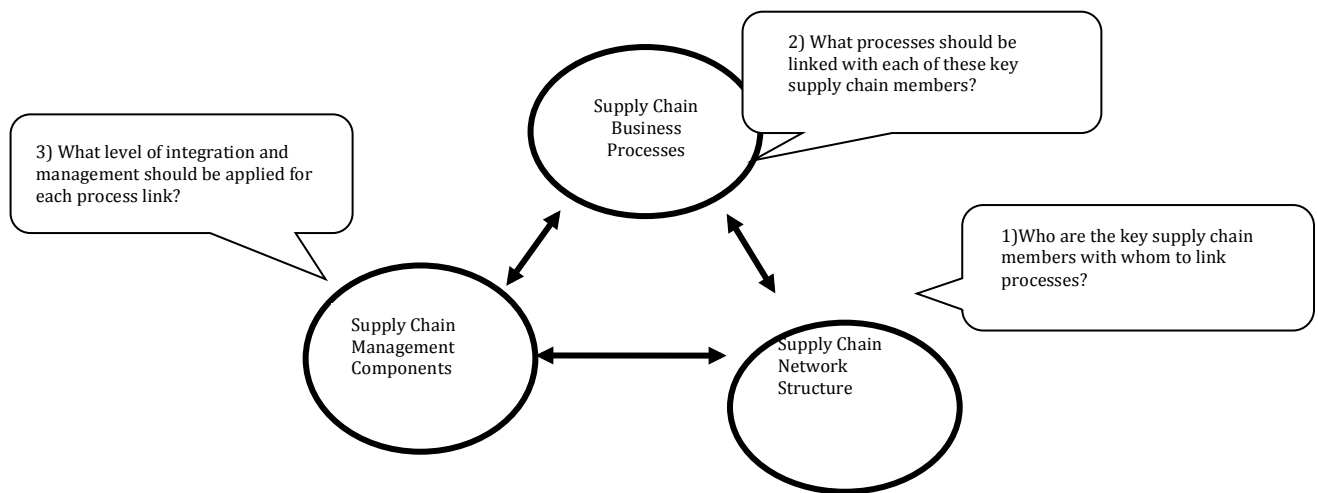
The above figure 1 shows that the components here are manufacturers, customers and retailers, suppliers etc. The end users are the major attraction in the cyclic chain of supply management.. Customers are the major focus of the chain because every enterprise wants to make profit. They further argue that supply chain management engages in the management of flows between and among stages of manufacturing products, information and finance with upstream and downstream linkages in the supply chain to minimize total cost.

In choosing the membership of the supply chain, not all entities in the chain are considered, because they may be too complex to manage. Only those entities that have strategic effect, add value to enhance key outcomes and drive the chain's performance, starting from the suppliers of raw materials to the customers. Such firms are allocated with managerial attention and other resources in the market environment. (Tan et' al, 1998). The turbulent nature of the market environment has made it that companies are mindful of their supply chains and the roles, which will ensure a competitive advantage for the firms. This involves production, location and transportation of the supply chain member to achieve the best mix of responsiveness and efficiency for the market being served.

Elements of Supply Chain Management

The frameworks of SCM are made up of closely related elements as given by Lambert and Cooper (2000). They include: Supply chain network structure; The supply chain business processes; The supply chain management components. This is illustrated in the diagram below.

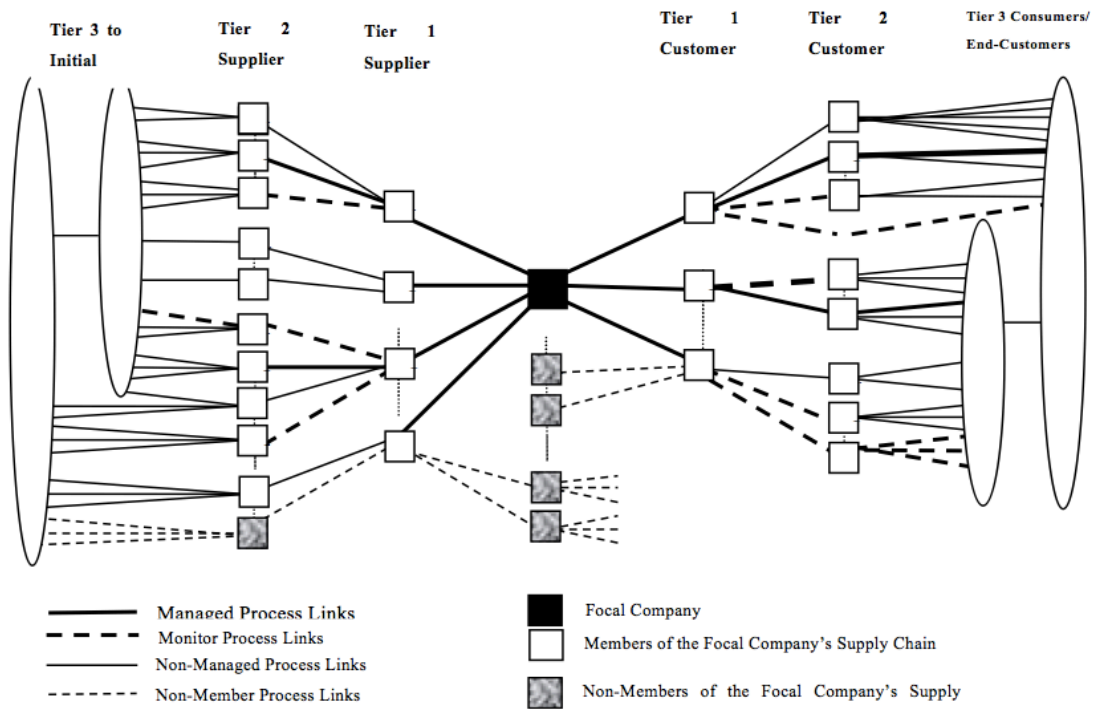
Figure 2. **Supply chain management framework: elements and key decisions**



Source: Lambert & Cooper, 2000

The diagram above represents the clear questions that will arise in supply chain management and how it will be addressed by connecting private firms. Similarly, there is a managed processed link. This process link allows the focal companies manage the process links they find important to integrate and manage. In the figure below, the focal company will integrate and manage process link with tier I customer and suppliers, this is indicated with thick lines.

Figure 3. Types of Intercompany Business Process Links



Source: Lambert, Cooper & Pagh, 1998

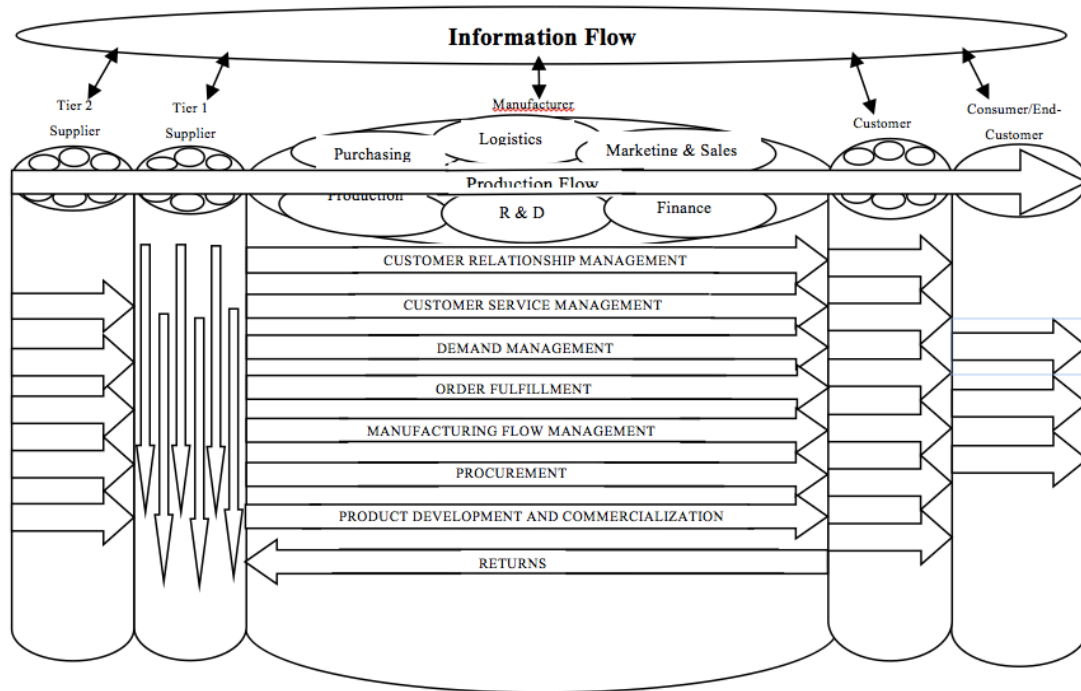
The diagram represents monitored process links, non-managed links; non-member links showing how integrate, relate and are regulated within the supply chain process.

The process structure, functional structure, combination of functional and process structure.

The process structure

The companies with process structure have different number of processes involving of different activities and links between them. The processes do not have uniform names; there are different names for similar processes and sometimes similar names for different processes. These inconsistencies in identities of processes in companies appear to have resulted in significant frictions and inefficiencies in supply chains. If each firm identifies its own set of processes, which are not known by other firms how these processes will be linked across firms is a problem. (Lambert et al, 2000) show a simplified diagram of a detached supply chain as shown in the figure below.

Figure 4. SCM: Detached.



Source: Lambert, Stock and Ellram, 1998

The number of key processes that could be integrated and managed by companies varies with companies. It may be appropriate to link to one key process or all key processes as the executives deem necessary after analysis (Lambert et al, 1998).

Functional structure

In companies with functional structure, there appears to be a relative uniform identity of functional areas like marketing, manufacturing, accounting/finance and they cut across companies. In some companies, the internal business processes have been prolonged to suppliers and accomplished to some extent between the firms involved. When a leadership role of a company is accepted by other partners then that firm`s internal business processes can become the supply chain business processes, this is with the advantage of “each member of the band playing the same tune”.

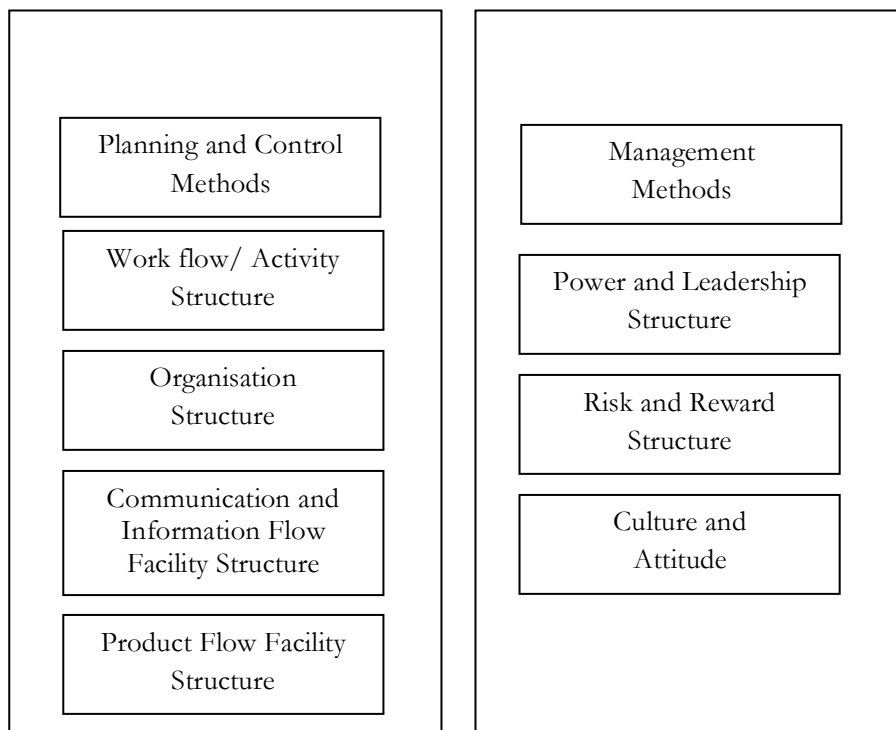
The Management Components of Supply chain

The extent of integration and management of business process link is dependent on the number of components added to the link and the level or extent of integration, which may be high or low. If the number of management components added is high or the level of each component is increased, this will increase the level of integration of the business process links (Ellram et al, 1990 and Houlihan, 1985). Nine management components identified that will ensure a successful SCM, are as follows:- planning and control work structure, organization structure, product flow facility structure, information flow facility structure, management method, power and leadership structure, risk and reward structure, culture and attitude.

These management components are divided into two: The physical/technical group which includes: The most visible, tangible, measurable and easy to change components though they are necessary but should not be the only focus of the managerial attention. The second group is consisting of the managerial and behavioural components, these components though less tangible, visible and often difficult to assess and alter are very important because they define the organizational behaviour and influence how the physical and technical management components are implemented (Lambert et al, 1998). The competitiveness and profitability of the supply chain depend on how the managerial and behavioural components are linked to impose organisational behaviour that supports the objectives and operation of supply chain.

The change in the physical and technical group components will lead to the adjustment in the components management of managerial and behavioural group. Understanding each components of SCM and interdependences is the basis for successful SCM. Cousins, P. D., Lawson, B. & Squire, B. (2006) states that successful intra and intercompany business process management or redesign depends on the change process that address all SCM components.

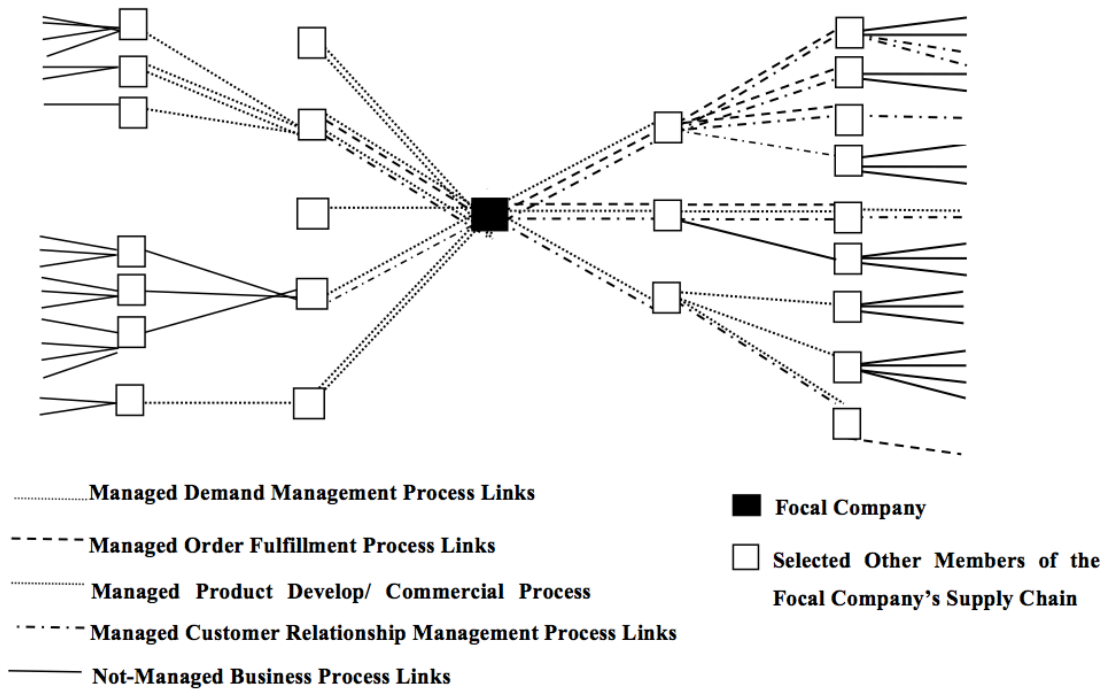
Figure 5. **SCM Components.**



Source: Lambert, Cooper & Pagh, 1998

How the integration and management business process links of a focal company differs from each process is presented in the diagram below. The focus was on managed and non-managed business process links without involving the monitored and non-monitored member process links and few supply chain members were included. There was a super imposed supply chains of four individual business process links as shown in the diagram. Individual processes were mapped first and super imposed on one supply chain map and managers are advised to use this approach when mapping their supply chains.

Figure 6. **The integrated and managed business process links combined by SCM**



Source: Ellram and Cooper, 1990

Measurement of Performance

The pressure on organization for accountability and performance has raised the need for performance measurement. Performance measurement is observed to have gone beyond short term level to long-term value, creating activities such as customer service, quality of internal process and organizational learning (Cox, 1999). To measure the performance of a firm or network of firms, the following metrics are considered: Net income, revenue growth, productivity, customer satisfaction and employee retention representing the outcomes of performance but not the causes.(Cox, J.F., Blackstone, J.H., & Spencer, M.S. (1995). To understand the value of SCM on the performance of PMEs, there is the need to measure those factors that affect performance of the firm; ranging from those firms that process raw materials to those engaged in wholesaling and retailing. Also to measure organizations involved in material handling such as, transportation, ware housing which can cause the uncertainties for the firms (Croom, S., Romano, P. & Giannakis, M. (2002).

Organizational Performance is measured by measuring the key performance indicators that are directly related to the company's success factors (Croxtton, K.L., Garcia-Dastugue, S.J., Lambert, D.M.,& Rogers, D.S(2001).

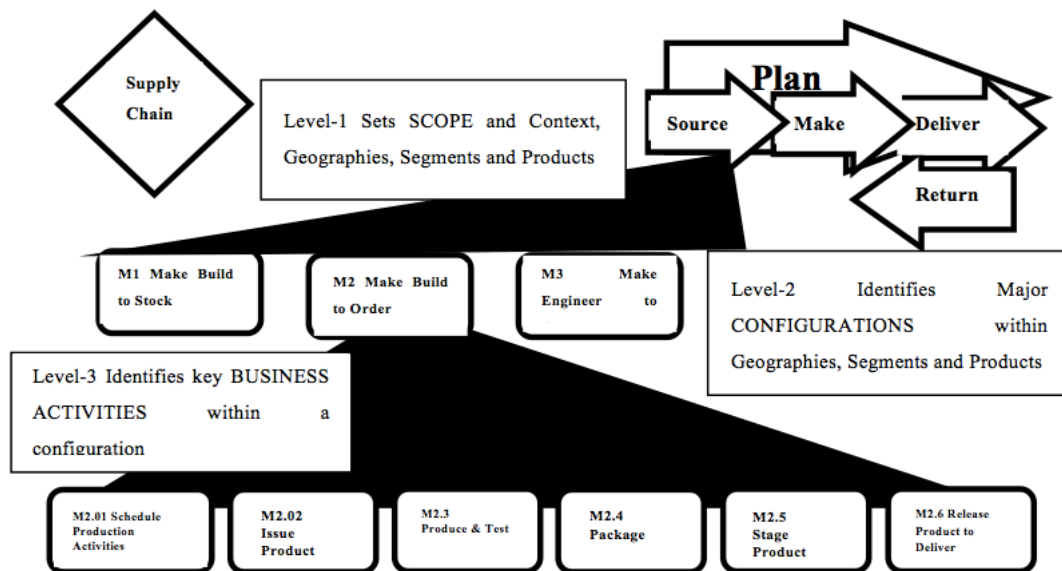
The several ways of measuring business performance include: accounting perspective (assessing the financial performance), marketing perspectives (assessment of marketing inputs), and operational perspectives (assessment of effectiveness and efficiency) (Davenport, 1993). The European Foundation for Quality Management (EFQM) and Malcolm Baldrige Award model has developed the measurement of performance in their

assessment of award winners. The EFQM excellence model has nine elements grouped under ‘Enablers and ‘Results’, the ‘Enablers’ are five (leadership, policy and strategy, people, partnerships and resources, and processes) while the ‘Results’ are four (customers’ results, people’ results, key performance results, and society result). ‘The Enablers’ represent, the operations of the organizations while the Results focus on the achievements of the goals of the organizations, stakeholders and how they are measured and targeted (*idem*).The nexus between organizational performance of PMEs and the supply chain management lies on the extent of integration to their supply chain partners.

Theoretical Framework

The study will be anchored on the Supply Chain Operations Reference (SCOR) Model as established Davis (1995). The Model is the world’s leading supply chain framework. It is a management instrument used to address, improve and communicate in the dynamics of supply chain management decisions within a company and with suppliers and customers of other companies. The model increases the speed of system implementation and support organizational learning goals which improves inventory turns.

Figure 7. SCOR Framework Levels



Source: Lockamy and McCormack, 2004

Methods

Given the nature of this study, a survey research design was employed Geographically. Some selected private manufacturing enterprises registered with (M.A.N) in South-East states of Nigeria were studied. This (M.A.N) has two branches: Imo/Abia branch and

Anambra/Enugu/Ebonyi Branch covering the five states that made up the South-East Geopolitical Zone of Nigeria. All the 184 registered manufacturing firms with (M.A.N) in South-East Geo-political Zone of Nigeria which is made up of five states (Abia, Anambra, Ebonyi, Enugu and Imo States) formed the population of the study and were grouped in their states with their undertakings. The companies, names, addresses and core businesses as given by (M.A.N) in these branches. Anambra/Enugu/Ebonyi branch has a total of 147 companies while Imo/Abia branch has 37 companies.

Due to the nature of the study which focuses on supply chain management a strategic function, the target respondents were managers for operations/ manufacturing/ purchasing/ logistics/ material managers, directors/managing directors/CEO and other managers of units because they are deemed to have knowledge and take decisions in this area.

Table 1. Number of companies in the population branch by branch

BRANCHES	Number of companies
ANAMBRA/ENUGU/EBONYI	147
IMO/ABIA	37
TOTAL	184

Source: Field Survey. 2016

The study employed G*Power version 3.1.9.2 sample size calculator to get the sample size of thirty (30) companies at the effect size of 0.25 that is representative of the population. The effect size is a measure of the level of prevalence; awareness or occurrence previously reported or guest mated (Onodugo, V.A; Ugwuonah, G.E; Ebinne, E.S. (2010) The effect size was based on 61% level of awareness of SCM reported in South Western Nigeria. Systematic random sampling technique was used in selecting this number from the list of companies registered with Manufacturers Association of Nigeria (MAN) which formed the population at the interval of 6 to cover the five states. Due to the nature of the study, the research was conducted among the management staff population of two thousand and fifty seven (2057), comprising of supervisors, heads of units, managers at all levels and chief executive officers (C.E.Os) of these companies.

Table 2. Summary of companies, with their management staff from the two branches.

BRANCHES	Number of Companies	Number of Management Staff
ANAMBRA/ENUGU/EBONYI	19	1378
IMO/ABIA	11	679
TOTAL	30	2057

Source: Field survey 2016

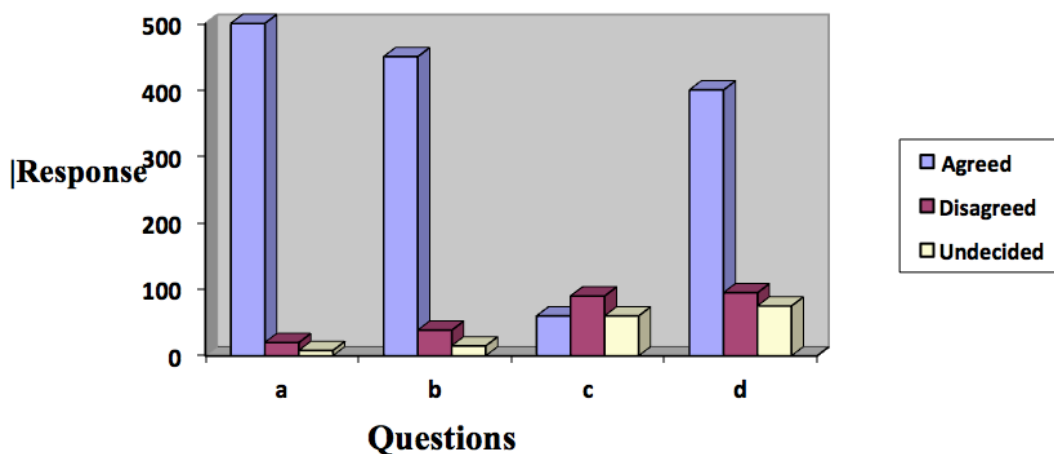
A sample size of thirty (30) companies was obtained from population of 184 companies understudy using G*Power sample size calculator.

Findings

Research question 1

To answer the question on the extent PMEs integration to supply chain partners affects the availability of products in the organization, four (4) questions were designed in the questionnaire and their responses as were given in table 4.7 revealed that the expected response frequency was 2028, with response rate of “very large extent and large extent” of 1683(83%), 223(11%), of “very low extent and low extent” and 122(6%) of undecided. This showed that 83% of the respondents were in agreement that integration of supply chain partners to the manufacturers, guaranteed availability of products in the organization, while 223(11%) did not agree and 122 were indifferent. (See Appendix 1)

Figure 8. The response to Research Question 1



Test of Hypothesis One

Ho: Integration of PMEs to their SC partners does not enhance product availability in the organization.

Hi: Integration of PMEs to their SC partners enhances product availability in the organization.

Fisher’s exact value test at 0.05 was used to test for statistical significance = 348.6, $P < 0.05$. Fisher’s exact value test = 348.6, $P < 0.05$ means that the association of the two variables is significant and the regression sum of squares (8.273208) which is greater than the mean squares (1.378863) means that there is significant relationship between the dependent and independent variables. Also the value of F-Ratio (0.000) is less than 0.0500, which indicates that the variation explained by the model is not due to chance. The R^2 (regression coefficient) = 1 shows that there is significant positive relationship between PMEs integration to the SC partners and product availability in the organizations which is also shown with T-test value 1.0000. Therefore the null hypothesis was rejected and the alternate hypothesis accepted. (See Appendix 2)

Research Question 2

Five questions were designed to give answers to the effect of lean and agile strategies on cost reduction of private manufacturing enterprises. The result of the analysis based on the cumulative response showed the expected response frequency of 2535, while the observed response of strongly agree/agree was 2494(98.4%) 38(1.5%) of strongly disagree and disagree and 3(0.1%) rate of undecided. This implied that 98.4% of the respondents agreed that the use of lean and agile strategies reduced cost while 1.5% disagreed to the assertion, only 0.1% were indifferent. (See Appendix 3 for the designed questions)

Test of hypothesis Two

Ho: Lean and agile strategies cost reduction of PMEs does not significantly increase productivity.

Hi: lean and agile strategies cost reduction of PMEs significantly increases productivity.

Fisher's exact value test at 0.05 alpha was used to test for statistical significance association = 29.82 $P < 0.05$. Fisher's exact value test = 348.6, $P < 0.05$ the regression sum of squares (8.273208) is greater than the mean squares (1.378863). This means that the relationship between the two variables is significant. Also the value of F-Ratio (0.000) is less than 0.0500 which indicates that the variation explained by the model is not due to chance. The R^2 (regression coefficient) = 1 shows that there is significant positive relationship between PMEs agile and lean strategies and cost reduction in the organizations which is also shown with t-test value 1.0000. Therefore the null hypothesis should be rejected and the alternate hypothesis accepted. (See appendix 4 for detailed results)

Discussion

To assess the effect of integration of the PMEs, to their supply chain partners on product availability. Given the objective one of the study, the result of the analysis revealed that 83% of the respondents agreed that integration of PMEs to their supply chain partners increased product availability in the organization. Fisher's Exact value = 348.6, $P < 0.05$, which showed that, there is significant association between PMEs integration to SCM and steady product availability. Since PMEs integration with SCM led to steady product availability, in testing the hypothesis, the null hypothesis was rejected while the alternate one was accepted. The result of this study substantiated the previous findings of the study carried out by Otchere, Anacan and Quarsah (2013) which revealed that effective integration of upstream and downstream partners ensured positive effect on access to raw materials and improved organizational performance.

In analyzing the research question 2, the result showed that 98.4% of the respondents agreed that effective supply chain management produced cost reduction through the use of lean and agile strategies. The test of hypothesis-2 using Fisher's exact test value = 29.82, $P < 0.05$, showed that effective supply chain management reduced significantly total cost which also increased productivity in the organization. This has rejected the null hypothesis and accepted the alternate hypothesis that effective uses of lean and agile strategies reduce total cost in the organization.

Conclusion

This study concluded that effective supply chain management manifested in integration with chain partners, use of lean and agile strategies, high product quality, responsiveness to

customers' demand, socio-economic aspects of the partners significantly impacted positively on organizational performance of PMEs which are shown in product availability both in raw materials and finished goods for the target market, cost reduction, low inventory level and few product recalls.

The imperativeness of private manufacturing enterprises in Nigeria becoming key players and not just market (consumers) in the global arena and also being the bulwark of the economy in employment generation, industrial production and other significant roles like their counterparts in western nations led to the following recommendations. Firstly, each PME should identify and maintain closer relationship with the key entities they transact businesses with, especially the suppliers of raw materials and customers by establishing a new vice president or manager in charge of supply chain. These managers will co-ordinate the activities of the focal organization with other organizations to establish a cross-functional team for their products. They should also create a platform for virtual interaction of all the managers and other stakeholders of the supply chain managed by the SC manager from each organization. Secondly, since timely and accurate information is needed to improve organizational performance through supply chain, there should be integrated information system and electronic commerce like POS, EDI among others, linking the partners of the chain for more effective transmission of market information. Lastly, the standard organization of Nigeria (SON) National Agency for food, Drug Administration and control should beef up intelligence on quality control and monitoring.

References

- Adrian, O. S., Ketikedis, P. H & Choudhary, A. (2012). A Knowledge Based Approach for Handling Supply Chain Risk Management. <http://dx.doi.org/10.2139/ssrn.2136550>.
- Andrews, D. C. & Stalick, S. K. (1994). *Business Reengineering. The Survival Guide*, New Jersey: Yourdon Press.
- Bakker, F., Boehme, T. & Van Donk, D. (2012). Identifying barriers to internal supply chain integration using systems thinking. *Proceedings of the 4th Production and Operations Management World Conference*: 1-10.
- Brindley, C. (2004). *Supply Chain Risk*. Hampshire: Ashgate Publishing Limited.
- Burgess, K., Singh, P. J. & Koroglu, R. (2006). Supply chain management: A structured literature review and implications for future research. *International Journal of Operations and Production Management*, 2(6), 703-729.
- Cardillon, J.J., Fearn, P.A., Tam, G.T.P., Moustler, P., & Poole, D.N. (2005). Collaborative Commerce or Just Common Sense? Insights from Vegetable Supply Chains in Ho Chi Minh City. *Journal of International Supply Chain*, 10(3):147-149.
- Cassivi, L. (2006). Collaboration planning in a supply chain: *Supply Chain Management International Journal*, 11 (3), 249-258.
- Chen, I.J. & Paulraj, A. (2004). Towards a theory of supply chain management: The Constructs and Measurements. *Journal of Operations Management*, 22 (2), 119-51.
- Child, J. (1972). Organizational structure, environment, and performance: The role of strategic choice. *Sociology* 6: 1-22.
- Chopra, S. & Meindl, P. (2001). *Supply Chain Management; Strategy, Planning, and Operations*. Upper Saddle River, New Jersey, Prentice Hall.
- Christopher, M. (2011). *Logistics and Supply Chain Management*. Edinburgh: Pearson Education Limited.

- Cooper, M.C. & Ellram, L.M. (1993). Characteristics of SCM and the Implications for Purchasing and Logistics strategy. *The International Journal of Logistics Management*, 4(2), 13-24.
- Cousins, P. D., Lawson, B. & Squire, B. (2006). Supply chain management: Theory and practice – the emergence of an academic discipline? *International Journal of Operations and Production Management*, 2(6), 697-702.
- Cox, A. (1999). Power, value and supply chain management, *Supply Chain Management: An International Journal*, 4 (4), 167-75.
- Cox, J.F., Blackstone, J.H., & Spencer, M.S. (1995) *APICS Dictionary: American Production and Inventory Control Society*, Virginia:Falls Church.
- Croom, S., Romano, P. & Giannakis, M. (2002). Supplychain management: An Analytical framework for critical literature review. *European Journal of Purchasing and SupplyManagement*, 6(3), 67-83.
- Croom, S., Romano, P., & Giannakis, M. (2000). Supplychain management: An analytical framework for critical literature review. *EuropeanJournal of Purchasing and SupplyManagement*, 6, 67-83.
- Croxton, K.L., Garcia-Dastugue, S.J., Lambert, D.M.,& Rogers, D.S.(2001). The supply chain management processes. *International Journal of Logistics Management* 1(2), 13–36.
- Davenport, T. H. (1993). *Process Innovation–Reengineering Work through Information Technology*, Boston, Massachusetts: Harvard Business School Press.
- Davis, D.(1995). State of a new art: Manufacturers and trading partners learn as they go, *Manufacturing Systems*, 13(8): 2-10.
- Drucker, P. F. (1998). Management’s new paradigms.*Forbes Magazine*, 5(2), 152–177.
- Ellram, L. M. (1991). Supply chain management: The Industrial Organization Perspective, *International Journal of Physical Distribution and Logistics Management*, 21(1), 13-22.
- Lambert, D. M. & Cooper, M. C. (2000). Issues in supply chain management. *Industrial Marketing Management*, 29(1), 65-83.
- Lambert, D. M., Emmelhainz, M. A. & Gardner, J. T. (1996). Developing and implementing supply chain partnership. *The InternationalJournal of LogisticsManagement*, 7(2),1–17.
- Lambert, D. M., Stock, J.R & Ellram, L.M. (1998).*Fundamentals of Logistics Management*: Irwin/McGraw-Hill, Burr Ridge, Illinois.
- Lambert, D. M.& Cooper, M. C. (2000), Issues in supply chain management. *Industrial Marketing Management*, 29(1), 65-83.
- Lockamy III, A. & McCormack, K. (2004).Linking SCOR planning practices to supply chain performance, an exploratory study. *International Journal of Operations and Business Management*, 24(12), 1192-1218.
- Onodugo, V.A; Ugwuonah, G.E; Ebinne, E.S. (2010) *Social sciences research: Principles, Methods and Applications*. Enugu: EL'DEMAK
- Otchere, A. F., Annan, J.& Anin, E. K. (2013). Achieving competitive advantage through supply chain integration in the cocoa industry: A case study of Olamghana limited and produce buying company limited. *International Journal of Business and Social Research (IJBSR)*, 3(2), 131-145.
- Stock, J. & Boyer, S. (2009). Developing a consensus definition of Supply Chain Management: A qualitative study.*International Journal of Physical Distribution & Logistics Management*, 39(8), 690- 711.

Appendix 1

Table 1. Coded Response for Question 1

Question: To what extent do you agree that PMEs integration to supply chain partners enhances availability of products in the organization?	VLE/LE		VLoE/LE		UD	Total
	5	4	3	2	1	
a. When the suppliers of raw materials are integrated to the manufacturers, it guarantees constant supply of raw materials and availability of products in the firms	477 (94.1%)		23 (4.5%)		7 (1.4%)	507
b. Coordination of suppliers to manufacturers reduces waste, scarcity and transaction cost which ensures product availability	433 (85.4%)		50 (9.9%)		24 (4.7%)	507
c. When suppliers and customers collaborate with manufacturers, forum is created for early involvement of these partners in product design and development processes and the right type of raw materials are made available for manufacturing.	395 (77.9%)		72 (14.2%)		40 (7.9%)	507
d. Poor integration of suppliers to manufacturers creates scarcity, which impedes production and decreases product availability in the organizations.	378 (74.6%)		78 (15.4%)		51 (10%)	507
Grand total	1683		223		122	2028
Percentage	83%		11%		6%	100

Appendix 2: Multiple Regressions Results

Table 2. Run Summary Report

Item	Value	Rows	Value
Dependent variable	Product availability in the organization	Rows processed	53
NumberIndep. variables	6	Rows fill tended out	0
Weight variables	None	Rows with Xs Missing	0
R ²	1.0000	Rows with Y missing	0
Adjusted R ²	1.0000	Rows with weight missing	0
Coefficient variation	0.0000	Rows used in estimate	53
Mean square Error	0	Sum of weights	53.000
Average Abs Pct Error	0.000		
Completion status	Normal completion		

Table 3. Descriptive statistics

Variable	Count	Mean	Std	Minimum	Maximum
Integration of PMEs to their SC partners significantly enhances product availability in the organizations	53	4.538679	0.3988736	3.5	5

Table 4. Regression coefficients T-Test

Independent variable	Regression coefficient	Std error	Std coeff	T-Stat	Prob level	Reject H ₀ at 5%?	Power of Test at 5%
PMEs integration to their SC partners	1.0000	0					

Note: The t-value used to calculate the confidence unit was 2.013.

Table 5. Analysis Of Variance

Source	DF	R ²	Sum of squares	Mean squares	F-Ratio	Prob. Level	Power at (5%)
Intercept	1		1091.779	1091.779		1.000	0.0500
Model	6	1.0000	8.273208	1.378868	0.000		
Error	46	0.0000	0	0	0		
Total (Adjusted)	52	1.0000	8.273208	0.1591001			

Appendix 3

Table 6. Coded Response for Question 2

Question: To what extent do lean and agile strategies affect cost reduction and productivity of the PMEs	SA A		AS D		UD	Total
	5	4	3	2	1	
The continuous improvement through lean strategy eliminates non- value adding activities and reduces cost in the organization	498 (98.2%)	4	3 (1.8%)	2	1	507
The lean and agile strategies encourage production in small batches to meet changing demand; this reduces mass production that ties working capital to the dumped goods and increases cost of the goods.	500 (98.6%)		6 (1.2%)		1 (0.2%)	507
Agile strategy works with current information to respond to changes in the market and avert possible increase in cost. A company that uses this quick action enjoys reduced cost of production in the organization	504 (99.4%)		3 (0.6%)		-	507
Agile strategy encourages flexibility and increases speed by linking to autonomous companies. These linkages reduce transaction cost, handling cost (total cast) in the organization	507 (100%)		-		-	507
When a manufacturing enterprise enjoys a larger share of the market, because the price of the goods is competitive enough, it expands the frontiers (creating new branches and introducing new products) this increases productivity	485 (95.7%)		20 (3.9%)		2 (0.4%)	507
Grand total	2494		38		3	2535
Percentage	98.4%		1.5		0.1	100

Appendix 4: Multiple Regression Report

Table 7. Descriptive statistics

Variable	Count	Mean	Std deviation	Minimum	Maximum
Lean and agile of PMEs significantly increases productivity	53	4,356604	0.5468414	3.4	5

Table 8. Regression coefficients T-Test

Independent variable	Regression coefficient	Std Error	Std coefficient	T-statistics To test H ₀ : $\beta(1)=0$	Prob level	Reject H0: at 5%	Power test at 5%
Lean and agile	1	0	1.000				

Note: The T-value used to calculate the confidence unit was 213.

Table 9. Analysis of Variance Detail

Source	DF	R ²	Sum of squares	Mean square	F-ratio	Prob. level	Power at (5%)
Intercept 1	1		1091.779	1091.779			
Model	4	1.000	8.273208	1.378868	0.000	1.000	0.0500
Question 1	1	0.000	0	0	0		
Normality tests	1.0000	0.000	8.273208	0.1591001	0		

