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## TO STUDY THE IMPACT OF MULTI-VENDOR OUTSOURCING ON THE PERFORMANCE OF THE SUPPLIERS AND REJECTION LEVELS

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### ABSTRACT

The automobile industry has seen phenomenal growth during last two decades or so. It was observed that there was a tremendous pressure on the giants in this field to produce vehicles and fulfill the production processes carried out by these companies. These changes are distinct from the changes forced by the technological development. Further, these changes have added different dimensions to the traditional approaches in almost every function of the business. Certain new concepts have emerged, such as, Vendor Development, Supply Chain Management, Forward and Backward Integration of the production processes, Outsourcing etc. while introducing each of such new concepts, it has been stated that these concepts will lead to reduction of cost with high quality and greater speed in the production processes. Further as a result of phenomenal growth of the automobile sector which has increased the strength of the giants. This has led to increase in the number of SSI units supplying materials to these giants. Even the giants have shown interest in starting such a venture. The work load was such heavy that these vendors (i.e. SSI units) have further proceeded for sub-vendor ship. This has led to the creation of multi-layer production process for the production of one unit/part of the unit. The multi-layer, hierarchical process leads to decrease in margin of profit at each such level of process as also reduction in quality, delay in supply and increase in the number of rejections.

On this background, the researcher has decided to probe into the claims made (as mentioned above) in the context of automobile industry. The focus of this study, however, is not on the giants in automobile sector, though initially they were manufacturing 100% of the parts and the products on their own. But the researcher has concentrated on the Small Scale Industries (hereafter referred to as SSI) supplying materials to these giants these days. This is because practically the production takes place at these SSI's and also because, the aspect of quality is crucial in this context.

**Keywords:** Multi-layer production, Processes, Rejection, Sub-vendor ship, Technological development.

## 1. INTRODUCTION

Nowadays with increasing competitive pressure and progressing globalization, firms have to reduce their costs and build new opportunities via optimized using of internal and external resources. Internalization forces firms to build resources to a course of action, which may restrict flexibility and be hard to retreat. Also, internalization may be required to more effectively production. The difficulty of these dimensions has worsened in recent years stimulated by raised competitive pressures, the acceleration of technological change, and the distribution of knowledge across various organizations and geographic markets. Outsourcing may be either tactical or strategic. Strategic outsourcing looks for overall business improvement and competitive advantages rather than simple cutting costs, therefore, a company could attain its strategic goals by focusing on central activities to organizational success. Tactical outsourcing has a short-term focus on minimizing operational costs or maximizing daily operations productivity.

Outsourcing is contracting with another company or person to do a particular function.

Almost every organization outsource in some way. Typically, the function being outsourced is considered non-core to the business.

### **Stages of outsourcing:**

The process of outsourcing generally encompasses four stages:

- a) **Strategic thinking**, to develop the organization's philosophy about the role of outsourcing in its activities;
- b) **Evaluation and selection**, to decide on the appropriate outsourcing projects and potential locations for the work to be done and service providers to do it;
- c) **Contract development**, to work out the legal, pricing and service level agreement (SLA) terms; and
- d) **Outsourcing management or governance**, to refine the ongoing working relationship between the client and outsourcing service providers.

In all cases, outsourcing success depends on three factors: executive-level support in the client organization for the outsourcing mission; ample communication to affected employees; and the client's ability to manage its service providers.

## 2. SCOPE OF THE STUDY

The researcher has decided to concentrate on these aspects from the quantitative as well as qualitative point of view. Pune region is an important “automobile hub” in this country. The number of vehicles on road in this city has increased several hundred times in last one decade or so. From the point of view of the manufacturer, the giant like Bajaj Auto Ltd, Tata Motors, Kinetic Engineering Ltd, and Bajaj Tempo Ltd. are situated in Pune region. Apart from this, several research institutes (such as Automotive Research Institute of India, Central Institute for Road Transport etc.) are situated in Pune region. Hence, the researcher has decided to investigate on the said subject.

### 3. IDENTIFICATION OF THE PROBLEM

After discussion with the authorities from vendor development and purchase department from various auto component industries and after collecting the data with the help of questionnaire following technical impediments (hurdles) were identified:

- 1) Many vendors or suppliers further outsource the processes due to insufficient in-house facility, capacity, expertise, specific operations, access to better technology, better efficiency; firm want to focus on core competency etc. which may leads to increase in rejection levels at further stages.
- 2) As number of levels increase in a supply chain the proportion of non certified vendors to certified vendor increases.
- 3) As number of tiers or levels increases there is increase in rejection rate which is incremental.
- 4) It was observed that higher the level of technology lesser is the rejection level, but it was observed that as we go down the line SSI units are not technologically upgraded.
- 5) It is been observed that when the processes are carried out, in-house rejection is less where as if processes are outsourced the percentage rejection at every stage increases.

Hence the researcher has decided to study the impact of ‘multi-operations’ and “multi-vendor outsourcing” on the level of rejection and thus the following objectives were set.

### 4. OBJECTIVE

- To study the impact of multi layer outsourcing on rejection.

The researcher wanted to check whether there is any correlation between multi-vendor outsourcing on rejection level, whether adding more number of vendors down the line increases the rejection level at every progressive stage and if so whether rejection is incremental at every further stage.

Hypothesis: “There is increase in rejection level at every stage of outsourcing (multi-vendors outsourcing)”

### 5. UNIVERSE

There are close to **400** players in the organized sector i.e. tier-I and over **5,000** in the unorganized sector i.e. tier-II and tier-III. Players in organized sector supply to organized vehicle manufacturers directly. The unorganized sector, on the other hand, mostly has small units, producing low-technology components and supply to tier-I organized supplier and predominantly competing in after-market spare.

#### Sample size

- 1) **46** number of tier-I manufacturer who falls in organized sector and who supplies to vehicle manufacturer directly.
- 2) **114** number of tier-II manufacturer who falls under unorganized sector and who are suppliers to tier –I manufacturer.
- 3) Approximately **300** tier-III vendors the information of whom was taken from tier-II suppliers

Total sample size organized and unorganized is **46+114+300=460**

**Sampling technique used:**

The research is about Automobile Sector in Pune region. Pune region has been selected as there are plenty of SSI's in this sector and secondly, the researcher found it convenient to focus on the region on the grounds of vicinity. In the context of the topic, vendors were identified at three different levels.

Tier-I- who are direct vendors to the giant's vehicles manufacturer.

Tier-II- Suppliers to Tier –I vendors

Tier-III- Supplier to Tier-II vendors

It was desirable on the part of the researcher to gather relevant information from all the three categories.

Though multi stage sampling is a part of random sampling the researcher has used multistage sampling for non random sampling for Tier-I and Tier-II vendors.

Sampling design for Tier-I vendors.

- N= 200 approximate
- n=46
- Sampling ratio 25%
- Method of sampling- Non random- Combination of convenience and Judgmental sampling. Judgmental on the basis of possibility of getting data.

Sampling design for Tier-II vendors

- N=1000 approximate
- n=114
- sampling ratio 11.4%
- Sampling technique- Non random- Combination of convenience and Judgmental sampling.

**Stage I** –selection of Tier –I vendors was Non random- Combination of convenience and Judgmental sampling.

**Stage II** – Selection of 114 vendors was done on the basis of recommended by 46 Tier –I vendors.

Selection of 2 or 3 vendors was done from each Tier-I vendor.

**Tier –III** vendors around 300

The required information was provided by 114 (Tier-II vendors). As per the availability and convenience

**Data Collection:**

Taking into consideration all the facts the researcher has used.

- 1) Questionnaire: A structured questionnaire was prepared.
- 2) Records: Information, data specifically related to the rejection rate and outsourcing tendency was taken from the records.
- 3) Individual interviews: Individual's responses, opinions and views were considered.

**Important note:**

The range of quality, as measured by defects found in incoming components – expressed in 'parts per million' defective. International best practice for car makers in the U.S., Japan and Europe predominantly competing in after-market spare currently aims to bring the large majority of suppliers under 100 PPM. The 'parts per million' defective

allowed by the Indian companies studied ranges between 200 to 500 PPM and in some cases it's up to 1000 PPM.

## 6. ANALYSIS AND INTERPRETATION:

The data so collected was analyzed according to the alternatives of the closed ended questionnaire and interpreted as per the graphical representations provided herewith.

### Hypothesis testing:

**Hypothesis:** “There is increase in rejection level at every stage of outsourcing (multi-vendors outsourcing)”

H0: “There is decrease in rejection level at every stage of outsourcing (multi-vendors outsourcing)”

H1: “There is an increase in rejection level at every stage of outsourcing (multi-vendors outsourcing)”

The researcher has collected data on average rejection per process for tier –I supplier and for tier-II and tier-III suppliers the researcher has the data for total rejection along with number of operations carried out on that component by the supplier. To bring the whole sample on equal platform and to be more realistic the researcher has converted total rejection into rejection per process by dividing total rejection for that supplier by number of operations carried out at that supplier end.

**To check the hypothesis:** “There is an increase in rejection level at every stage of outsourcing (multi-vendors outsourcing)”. The researcher has used one way ANOVA test.

The mean for the rejections at different levels of tiers are as follows.

The mean for tier one (rejection) is 1062.3

The mean for tier two (rejection) is 3465.7

The mean for tier three (rejection) is 7374.8

### Oneway Descriptive Rejection

	N	Mean
1	46	1062.3
2	107	3465.7
3	78	7374.8
Total	231	4307.1

It is observed that there is the difference between the rejection at three different stages as tier 1, tier 2 and tier 3, which is statistically significant at 0.01 level of significance (**p-value=0.000**).

Further on the basis of mean the researcher can conclude that the rejection at tier 3 is more than that at tier 2 and tier 2 rejection is more than that at tier 1.

The researcher can conclude that the hypothesis “There is increase in rejection level at every stage of outsourcing (multi-vendors outsourcing)” is validated and accepted and null hypothesis “There is decrease in rejection level at every stage of outsourcing (multi-vendors outsourcing)” is rejected.

**ANOVA**

Rejection	Sum of Squares	df	F	Sig.
Between Groups	1.294E9	2	24.539	0.000

**Post Hoc Tests  
Multiple Comparisons**

**Rejection**  
Tukey HSD

(I) Group	(J) Group	Mean Difference (I-J)	Sig.
1	2	-2403.37059*	.023
	3	-6312.44918*	.000
2	1	2403.37059*	.023
	3	-3909.07859*	.000
3	1	6312.44918*	.000
	2	3909.07859*	.000

\*. The mean difference is significant at the 0.05 level.

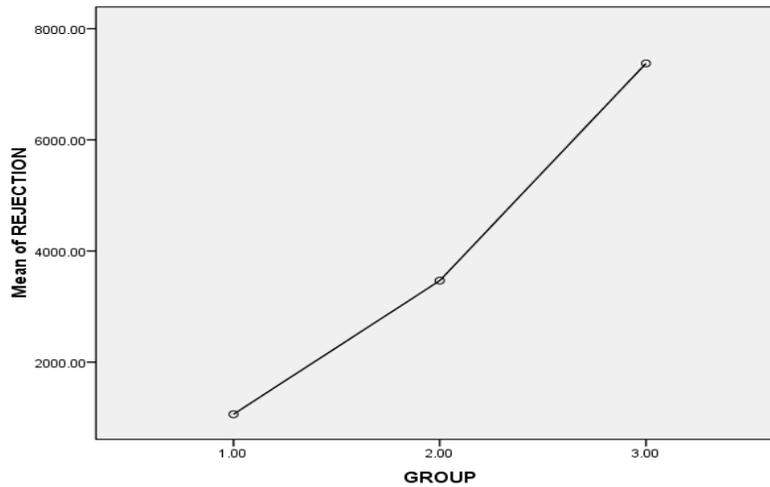
**Homogeneous Subsets  
Rejection**

Tukey HSD

Group	N	Subset for alpha = 0.05		
		1	2	3
1	46	1062.3		
2	107		3465.7	
3	78			7374.8
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

**Means Plots**



**Post Hoc Tests**

Further from the post test (tukey HSD) it is observed that the rejection at highest tier is always higher as compared to that of the lower tier. As mean difference of rejection at tier two and tier one is -2403.37. The mean difference of rejection at tier three and tier one is -6312.44.

As mean difference of rejection at tier one and tier two is 2403.37. The mean difference of rejection at tier three and tier two is -3909.07.

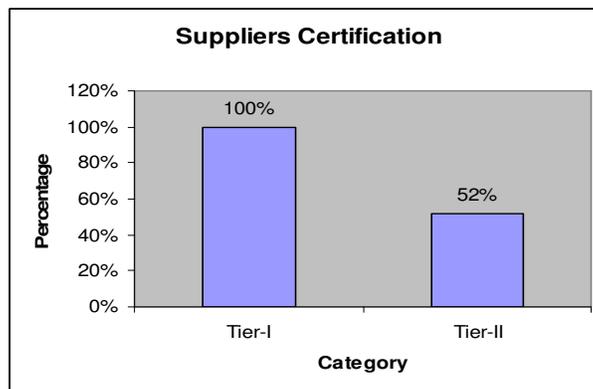
As mean difference of rejection at tier one and tier three is 6312.44. The mean difference of rejection at tier two and tier three is 3909.07.

**Data analysis:**

**Certification:**

**1) Certification of the suppliers:**

The researcher wanted to find out the percentage of certified suppliers and non certified suppliers. Hence researcher collected data for certification of supplier from both the groups i.e. tier-I and tier-II suppliers.



After analyzing the data for tier-I and tier-II suppliers it is observed that 100% suppliers from tier-I are certified whereas only 52% suppliers from tier-II are certified. This means tier-II suppliers consist of 52% certified and 48% non-certified supplier.

Data regarding tier-III suppliers was not available with tier-II suppliers.

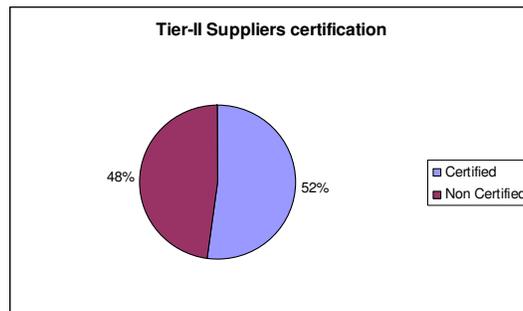
**Observation:** It is observed that as we go on outsourcing further from tier-I to tier-II and tier-III proportion of non-certified to certified supplier increases.

**Comment:**

- Multi-level sourcing leads to larger number of non-certified suppliers.

### 2) Certification of Tier-II Supplier:

From the above analysis it is observed that as number of tiers increases the proportion of certified supplier to non-certified supplier falls. Thus researcher also wanted to find out what is the proportion of certified suppliers to non-certified suppliers at tier-II.

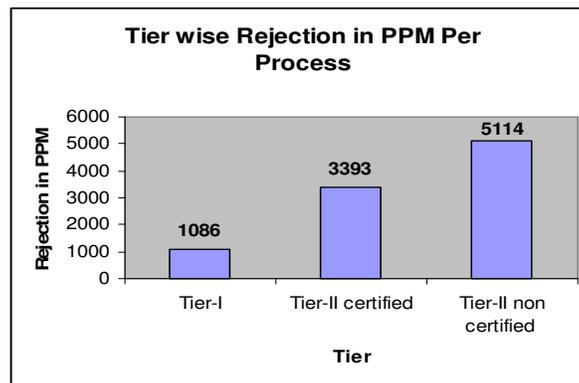


From the data analysis it is observed that 52% of tier-II suppliers are certified whereas 48% of tier-II suppliers are not certified.

**Observation:** After analyzing and comparing the data for tier-I, tier-II suppliers it is found that as number of tiers increases the percentage of certified suppliers falls.

### 3) Certification and rejection:

From the above analysis it is found that multi-sourcing leads to a less number of certified suppliers hence it becomes necessary to find out whether certification has any impact on the quality of the product.



After comparing the data for certification, the researcher wanted to test whether certification has any impact on the rejection level. Hence researcher felt it necessary to compare the data with the rejection level for all the groups.

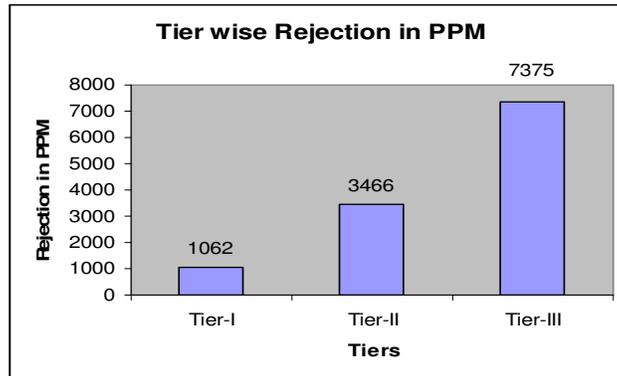
After comparing the data with the rejection level in PPM per process it is found that as percentage of non certified supplier increases, rejection increases but which is not statistically significant.

**Observation:** It is observed from data analysis that as number of tier increases percentage of non certified supplier to certify supplier at every incremental level increases. It is also observed that higher number of certified suppliers leads to better quality and lesser rejection and vice-versa.

**Comments:**

- Tier –I suppliers are 100% certified suppliers this is because OEMs while selecting their supplier it is obligatory and mandatory for the suppliers to be certified and hence rejection is less at tier-I. When it comes to selection of tier-II supplier tier- I supplier gives more importance to cost than certification and hence it can be seen from the data analysis that proportion of certified suppliers fall down drastically at tier –II level.

**4) Tier wise rejection in PPM ( Parts per Million):**

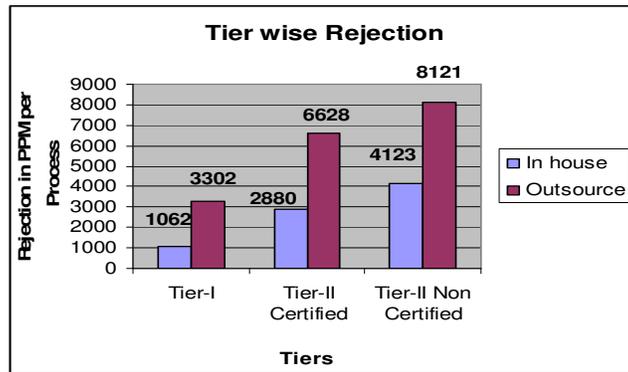


It is observed that as number of tiers increases, rejection increases. Hence the researcher can conclude that multi tier leads to increase in rejection level.

As we go on increasing the tiers percentage of certified vendors falls down and it is found that rejection is more in case of non certified suppliers than certified suppliers.

- After data analysis it is found that
- Tier-I rejection at customers end is 290 PPM (at OEMs end)
- Tier-I in-house rejection is 1086 PPM
- Tier-I outsource rejection is 3302 PPM
- Tier-II certified suppliers in house rejection is 2880 PPM
- Tier-II non certified supplier in house rejection is 4123 PPM
- Tier-III suppliers for tier-II certified vendor's rejection is 6628 PPM
- Tier-III suppliers for tier-II non certified vendor's rejection is 8121 PPM

5) Tier wise rejection



From the data analysis it is observed that in-house rejection for all the group is less than outsourced rejection. It is also observed from the data analysis that for all the tiers their in house rejection is less than the rejection for the processes which were outsourced. It is also observed that at every incremental level there is incremental increase in rejection for both in house and outsourced operations.

**Findings:**

- 1) It is observed that as we go on outsourcing further from tier- I to tier-II and tier-III proportion of non-certified to certified supplier increases.
- 2) After analyzing and comparing the data for tier-I, tier-II suppliers it is found that as number of tiers increases the percentage of certified suppliers falls.
- 3) It is observed from data analysis that as number of tier increases percentage of non certified supplier to certified supplier at every incremental level increases. It is also observed that higher number of certified suppliers leads to better quality and lesser rejection and vice-versa.
- 4) It is found that multi layer outsourcing leads to more number of non certified suppliers. (Certification is essential requisite for Tier-I suppliers. It is obligatory and not mandatory for tier II and tier III suppliers in many cases).
- 5) It is observed that as number of tiers increase, rejection increases. Hence the researcher can conclude that multi tier outsourcing leads to an increase in rejection level.

Factor	Tier-I	Tier-II	Tier-II Certified	Tier-II Non Certified	Tier-III	Comments
Average Rejection	1062	3466			7375	Average rejection increases with an increase in level of tiers.
In house Rejection	1062		2880	4133		Average in-house rejection increases at every further tier.
Outsource Rejection	3302		6628	8121		Average rejection for outsourcing increases at every further tier.

## CONCLUSION:

**Hypothesis:** “There is an increase in rejection level at every stage of outsourcing (multi-vendors outsourcing)”

The hypothesis has been tested and elaborated. There is an incremental increase in rejection levels at different stages of outsourcing i.e. at tier 1, tier 2 and tier 3, which is statistically significant at 0.01 level of significance (**p-value=0.000**). This hypothesis has been proved and hence accepted.

## GENERAL CONCLUSIONS:

- 1) Automobile industry is undergoing a major transformation due to pressure of demand, globalization, competition and technology. Major evolution in business environment for parts has become obvious. As the volume of business is increasing along with the competition these OEM's have no alternative than to rely on outsourcing the components.
- 2) Outsourcing has become one of the most important and essential elements of strategy in current business environment. Outsourcing offers various benefits to companies which include:
  - a) Lower parts or service cost.
  - b) Low upfront investment and
  - c) Less financial risk if expected sales volumes do not materialize.Some disadvantages can be:
  - a) Increase in rejection levels.
  - b) Wastage of material as well as processes
  - c) Delay in supply
  - d) Competitors may gain access to critical technology through a common supplier
  - e) Loss of ability to intelligently purchase components
  - f) Knowledge of the components may become obsolete leaving them helpless to make any innovations in component, performance etc.

Hence the companies must carefully consider all the relevant factors before taking decision for outsourcing. And restrict the tiers to minimum.

## Area for further research:

- 1) This research is location specific hence further research should be carried out to check the applicability of the research at different locations.
- 2) Total impact study is required as in this study implication of cost of poor quality is not accessed.
- 3) This study is carried out for all the sectors which form a part of automobile. Further study specific to different sector is required to have better idea and its performance.
- 4) A study should be conducted for classifying the components in a way that it is suggested in respect of ABC analysis of inventory. In a similar way, the components should have ABC analysis on the basis of Quality Criticality.

## Limitations of the Study:

Every man-made system has got its inherent limitations. Similarly, this research project has also had its limitations. These are listed below:

- 1) The period for which the study is conducted is only after March, 2000. Hence, the researcher is ignoring the cases of the last century.
- 2) The study was confined to units located in and around Pune region MIDC area.
- 3) The financial data regarding the cost of rejection or the cost of production was not disclosed by the companies.
- 4) The primary data collected through questionnaires and interviews may have personal bias involved therein.
- 5) The field of manufacturing, these days, is very volatile and fluctuating. This may result into sudden change in the product/production process, which may lead to some confusing results.(manufacturing environment is rapidly undergoing transformation due to technology, competition, shorter product life and globalization)
- 6) Despite the best efforts, researcher could not get all the information due to lack of respondents' interest. (Constraints in getting detailed information due to reluctance in revealing information of discretionary nature).

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