An Empirical Study to Draw a Framework for Vendor Retention and Upgradation Process in Auto Industry

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The purpose of this paper is to investigate supply chain management practices related to vendor assessment, audit and developing reliable vendor base in the Indian auto industries. This paper describes an exploratory study to examine the interrelated factors to propose a research framework.A comparative study was conducted on two Indian auto organizations. Assessment of their vendors was done to investigate the business drivers and response effect of the supply chain. The research paper evolves a four stage framework for supplier management, entailing supplier assessment guidelines, audit check list, assessment of supplier, enlisting as approved suppliers, that builds on the conceptual approach of Lamming (1993), Sahay et al (2006), Johnson et al (2008), Jonson and Ford (2008), and others. This paper contributes to research in supply chain management and particularly in vendor management in the specific field of vendor based supply management. The study presents a practical approach to the vendor assessment and audit process by evaluating, rating on various parameters to establish framework for effective vendor based assured supply systems.

The framework is fully operational, easy to implement; and facilitates proactive and dynamic supplier management based on two case studies

Keywords *- Vendor management, parameters, vendor assessment, audit, quality, capacity.*

Rationale

With rise in purchasing power of millions of people there is spurt in disposable income for comfort. People are expecting to have more facilities and features while buying consumer goods including white goods, automobiles etc .Today's consumers demand cheaper, high quality products, on-time delivery and excellent after-sale services. To be able to handle these growing new demands, the key purchasing people have to be trained to understand criterion and practice same effectively.

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Vendor evaluation by capacity (including quality) audit is a technique used by every auto company to ensure that their supplier always maintains the desired level of performance. This particular stage in Supply Chain Management has special significance in automobile industry in the event of cut-throat competition prevailing in today's market. Suppliers are also able to improve their performance and growth in the industry using the Vendor capacity Index as a benchmark. This study also aims at identifying the best practices used in this discipline and to bench mark as well highlight their features.

Introduction

The main aim of this study is to get an overall picture of the supplier evaluation and assessment process and practices. This research paper looks into the sorts of decision making methods and tools reported in the literature and those already applied in practice. It is aimed that the findings will lead to new research settings together with directions for future research.

In this project, we reviewed referred journal articles pertaining to supplier management, supplier decision tools and methods for supplier evaluations, assessment and up gradation process in particular. The supplier up gradation is generally considered as a four -phase process starting from:

- Realization of the need for continuation of supplier;
- Formulation of decision criteria (checklist, guidelines) to assess;
- Supplier assessment quality and capacity audit,
- Approval of supplier for continuation to supply

There are several factors that affect the supplier assessment and retention process. The number of suppliers to be retained depends on the sourcing strategy that a company follows. A customer's preferences towards location of suppliers can have some impact on the supplier selection and retention process. Choosing local and domestic suppliers can be less complicated than those of international suppliers.

Trends in automobile Industry

With the growing complexity of the engineering products in sectors such as electrical, white goods, brown goods, automobile materials and components, the knowledge requirement of buyers has increased, and as also the suppliers getting updated equally well. Vendors and customers are keen to have long term business relationship.

Strategic alliance is a relationship between two trading partners that entails multifunctional interaction right from engineering and marketing to

production planning, inventory and quality management. Various Companies articulate many goals for these relationships, goals that encompass cost reduction, quality improvement, better delivery performance, or increased flexibility to new product introduction. There are many ways to maintain the strategic alliance with the suppliers. Firms can motivate their suppliers to continue to support the alliance by working closely with them to improve efficiencies and costs. The incentive is that the final products will be more successful in the marketplace, and therefore both parties continue to share benefit.

The first referred OEM (Original Equipment Manufacturers), Renault; a manufacturer of passenger cars is having its plants in south and west India. Renault is a French automobile multinational having joint venture with Indian and Japanese companies. The technology is state of art comparable with best in world in auto sector. Their presence in India is only four years still they have been able to make dent in mid segment car market competing with likes of Maruti, GM, Ford, Tata, Honda, and many more.

The second OEM, MSIL, a manufacturer of cars, SUVs, is having its plants in north India in Gurgaon and Manesar. It started its operations in India in 1981 with support of Indian Govt. Soon in 1982 JV (joint venture) was formed with support of Suzuki motors of Japan. Maruti India started production operations in 1983. In 1987 Suzuki increased its stake in Maruti India Ltd, to more than 51% and was renamed as Maruti Suzuki India Ltd(MSIL).It has brands in all segments eg small cars, mid size, big size, SUV, MUVs, jeeps and competing with national and international brands such as Tata, GM, Audi, Skoda, Hyundai, BMW, Renault, Honda, Toyota, and many more.

Literature Review

Business enterprises have to run their operations efficiently in order to remain competitive. Efficient operations of an organisation cover all the activities which are dynamic in nature, always changing with time and competition. The management of such organisation has control of all the internal operations e.g. production, quality, design, human efficiency, including other activities. External operations affecting the organisation for example transportation, materials supplied by vendors, services rendered by vendors etc are beyond its control. Supply chain function covers all internal and external operations affecting the organization. Many researchers have explained these functions in different ways. Supply chain management (SCM), a term used for over three decades, as also dependent on external factors, can be summed as "managing the entire chain of raw materials supply, manufacture , assembly and distribution till customer end [Jones (1989)]. Tan et al (1999) termed

SCM as "Simultaneous integration of customers' requirement, internal process and upstream supplier performance. Raghvan (2001), Cormican (2006), considered SCM as coordination activities of all vendors used in purchasing, producing, delivering, maintaining services, products for customers across globe. As generally accepted many scholars [Anderson et al (1999), Beamon (1999), Kotzab and Otto (2004), Lockamy and McCormack (2004)] describe it as "An integrated process where materials are manufactured into final product for delivery to end customers"

Above statements and definitions regarding supply chain for the purpose of supplier management , also known as supplier base management by a few researchers, can be seen as complex process inter connecting no of activities covering many organizations. Once these activities are systematically and seamlessly connected , will mean reduced cost to customers including those affected in the chain, all vendors functioning to be virtually part of their factory [Timmers (2000), McAdam and McCormack (2001), Branganza (2002), Cousineau et al (2004)].

Purchasing beyond essential raw materials is not by choice but driven by concern for cost reduction and to remain profitable all the times (Monczka1990). Traditional multi sourcing is being reviewed to fewer suppliers for the same item, which reduce purchasing effort to a considerable extent gradually. This leaves enough time and effort available to purchasers to concentrate on new product development with the help of same set of suppliers. Even such suppliers support buyers in getting new product or part developed [Lyons et al (1990)]. As purchasers move from in house manufacturing to vendorisation (out sourcing) the issue of inventory moves from raw materials to parts or sub assemblies having higher value addition leading to better inventory management (Davies1993). VMI (vendor managed inventory) is being adopted by large organizations to control inventory, reduce inventory carrying cost, and outsource what is economical. A research has established that VMI (vendor managed inventory) has given greater advantage to small companies as compared to large organizations (Kuk, 2004).

Vendor assessment and development is an important subject for effective vendor management, which if implemented will mean improved supplier performance , reduction in working capital, product and process improvements, ultimately satisfied customers and more profits for customers and connected organizations. Competing manufacturing companies, vendors and OEMs(original equipment manufacturer), thus become less isolated entities, becoming complex association of interdependent units [Browne and Zhang 1999,Boardman and Clegg 2001, Waller2004].It can be further argued that competition is shifting amongst companies dynamic supply chain network [Nadler and Tushman1999,Walters and Buchanan 2001, Voss2003].

Vendor management also called supplier base management by few researchers is an important function for industrial manufacturing companies (IMP). As per Burt (1989): 'it is almost impossible to reform manufacturing process without strong supplier base'. As established earlier, manufacturing companies including automobile companies have come to terms of concentrating on core competencies, developing stronger supply base for raw materials, parts and sub assemblies. Strong supplier base contributes towards quality improvements, cost reductions, and enhanced delivery performance thus maximizing supplier performance better than competitors [Davis (1994), Monczka (1990)]. If a company operates on around 10% profit, possibly 1% saving in raw materials and parts cost will lead to about 3-5% increase in profits which is phenomenal [Burt (1991) and Larson (1994)].

The present research focuses more on ability to retain the vendors already selected for supply year after year for which it is essential to audit the strategic and essential capabilities including ability to modify product or develop new product : Kolay (1993)and Monczka et al (1993). The supplier evaluation, selection and retention model adopted by companies must not only focus on price including existing status of conformance(Lamming 1993) but also on total improved conformance issues related to ordering , scheduling, logistics, inventory, quality(Larson1994), financial ability, environmental conformance and many more by looking at their quality records [Larson (1994), Harrison (1990)].

With input of EDI the vendor assessment model gets developed smoothly, which may partially differ from one company to another company based on their size , global exposure, financial muscle, vision ,mission, objectives etc [Tan et al (1999),Tracy and Tan (2001), Cebi and Bayaktar (2003)]. In manufacturing industries sector in India many automobile companies such as Maruti Suzuki, Omax Auto, Renault, Tata Motors and engineering industries such as Havells India, Voltas, Indoasian (Legrand) have used EDI getting enormous benefits. Indian manufacturing sectors including those mentioned above have also implemented TPS (Toyota Production Systems), 14 principles of Dr Deming(1982) and many features of TQM (Total quality Management) [Walton and Mary(1986)], philosophy for QIPs(quality improvement programs), step by step small improvements, Kaizen, initiated by people on job and workmen on shop floor too[Mohanty and Deshmukh(1993),Levy et al (1995)]. TQM initiatives among others also include lean manufacturing [Ohno, Taiichi (1995), Shingo, Shigeo(1989), Womacck et al (1991)] and JIT(just in time) [Cook R L and Rogowski (1996), Golhar, Stamn & Smith (1990)] making considerable impact on supply chain effectiveness there by profitability of organizations. Such modified supply chain management initiatives have developed into replicable vendor assessment ,selection and retention working

models authenticated by corporate in their balance sheets, annual reports year after year giving competitive edge and ability to serve customers on timely delivery with satisfaction, and survive even in recession environment when bottom line starts shrinking.

Objective of study

To do an empirical study of vendor evaluation and assessment process in Indian auto industry in order to draw a framework for vendor retention and up gradation

Research Methodology

The research methodology adopted is based on secondary data. Collection of secondary data was done by study of one OEM (Original Equipment Manufacturer) and its two suppliers and another OEM and its one supplier in the automobile sector across India. The vendors selected are suppliers to many OEMs in addition to two selected OEMs spread across continents. This approach has given us an opportunity to encompass and map best practices in the auto sector adopted world over under competitive conditions.

Conceptual Framework of Supplier Evaluation, Assessment, Audit and retention

Prior to building conceptual framework for research objective it is quite essential to understand the terms being used in this process. The terms being used are briefly described below:

Supplier evaluation: It refers to the process of evaluating and approving potential or existing suppliers by factual and measurable assessment.

Supplier Assessment: This is the step in conducting an onsite assessment of the problematic suppliers.

Supplier Audit: Regular supplier audits (quality, technical, logistics, and capacity etc aspects) must be performed to assess the effectiveness of suppliers' quality assurance.

Supplier Retention: The implementation of supplier retention strategies will work out well if they are motivated by guidance, training, business growth, awards.

Outline of Process of Supplier Retention and up gradation

Following key activities are required to be done:

- *Identification of Requirements for the purpose of Supplier Retention*
- *Determination of Sourcing Strategy*

- *Understanding the Supplier's Sourcing Strategies, Policies, and Techniques*
- *Building Long-Term Relationship*
- *valuation of Supplier Performance*
- *Supplier Visits*
- *Reassessment and selection of Suppliers*
- *Key Supplier Evaluation Criteria*

The purchaser would go for Logistic Audit as well as for Quality Audit in order to have a proper assessment of its vendors for retaining. Both the terms are briefly explained as under.

A. Capacity Audit

The logistic audit plays a very vital role in the assessment of vendors. This is purely of qualitative nature; however the relevant data for the previous years and the projected data for the future are taken in to consideration. It includes following among other aspects:-

i. Management Capabilities
ii. Employee Capabilities:
iii. Cost Structure
iv. Total Quality Management

B. Quality Audit

The Quality Audit is carried on production operations and quality issues. It includes following among other steps:

Step 1. Identify Supplier Quality Audit parameters (metrics)
Step 2. Assign a weight to each evaluation parameter
Step 3. Define Scoring System for parameters
Step 4. Review Qualitative criterion and evaluate results and make retention decision
Step 5. Review and Improve Supplier Performance Continuously

Analysis

The present research work was undertaken on the following two manufacturing companies of automobile sector to study the vendor retention practices:

- Renault
- MSIL

These companies have well defined approved Quality Audit and Logistics Audits policies given to their approved vendors only.

The main features of the Capacity (logistic) audit & Quality Audit practices at Renault and MSIL:

- Logistic audit is carried out at the beginning of production to ensure that all the requirements as per Quality management systems (ISO 9000/ TS16949) are in place.
- Capacity audit being a part of logistic audit is carried out at the time of PSW (parts submission warrant) i.e. approval for SOP (start of production).It is also carried out at the time of ramp up requirements. The 'run at rate' i.e. capacity is also verified under this process.
- Quality Audit is carried out covering the entire process at regular interval. In addition to that a special quality audit is also done in case of complaints from the customer related to some particular issues.

Live case study of Renault

In line with the procedures described above two of its suppliers have been assessed, audited, and upgraded in year 2010-11. Two Indian vendors have been supplier to Renault in India for more than two years and are in process of ramping up production capacity and as also the product quality as per agreed schedules. The researcher has approached the managers of these two vendors to understand procedure adopted by Renault in assessing, auditing and upgrading and retaining these vendors as approved suppliers for next two years. Quality Audit and Capacity Audit of Renault vendors are done based on number of parameters, same has been tabulated in Table no.1.

Live Case Study of MSIL

In line with the MSIL procedures described above one of its supplier has been assessed, audited, and upgraded in year 2010-11. This Indian vendor has supplier to MSIL in India for more than two years and is in process of ramping up production capacity and as also the product quality as per agreed schedules. The researcher has approached the managers of this vendor to understand procedure adopted by MSIL in assessing, auditing and upgrading and retaining their vendors as approved suppliers for next two years. The managers, of this supplier of MSIL, have been able to provide the necessary details about the actual practices.

MSIL has guidelines for quality improvements based on either complaints received at MSIL or on periodic basis schedules.

Steps in Vendor Quality Audit: Three steps to assess, monitor, control quality are referring audit check sheet & auditing based on this check sheet, making counter measure report with help of auditee, making executive summary sheet with action plan and target dates. MSIL has the capacity and purchasing guideline in place for operations and control of these functions. Quality Audit and Capacity Audit of MSIL vendors are done based on number of parameters, same has been tabulated in Table 1A & Table 1B. We can conclude on the basis of the above two live case studies that the standard practices of vendor assessment as narrated in the conceptual framework are being followed for the purpose of vendor retention and a very strong system has been developed at Renault.

Findings & Conclusions

In the forgoing study, the standard practices of logistic cum capacity audit and quality audit of vendors by two auto manufacturers, namely Renault and MSIL have been examined in detail to assess the capabilities in terms of quality, production, capacity, logistics etc to successfully meet their purchase requirements in order to develop a standard framework for the vendor assessment for retention purpose. We also examined their capabilities to grow and continue to qualify the OEM's evaluation cum audit criterions enabling them to be performing vendors. Comparative studies of two auto manufacturers in Table 1A shows that parameters being followed by both of them are marked 'y' and those which are not followed are marked 'n'.

Capacity Audit framework

From the study it is emerged that in all there 21 are parameters in Capacity Audit, as given in SN3 in Table 1A. As indicated at SN1, Renault is following all the 21 parameters, where as MSIL consider 19 parameters but for two parameters namely Parameter 20: TPM implementations and parameter 21: Tool Room requirements.

Quality Audit Framework

From the study it is concluded that in all there are 24 parameters for Quality Audit, as given in SN 4 in Table 1B. As indicated at SN 2, Renault is following 23 parameters but for one parameter i.e. 21: History management of 'A' class parts, where as MSIL is considering 22 parameters but for two parameters namely, 23: 6 sigma implementation and 24: Energy management.

We can conclude on the basis of the above two live case studies that the standard practices of vendor assessment as narrated in the conceptual

framework are being followed by the companies under study for the purpose of vendor retention and a very strong system has been developed.

Recommendations

The literature review revealed some trends in supplier selection related studies. Specifically, the review revealed that greater emphasis was placed on i) decision criteria and associated weightings used for supplier assessments ii) decision making methods/tools used or proposed for supplier up gradation. It was observed that there was a more recent trend towards studying the effects of buyer-seller relationships and e-commerce (EDI) on the supplier assessment process and practices. The review also exposed the areas that attracted little or no research attention. There has been a growing demand and need for a more detailed supplier assessment process by considering all qualitative and quantitative criteria such as energy management (ISO 50001), CSR (corporate social responsibility), ISO 9001, ISO 14001, Renewable/ green source of energy. On the basis of the assessment studies carried out by way of Quality Audit & Capacity Audit of three vendors by two major automobile manufacturers, we have tried to develop a recommended frameworks for implementation for manufacturing industries in the auto sector which has the following among other features:-

Quality Audit

In all 24 parameters of Quality Audit have been finalized to form a bench marked framework. 22 parameters are common to Renault & MSIL, while 2 parameters, namely six sigma and energy controls have been added which are special to Renault to make audit system more comprehensive. All the recommended decision parameters have been assigned weights (maximum scores) based on their significance for quality audit. The reason for assigning maximum score for each parameter is mentioned in last column in Table 2 A. The OEM auditors must review the last rating awarded and countermeasure agreed by vendor. The auditors will highlight that parameter where the scoring in current audit will be less than 70%, which is threshold for acceptance of rating in all parameters under study. Overall rating percentage is given out of 158 points (on 24 parameters).

If the score in any parameter is less than 70%, it is seamed that the company (vendor) has to make improvements in respect of that parameter. The Quality Audit score diagram 2B is created by putting value of the parameter as scored in audit observation given in Table 2A. The Quality audit score diagram is pictorial representation of vendor's performance as per Quality

Audits observation. The OEM can monitor the action taken by vendor and the improvements can easily be assessed again.

Capacity Audit

In the above study, three vendor evaluations cum capacity audits have been examined and explained based on the capacity audit guidelines of two major companies. In all 21 parameters are essential parts of capacity audit as evident from the study of Renault and MSIL assessment of its vendors. All the recommended decision parameters have been assigned weights (maximum scores) based on their significance for capacity audit. The reason for assigning maximum score for each parameter is mentioned in last column in Table 3A. The OEM auditors must review the last awarded audit rating and countermeasure agreed by vendor. The auditors will highlight that parameter where the scoring in current audit will be less than 70%, which is threshold for acceptance of rating in all parameters under study. Overall rating percentage is given out of 141 points. A Capacity Audit diagram is also developed for pictorial display of audit status. If the score in any parameter is less than 70%, it is seamed that the company (vendor) has to make improvements in respect of that parameter.

The Capacity Audit score diagram 3B is created by putting value of the parameter as scored in audit observation given in Table 3A. The Quality audit score diagram is pictorial representation of vendor's performance as per Capacity Audits observation. The OEM can monitor the action taken by vendor and the improvements can easily be assessed again.

Limitations

The research study has the following limitations:-

i. The *Logistics and Quality guidelines* of Renault and MSIL are very exhaustive in nature covering purchasing, inventory, planning, logistics, distribution and quality etc in few hundreds of pages. Therefore only relevant pages summary is being considered.

ii. As suppliers' guidelines book is confidential in nature, even the part of the original text can not be reproduced. Therefore the same could not be used as evidence in the above research paper. In addition, there were very few studies done on supplier assessment and audit process though the industry, especially automobile sector has undergone through major transformation in last three decades.

Scope for Future research

The researcher has carried out the study of supply chain management process of auto sector and has studied two major MNCs namely- MSIL and Renault. Additional parameters can be considered to enlarge the scope of Quality audit and Capacity audit further, which is anyway ongoing benchmark improvement process in all manufacturing industries.

Therefore there is a wide scope of further development of the suggested framework by studying more auto and electrical manufacturers.

REFERENCES AND BIBLIOGRAPHY

1. Andersen, B., Fagerhaug, T., Randmael, S., Schuldmaier, J. and Prenninger, J. (1999), "Benchmarking supply chain management: finding best practices", The Journal of Business & Industrial Marketing, Vol. 14 No. 5, pp. 378-89.
2. Atul B. Borade, Satish V Bansod, Study of vendor managed inventory practices in Indian industries, retrieved from www.emeraldinsight/1741.038x.htm
3. Beamon, B.M. (1999), "Measuring supply chain performance", International Journal of Operations & Production Management, Vol. 19 No. 3, pp. 275-92.
4. Boardman, J.T. and Clegg, B.T. (2001), "Structured engagement in the extended enterprise", International Journal of Operations & Production Management, Vol. 21 No. 5, pp. 795-811.
5. Branganza, A. (2002), "Enterprise integration: creating competitive capabilities", Integrated manufacturing Systems, Vol. 13 No. 8, pp. 562-72.
6. Browne, J. and Zhang, Z. (1999), "Extended and virtual enterprises – similarities and differences", International Journal of Agile Management Systems, Vol. 1 No. 1, pp. 30-6.
7. Cebi, F. and Bayaktar, D. (2003), "An integrated approach for supplier selection", Logistics Information Management, Vol. 16 No. 6, pp. 395-400. .
8. Cook R L and Rogowski(1996)" Applying JIT Principles to continuous process manufacturing supply chain" Production and Inventory Management Journal , Vol 37, No1, pp12-17.
9. Cousineau, M., Lauer, T. & Peacock, E. (2004), "Supplier source integration in a large manufacturing company", Supply Chain Management: An International Journal, Vol. 9 No. 1, pp. 110-7.
10. Davies, T., "Effective supply chain management", Sloan Management Review, Vol. 34 No. 4, 1993, pp. 35-46.
11. Davis, D., "Partnerships pay off", Manufacturing Systems, Vol. 12 No. 11 (Supply-chain
12. Deming W Edward (1988), Out Of Crisis (14 principles): ISBN 026254157
13. Golhar D Y, Stamn C L and Smith W P (1990)" JIT implementation in Manufacturing Firms", Production and Inventory Management Journals, Vol 31, No2, pp 44-8.

14. Harrison, A., "Co-maker ship as an extension of quality care", International Journal of Quality & Reliability Management, Vol. 7 No. 2, 1990, pp. 15-22.

15. Jones, C., "Supply chain management – the key issues", BPICS Control (Journal of the British Production and Inventory Control Society), Vol. 15 No. 6, 1989, pp. 23-6.

16. Kuk, G. (2004), "Effectiveness of vendor-managed inventory in the electronics industry: Determinants and outcomes", Information & Management, Vol. 41, pp. 645-54.

17. Kathryn Cormican and Michael Cunningham (2008), Supplier performance evaluation: lessons from a large multinational organization CIMRU, Industrial Engineering National University of Ireland, Galway, Ireland11.

18. Keith Goffin, Marek Szwejczewski and Colin New, "Managing suppliers: when fewer can mean more", Cranfield School of Management, Cranfield University, Cranfield, UK

19. Kotzab, H. and Otto, A. (2004), "General process-oriented management principles to manage supply chains: theoretical identification and discussion", Business Process Management Journal, Vol. 10 No. 3, pp. 336-49.

20. Levy, P., Bessant, J., Sang, B. and Lamming, R., "Developing integration through total quality supply chain management", Integrated Manufacturing Systems, Vol. 6 No. 3, 1995, pp. 4-12.

21. Lockamy, A. and McCormack, K. (2004), "The development of a supply chain management process maturity model using the concepts of business process orientation", Supply Chain Management: An International Journal, Vol. 9 No. 4, pp. 272-8.

22. Lyons, T.F., Krackenberg, A.R. and Henke, J.W., "Mixed motive marriages: what's next for buyer-supplier relations", Sloan Management Review, Vol. 29 No. 3, 1990, pp. 29-36.

23. McAdam, R. and McCormack, D. (2001), "Integrating business processes for global alignment and supply chain management",Business Process Management Journal, Vol.7 No.2, pp.113-30.

24. Monczka, R.M., Callahan, T.J. and Nichols, E.L., "Predictors of relationships among buying and supplying fir ms", International Jour nal of Physical Distribution & Logistics Management, Vol. 25 No. 10, 1995, pp. 45-59.

25. Monczka, R.M., Trent, R.J. and Callahan, T.J., "Supply base strategies to maximize supplier performance", International Journal of Physical Distribution & Logistics Management, Vol. 23 No. 4, 1993, pp. 42-54.

26. Mohanty, R.P. and Deshmukh, S.G., "Use of analytic hierarchic process for evaluating sources of supply", International Journal of Physical Distribution & Logistics Management, Vol. 23 No. 3, 1993, pp. 22-8.

27. Nadler, D.A. and Tushman, M.L. (1999), "Organization of the future: strategic imperatives and core competencies for the 21st century", IEEE Engineering Management Review, Vol. 27, pp. 96-107.

28. Ohno, Taiichi (1995) "Toyota production system beyond large scale productions, Productivity Press Inc, ISBN0-915299-14-3.

29. Raghavan,N., Srinivasa,R. and Viswanadhan,N. (2001),"Generalized queuing network analysis of integrated supply chains" International Journal of Production Research, Vol. 39 No. 2, pp.209-24.

30. Shingo, Shigeo (1989), A Study of Toyota Production System from an Industrial Engineering View point", Productivity Press, ISBN0-915299-17-8.

31. Tan, K.C., Kannan, V.R., Handsfield, R.B. and Ghost, S. (1999), "Supply chain management: an empirical study of its impact on performance", International Journal of Operations & Production Management, Vol. 19 No. 10, pp. 1034-52.

32. Timmers, P. (2000), Electronic Commerce, Wiley, London.

33. Thomas Johnsen, Rhona E. Johnsen, Chia-Jung Lee, Towards A Managerial Model For Supplier Relationship Evaluation, Audencia School of Management, Nantes, France

34. Tracey, M. and Tan, C.L. (2001), "Empirical analysis of supplier selection and involvement, customer satisfaction and firm performance", Supply Chain Management: An International Journal, Vol. 6 No. 4, pp. 174-88.

35. Voss, C.A. (2003), "Rethinking paradigms of service", International Journal of Operations & Production Management, Vol. 23 No. 1, pp. 88-104.

36. Waller, B. (2004), "Market responsive manufacturing for the automotive supply chain", Journal of Manufacturing Technology Management, Vol. 15 No. 1, pp. 10-19.

37. Walter Mary (1986)," Deming Management methods", ISBN 0399550003

38. Womack James P, Jones, Daniel T and Roas, Daniel (1991) "The Machine that Changed the World: The story of Lean Production", Harpet Business, ISBN 0-06-097417-6

39. www.renaultindia.co.in

40. www.msil.co.in

ANNEXURES

Capacity Audit and Quality Audit Parameters (Table 1A)

Sn	Parameter	Audit Parameters								Renault								MSIL							
	Capacity Audit	1	2	3	4	5	6	7	8	y	y	y	y	y	y	y	y	y	y	y	n	y	y	y	y
1		9	10	11	12	13	14	15	16	y	y	y	y	y	y	y	y	y	n	y	y	y	y	y	y
		17	18	19	20	21				y	y	y	y	y				y	y	y	n	n			
2	Quality Audit	1	2	3	4	5	6	7	8	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
		9	10	11	12	13	14	15	16	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
		17	18	19	20	21	22	23	24	y	y	y	y	n	y	y	y	y	y	y	y	y	y	n	n

Table 1B

Legend for Capacity Audit		Legend for Quality Audit		
1: Layout	12:Stock Policy	1:Production systems	11:Compliance to Operation Standard	21: History Management of 'A' parts
2:Machine Availability	13: Logistics Flow	2: Initial Supply control	12: Manager Role & Responsibility	22:Inspection systems implementation
3:Workinh Hours	14: R & D facility	3. Initial Change	13: Quality Improvement programme	23: 6 sigma implementation
4: Dedicated Lines	15: Training Schedule	4:Preventive Actions	14 : Machine & Jig Control	24: Energy Management
5: Manpower	16:Absentiesm	5:Training	15:Inspection Equipment Control	
6: Process Map	17: EDI	6: Quality Audit	16: SQC	
7:Capacity	18: Packaging	7: Supplier Control	17: Wrong assembly control	
8: Ramp Up Plan	19: Bar Coding	8: Drawing Control	18: NCP(Non Conforming Product) Control	
9:T2 Supplier	20: TPM	9:Inspection Standard	19: storage controls	
10: RM assurance	21: Tool Room	10:Operation Standard	20: FIFO	
11 Lead Time				

Table 2A: Quality Audit Points

S. No.	Parameters	Audited Score			Reason for Giving the Max Score
		Achieve Score	Max. Score	Achieved	
1	Production systems		7		Must for quantity and quality.
2	Initial Supply Control		6		Must for quality production lost
3	Initial Change		5		Recommended change should be implemented.
4	Preventive Actions		7		Must to stop mistake happening again.
5	Training		8		Employee training is must for quality and quantity
6	Quality Audit		7		Must to check non-conformance

7	Supplier Control		6		Must for ensuring materials inputs
8	Drawing Control		6		Drawings mistake proofing must for defect prevention
9	Inspection Standard		5		Very important to check non-conformance
10	Operation Standard		6		Very Important for consistency in quality and quantity.
11	Compliance to Operation Standard		7		Must for quality n quantity
12	Manager Role & Responsibility		4		Important for better management
13	Quality Improvement Program		6		Must for progressive organisation
14	Machine and Jig Control		7		Must for quantity and quality constantly
15	Inspection Equipment control		9		Must for error free measurement
16	SQC		8		Must for continuous improvement
17	Wrong Assembly Control		8		Must for defect prevention
18	NCP(Non Conforming Product) Control		8		Must for control of defectives
19	Storage Control		5		Important for mistakes in inventory management
20	FIFO		5		Important for control on materials redundancy
21	History Management of 'A' Parts		5		Important for maintaining A parts (High values) Supplies
22	Inspection Systems Implementation		6		Important for defectives control
23	Six Sigma Implementation		8		Must for excellence, business efficiency and customer satisfaction
24	Energy Management and sustainability		9		Must for environment protection and global business
			158		
					OEM Target
					Last Rating

General Observations/ Impressions

1. If Score is less than 70% In any parameter, there is concern for vendor to improve by implementing suggested and agreed counter measure with target dates.
2. Last rating, counter measure must be reviewed at time of current audit.

TABLE-3A: Capacity Audit Points

S. No.	Parameters	Audited Score			Reason for Giving the Max Score
		Achieve Score	Max. Score	Achieved	
1	Layout		8		Must to start in house production
2	Machine Availability		9		Important for output
3	Working Hours		5		Better for Meeting customer targets
4	Dedicated Lines		5		Must for production to meet customer needs
5	Manpower		8		Must for dedicated line
6	Process Map		7		Must to meet customer schedule
7	Capacity		9		Must to meet increase customer target and schedules
8	Ramp Up Plan		7		Must for insuring supplier's supplier consistent performance
9	T2 Supplier		8		Must to insure supplier supplies
10	RM Assurance		8		Important for timely delivery by supplier
11	Lead Time		6		Inventory policy is necessary for finance control
12	Stock Policy		4		Must for supply chain materials flows
13	Logistic Flow		8		Definite Must for assured manufacturing capabilities
14	RND Facility		9		Must for quality and quantity by people
15	Training Schedule		7		Should be addressed to have timely delivery
16	Absenteeism		5		Must for being on line, JIT supplier
17	EDI		8		Its relevant, necessary to maintain safety, quality
18	Packaging		6		Very important for JIT, inventory and government regulations
19	Bar Coding		5		very Important least stoppage of production
20	TPM		5		Very important for least stoppages of production
21	Trail Room		4		Important for quick maintenance & uninterrupted production
Total Score	Overall		141		Last Rating
					OEM Target

General Observations/ Impressions

1. If Score is less than 70% In any parameter, there is concern for vendor to improve by implementing suggested and agreed counter measure with target dates.
2. Last rating, counter measure must be reviewed at time of current audit.

TABLE - 2B

TABLE - 2B