FINDING THE RELATION BETWEEN MAKE OR BUY DECISIONS AND PROFITABILITY FOR BATCH TYPE OF MANUFACTURING INDUSTRIES

Katikar R S  
Asso. Professor, Sinhgad College of Engg, Pune -411041 Maharashtra India

Dr Pawar M S  
Professor & Principal, Brhmdevdada Man Institute of Technology, Solapur-413002 Maharashtra India,

ABSTRACT

The decision on whether industries to produce product parts, in-house or outsource them, is complicated and dynamic. Manufacturing industries always look to improve manufacturing performance measured in terms of profitability. One of the decisions to improve the profitability is to outsource some parts or services. Some research has been carried out to find out conducted the effect of make buy decision on firm profitability. However, more research/efforts are required to confirm the relation between the outsourcing and profitability.

This paper reports an attempt made to know, how outsourcing influences the performance in manufacturing industries. A survey is carried out for batch type manufacturing industries to know the make buy trend and its effect on firm performance. This paper highlights the current trend of make-buy decision of the parts in a product and the relation between make or buy decisions and profitability. The results obtained and reported are useful to increase the profitability of manufacturing industries.

Key words- make-buy decisions make buy ratio, firm performance (profitability)

1.0 INTRODUCTION

To stay in today’s business, a make –buy decision plays an important role in manufacturing industries. The need for companies to develop consistent and competitive manufacturing strategies is now well established. A fundamental question in the development of a manufacturing strategy is the determination of what the company will make and what it
will buy, i.e. the make vs. buy (MvB) decisions. Profitability is the key factor which decides the long term survival of the industry in today’s competitive manufacturing era. There are many factors which affect the profitability of manufacturing a product such as demand for the product, sale price of product, cost of purchased material, make or buy decisions, capacity utilization of firm, etc. In a global competitive environment, Japanese automobile manufacturing companies have always tried to find less expensive and superior way of either making their product or buying components from a capable supplier.

Nowadays, manufacturers face an increasing pressure of customers’ requirements in product customization, quality improvement and demand responsiveness. On the other hand, they need to reduce production cost, shorten lead times, and lower inventory levels to ensure profitability. In order to survive under such pressures, more and more companies are striving to develop long-term strategic partnerships with a few competent suppliers and collaborate with them for different non-core process in manufacturing the product. Thus, most of the companies started to explore opportunities to reduce cost and to improve profit margin in order to maintain competitive edge in the market. One of the identified opportunities was to outsource non-core business functions to external service providers at a lower operating cost. According to expert opinion most important decisions that a manufacturing company should make is to determine the product mix which will maximize profits. Given that a company has considered a factor for e.g capacity constraints, technology etc., it may not be able to produce every unit of product demanded by the market. The best action to take in this case is to focus on the most profitable products for the company and to use all the existing resources of the company to produce these products. In this way the company can increase its profitability because it will use its existing resources to produce the most profitable products and depending upon the consistency of demand forecasted for future increasing in the capacity may be decided.

Typically, manufacturing companies have number of components in a product, each of which to be made in-house or outsourced. The sourcing decisions are not only restricted to materials and the components of a product but also apply to nonmanufacturing activities such as support services. For many organizations the potential (number of outsourcing parts or services) is enormous. Besides cost and profit, outsourcing decisions also involve consideration of strategy issues, capacity utilization and risk dimensions relating to supplier quality, lead times and delivery performance. When all of these factors are taken together, a sourcing decision can be highly complex that impacts the profitability of the firm. A wrong decision can lead to ineffective firm performance. Therefore, an attempt is done by undertaking the research to provides a more practical and structured guidance on Make or Buy decision-making.

To improve the profitability by outsourcing decisions, manufacturing units are unaware of the right ratio of make to buy components as it is not known. Hence, it is decided to undertake this problem. To know trend of make or buy and its effect on firm profitability, a survey is carried with the objective to find out (a) number of make parts and number of buy parts form the total parts in a product for manufacturing, (b) factors considered to take decision about a part to make or buy and (c) its effect on firm profitability. In next section, the brief report from the discussion on recent literature for Outsourcing and overall profitability, Outsourcing and Other Benefits and trends in Outsourcing is presented. The literature survey is followed by details of the survey.
2.0 LITERATURE REVIEW

2.1 Literature Review for Outsourcing and overall profitability:

Kimura (2002) does not find any evidence that outsourcing increases profits of the Japanese small and medium manufacturing firms due to its small volume of product and use of semi automatic technology.

Using the data on German firms, Görzig and Stephen (2002) find that while outsourcing of materials shows a positive relationship with profits, there is a negative relationship between profitability and outsourced services.

Using the data on Irish firms, Görg and Hanley (2004) also show that outsourcing reduces profit of the small plants while it increases profit of the large plants. Görg and Hanley (2009) found for a sample of about 1600 Irish firms in 2002-2004 positive effects on profitability for international and domestic services outsourcing as well as for domestic material outsourcing.

Ohnemus (2007) investigated the impact of IT outsourcing on labour productivity for about 1400 German firms in 2004 and found a significant positive effect. In a further study the same author found also a positive effect for business process outsourcing on labour productivity for 698 German firms in the period 2000-2007 (Ohnemus 2009).

In a study for 213 Spanish firms in 2006/2007 Bustinza-Sanchez et al. (2010) found a positive effect of outsourcing on a composite measure of economic performance that was constructed based on factor analysis of several single measures of firm performance. Antonuccci 1998, advised that, if the vendor is efficient than the prospective client, organisations could reduce its own costs through function consideration and resource optimization. Due to experience in the field and knowledgeable experts, it leads to proper and efficient use of resources yet with good quality work to improve firm performance. To compete on a cost basis, firms must focus on reducing overall costs across their supply chain in an effort to reduce the cost structure of their products (Koufteros etal., 2002; Safizadeh, Ritzman, and Mallick, 2000).

In manufacturing specifically, a cost focus can impact a number of areas including direct production costs, capacity utilization, market expansion, productivity, and inventory levels (Safizadeh et al., 2000). Jiang, Frazier, and Prater (2006) study the effects of outsourcing on the firm level performance measures of 51 large US firms based on audited accounting data in a period from 1990-2002. They did empirical work that directly measures the effects of outsourcing after the actual transactions were completed. They derived the exact dates of the outsourcing events by searching the press for outsourcing announcements and measured the cost efficiency, productivity, and profitability of the firms involved within one year after the outsourcing, based on quarterly accounting data. Observing the absolute change of the performance measures and the development relative to a control group without outsourcing they find improved cost efficiency but no change in the productivity and profitability of the outsourcing firms.

2.2 Literature Review for Outsourcing and Other Benefits:

Companies decide to outsource because they want to achieve certain positive effects, but in reality these effects are not always positive. Companies should achieve those effects for which they have decided to outsource. In the literature, there are mentioned many different effects, among which are most often mentioned positive effects: focus on core activities, increased productivity and quality, utilization of capacity, creativity, improvement
in financial indicators, positive financial impact, cost reduction, access to specialized knowledge, reengineering of processes in the company, new services, increased employee productivity, improved company image [Schniederjans, Zuckweiler, 2004, Zhang, Cao, 2002, Franceschini et al., 2003]. Okwo, Ifeoma Mary and Ugwunta, David Okelu were found out the Cost of sale is the major variable that has significant positive relationship with the profitability of the brewery firms in Nigeria. Cost of sale is therefore an important factor to be considered in enhancing or boosting the performance of Breweries in Nigeria. It is therefore necessary that the internal components of cost of sale such as material cost, labour cost and factory overhead should be reduced to the barest minimum.

Yavuz Cevger, Cengiz Ya.IN (2003) develop A Quantitative Model to Determine Factors Affecting Profits of Broiler Enterprises. They were found the most important factors affecting profit are the price of feed and the feed conversion rate.

2.3 Literature Review for trends in Outsourcing:

The reasons for the growing pace of outsourcing by the OEM (today over 75% of a vehicle’s added value) are: specialisation, particularly as regards the technological contribution; lower costs; conversion of fixed cost into variable cost, which means running a lower risk; and improved profitability of capital employed for vehicle manufacturers (Kimura and Ando 2005). The automotive industry, where some large car manufacturers only perform the final assemblage of major parts whose production is outsourced to external suppliers. Since this type of outsourcing quite often occurs at an international level, it is also closely entwined with the globalization process (Feenstra and Hanson, 1996).

To accommodate consumer preferences for product variety in the changing world, in contrast to Ford’s vertically-integrated production system Toyota built a flexible manufacturing system relying heavily on subsidiaries and other suppliers, which had a profound impact on the increasing outsourcing activities in the Japanese automobile industry. (Source Zhihao Yu-2003) According to Edward Davis (1992), typically the degree of outsourcing is 60-70 percent in Toyota compared to 30-40 percent in General Motors. Pharmaceutical developers and manufacturers of all sizes, but particularly the largest international companies, now routinely outsource many tasks and functions formerly considered in-house core competencies. The underlying nature of the pharmaceutical industry has changed as cost management and process efficiencies become critical to survival. Eric S. Langer (2012) carried out research on Pharmaceutical Outsourcing Trends and evaluated 24 areas of outsourcing, with the primary outsourced activities included product characterization testing (70% of companies outsourcing at least some of this activity). Other tasks now routinely outsourced include validation services (69%), toxicity testing (65%), analytical testing (61.1%) and fill/finish operations (60.0%). In BPO following processes were currently outsourced

<table>
<thead>
<tr>
<th>Process</th>
<th>Currently Outsourced (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payroll</td>
<td>37</td>
</tr>
<tr>
<td>Benefits Management</td>
<td>33</td>
</tr>
<tr>
<td>Property Management</td>
<td>32</td>
</tr>
<tr>
<td>Tax Compliance</td>
<td>26</td>
</tr>
<tr>
<td>Claims Administration</td>
<td>24</td>
</tr>
<tr>
<td>Applications Process</td>
<td>21</td>
</tr>
<tr>
<td>Human Resources</td>
<td>19</td>
</tr>
<tr>
<td>Internal Audit</td>
<td>19</td>
</tr>
<tr>
<td>Sourcing/Procurement</td>
<td>15</td>
</tr>
<tr>
<td>Finance/Accounting</td>
<td>12</td>
</tr>
</tbody>
</table>
Xin Wang & Yiwen Yan (2006) opinion that by the end of 2004, global outsourcing has reached a volume of US$ 6 trillion and about 50% of the spending is in manufacturing. Asia, with its attractive cost advantage and experienced work force, has now become the center of global manufacturing outsourcing.

(Source Peter Kroul-2009) Lacity and Wilcocks (2000-2006) surveys indicate that the most outsourced IT operations in larger companies can be defined as:

- Hardware outsourcing (67%)
- Help desk/IS support (63%)
- IT security services (disaster recovery etc.) (68%)

### 2.1 Literature Gaps:

1.) Studies about how many (number of) items (from the total items) are to be outsourced for highest profitability or no loss no profit performance are not reported by a single researcher.
2.) Studies about the influence of outsourcing on the performance (profitability), growth of the firm etc. are not reported in the literature.
3.) Studies about minimum level of make or buy decision for survival of the industries is not reported.
4.) What is the maximum level of outsourcing for increasing profitability is not reported.

Hence it is necessary to find out relation of make buy decision and profitability for better performance of an industry. A survey method is used to achieve the objective of this research. The design of survey and its related information is given in following section.

### 3.0 DESIGN OF SURVEY

This consist of a design of survey questionnaire for quantitative data collection, deciding respondents and sample size, method for data collection, data analysis method etc. Objective of this research can be achieved through the collection and analysis of the desired data. As the data is not directly available, personal contact with respondent is necessary to collect the data. Hence, it is decided that the data required is to be collected through contact only. As survey method allows researchers to contact respondents on one on one basis that is why survey method is being used. It is relevant, appropriate and viable in given context. Questionnaire method is selected for this survey in which combination of closed ended and open ended questions are considered.

### 3.1 Survey Questionnaire:

A questionnaire is designed to collect quantitative data of manufacturing outsourcing with focus on batch type engineering industries. Following guidelines are used to design a questionnaire.

3.1.1 While formulating a question, its content should be such that each respondent grasp the intention of the question very quickly as originally thought by the researcher.

3.1.2 Questionnaire must contain simple but straightforward direction for the respondents so that they may not feel any difficulty in answering the questions. This will minimize the distortion of the research focus.

3.1.3 The format of a question can be divided into two categories as open-ended and closed-ended. The open-ended questions may bring unconventional answers which are not known
to the researchers. These questions are for the collection of the data for number of make and buy part, total number of part, selling price, profit decided in percentage. The close-ended question is used to collect data about profitability status and the respondents have choice to select one of the three choice.

3.1.4 Profitability is a type of measurement that helps to determine the ability of a company to generate earnings in comparison to its costs and expenses over a certain time period. The company with a higher profitability ratio than their competitors is considered to be doing well. It is the ratio of profit to the selling price and expressing the result as a percentage. Profitability classified as per pilot study carried out the respondents perceived anything as less than 10% profitability as—Low profitability, in between 11 to 20% profitability as—Medium profitability and above 20% profitability as—High profitability to know the performance of industry for their current make–buy decision about a product under manufacturing.

In a questionnaire the data required about a different parts in a product selected is included. The desire data is planned in two categories as number of make parts and number of buy parts from the total parts in a product for manufacturing and factors considered to take decision about a part to make or buy. Data is also included for profitability. The questionnaire is designed with open-ended and close-ended questions based on individual experiences.

A pilot study was carried out. During the discussion with managers, senior managers of industries and subsequent discussion with expert in academic, the questionnaire was modified and enhanced to give the appropriate information for the purpose of research.

3.2 Respondents and Sample Size.

The respondents for the survey are selected as high level employees (senior level purchase manager or member in cross functional team such as design, manufacturing, production planning and control, quality) who are regular participants in the manufacturing business.

Following guidelines are followed to decide the sample size.

The sample size is an important feature of any empirical study in which the goal is to make inferences about a population from a sample. Inappropriate, inadequate, or excessive sample sizes continue to influence the quality and accuracy of research. Hence the sample size was calculated for a research work using a table of recommended sample sizes (n) for population (N) with finite sizes, developed by Krejcie and Morgan and adapted by Patten (2004), and Parasia Alagheb (2006). According to the sample size determination table, and for purposes of this study, a finite population size N = 60 (From Maharashtra industrial directory and information from MIDC Pune-2012, the number of industries who manufactures the ball valve with automation in Pune and around Pune are 60, which are selected for study) revealed a sample size n = 55 as the goal for this study.

3.3) Data collection methods-

In order to gain a better understanding of make-buy and its trend, data collection method selected is to collect the data by personally meeting with expert from industries.

3.4) Deciding the Data analysis method:

The aim of the research is to investigate range and average in percentage of (numbers as well as in value form) make or buy parts in a product for manufacturing industries. The data collected about make parts, buy parts, selling price, profit decided in % for different industries under survey is grouped into three categories on basis of profitability. The data
collected is in quantitative form and is enter in tabular form in Excel in order to find our objective. The quantitative data is to be analyzed using descriptive and inferential statistics.

4. DATA COLLECTION AND ANALYSIS

4.1) Data collection: The interview with each person with prior appointments is held for about 45 minutes along with questionnaire and other issues such as: core business, total number of parts in a product selected for survey, manufacturing process and technology, profitability status in percentage, factors for make or buy decision are discussed. Based on the discussion the data is entered in questionnaire. The data is collected as per questionnaire for selected number of industries for survey and is used for this study. During data collection, following problem are faced and are given below.

- The data required in questionnaire was not readily available with the production manager. Hence the data is collected and cross checked by approaching the sourcing department, for example the number of parts used in the product are found from planning department and cross check from materials department and assembly line. Similarly the information regarding price, cost is found from costing, material department and verified from purchase department.
- The above process is self explanatory and the time spends or lost was more due to unavailability of information at hand.

4.2) Data Analysis: The data analysis is carried out in following steps

4.2.1) Data tabulation-
Tabulation is done to have the systematic presentation of numerical data in rows or/and columns. Separation of data is done for data collected as per the profitability status given by the industries. The arrangement of the data separated is presented in chronological order as data for high profitability first, second data for medium profitability and third data for low profitability industries.

4.2.2) Editing of Data
Editing is done to assure that the data is accurate, consistent with other facts gathered. After entering data, we have used the data verification procedures available with excel package. In verification, the same data entered twice. The verification program indicates discrepancies in the numbers entered. When such discrepancies occurred, the entries are verified from original questionnaire. As care is taken during the data collection, problem of missing data is not in existence.

4.2.3) Analysis of data collected-
The analysis of quantitative information is done through the use of tools like Excel to get following results-a) average and range of percentage of make parts and percentage of buy parts in terms of numbers. b) Average and range of percentage of make parts and percentage of buy parts in terms of values (cost) for high profitability, medium profitability and low profitability.
4.2.4) Finding
From the analysis using software following results are found.
Table No.1 and Table No.2 shows the results of data analysis.
Table No.1 Average and Range of percentage of make parts and percentage of buy parts (in terms of numbers).

<table>
<thead>
<tr>
<th>Profitability</th>
<th>Average(Nos.)</th>
<th>Range(Nos.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%Make of parts</td>
<td>% Buy of parts</td>
</tr>
<tr>
<td>High Profitability  P&gt;20%</td>
<td>42</td>
<td>58</td>
</tr>
<tr>
<td>Medium Profitability 11&lt;P&lt;20%</td>
<td>38</td>
<td>62</td>
</tr>
<tr>
<td>Low Profitability P &lt;10%</td>
<td>34</td>
<td>66</td>
</tr>
</tbody>
</table>

Table No.2 Average and Range of percentage of make parts and percentage of buy parts (in terms of values (cost)).

<table>
<thead>
<tr>
<th>Profitability</th>
<th>Average</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%Make of parts</td>
<td>% Buy of parts</td>
</tr>
<tr>
<td>High Profitability  P&gt;20%</td>
<td>65.21</td>
<td>34.79</td>
</tr>
<tr>
<td>Medium Profitability 11&lt;P&lt;20%</td>
<td>73.52</td>
<td>26.48</td>
</tr>
<tr>
<td>Low Profitability P &lt;10%</td>
<td>80</td>
<td>20</td>
</tr>
</tbody>
</table>

DISCUSSION

From table no.1, it is seen that average value and range value in terms on numbers for make part (in percentage) increases from low profit making industries to high profit making industries. This might be due to that high profit making industries use advanced technology for manufacturing the in-house parts, having large setup, fixed customer and their requirements. Hence, the cost of production for in-house parts is also less, which result is lower cost of production for complete product, leading to highest profitability. Finding the exact cause of higher profitability is the area for future research.

From table no.2 it is seen that average value and range value in terms on cost for make part in percentage are decreases from low profit making industries to high profit making industries. This is due that the resources are used for competitive advantages which then leads to higher profitability and less overhead required to make part in-house.

5.0 CONCLUSIONS

Following conclusions are drawn from this study

5.1 Average and range in terms of numbers for make part in percentage is increases from low profit making industries to high profit making industries.
5.2 Average value and range value in terms of cost of make part in percentage is decreases from low profit making industries to high profit making industries.
5.3 Make to buy ratio (on the basis of number of parts) for highest profitable units is 42:58 and for lowest profitable units is 34:66.
5.4 Make to buy ratio (on the basis of value) for highest profitable units is 65:35 and for lowest profitable units is 80:20.

REFERENCES


ANNEX-I
Questionnaire for the Survey

1. Name of Organisation:
2. Address:
3. Number of Products:
4. Selected product for Questionnaire:
5. Models for Selected Product:
6. Type of Production for selected model: Batch / Mass
7. Details for Number of parts Manufactured (Make/Buy)

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Particulars</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total Number of Parts in a Product</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Number of Make Parts -(100% Make)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Number of Buy Parts –(100%Buy)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Number of Parts which can be Make or Buy</td>
<td>Make part-</td>
</tr>
<tr>
<td>5</td>
<td>Selling Price of Product in Rs</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Total % of profit decided</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Total cost of Make parts in Rs or In % of Total costs of a product</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Profitability Status in % (Tick in a box)</td>
<td>High &gt;20%</td>
</tr>
</tbody>
</table>

Signature of Respondent