

Selection of Distributors for Small and Medium Enterprises in Visakhapatnam District by Using Analytical Hierarchy Process

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ABSTRACT:

The activities of supply chain involve the transformation of natural resources, raw materials and components into a finished product that is delivered to the end customer. Flow of goods between a supplier and a customer passes through several levels in a supply chain mechanism and each level may consist of large number of facilities. A decision maker must consider decisions regarding the selection of the right distributors in the design of a supply chain and the selection of the distributors is a multi-criterion decision-making problem.

Distributors have long been relied on to serve as a bridge between manufacturers and customers. In today's increasingly globalized marketplace, this link becomes even more important.

The distributors play a very important role in increasing the sales of a company's products by ensuring the distribution of company's products in most of parts of their area through the network of retailers and wholesalers. The importance of appointing right distributors is essential for a company whether it can be a Small, Medium and Large enterprises because right distributors help the company march on path of progress and growth whereas "not right" distributors take the company backwards.

But in spite of the very important role of distributor in the supply chain it is matter of great concern that barring few top Indian and MNC companies, most of Indian companies do not take proper care and do not do proper homework before appointing a distributor. 90% of the time the distributors are appointed in a hurry just to meet month's targets.

Therefore the focus of this paper is to determine the composite weight of the factors, which are considered in the selection of distributors. Analytical Hierarchy Process (AHP) is used in the selection of the distributors after conducting survey.

Key words: Supply chain, Distributors, Small and Medium Enterprises, Analytical Hierarchy Process

INTRODUCTION:

Supply chain is a set of facilities, supplies, customers, products; and methods of controlling inventory, purchasing, and distribution. In a supply chain, flow of goods between a supplier and a customer passes through several echelons and each echelon may consist of many facilities. In designing a supply chain, a decision maker must consider decisions regarding the selection of the right distributors and distributor selection is a multi-criterion decision-making problem.

Supply chain is an entire network of entities, directly or indirectly interlinked and interdependent in serving the same consumer or customer. It comprises of vendors that supply raw material, producers who convert the material into products, warehouses that store, distribution centres that deliver to the retailers and retailers who bring the product to the ultimate user. Supply chains underlie value-chains because, without them, no producer has the ability to give customers what they want, when and where they want, at the price they want. Producers compete with each other only through their supply chains, and no degree of improvement at the producer's end can make up for the deficiencies in a supply chain which reduce the producer's ability to compete. Supply chain activities involve the transformation of natural resources, raw materials, and components into a finished product that is delivered to the end customer.

The path through which goods and services travel from the vendor to the consumer or payments for those products travel from the consumer to the vendor. A distribution channel can be as short as a direct transaction from the vendor to the consumer or may include several interconnected intermediaries along the way such as distributors, wholesalers, agents and retailers. Each intermediary receives the item at one pricing point and moves it to the next higher pricing point until it reaches the final buyer.

A supplier is someone who provides the products, commodity, or services to consumers, usually via distributors. The suppliers can also be manufacturers, processors, packagers, wholesalers, dealers, and merchants who deal in particular products and merchandise.

On the other hand, a distributor can be best defined as "an entity that buys the non-competing products or product lines, warehouses them, and then resells them to the retailers or directly to the end users or customers". Suppliers and distributors are a vital part of the supply-chain mechanism in a business world, and they can be either individuals or organizations that provide resources to each other to produce, supply and distribute the goods.

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The manufacturer produces the products according to the needs of the customers after procuring the sufficient raw materials from the suppliers. One of the prime motives of a manufacturer is to make available and sell his products to the customers. In order to achieve this, the distributors play a vital role in smoothly connecting the manufacturers and customers. Also, that they can expedite response times, enhance a company's reach, and even create value-added packages that complement a company's product offering or scope.

Distributors now more than ever are service providers. They don't just sell products, they provide engineering support and aftermarket services, reduce costs and optimize processes, as well as manage inventories, all of which creates value for manufacturers and customers alike.

IMPORTANCE OF DISTRIBUTION CHANNEL IN SMALL AND MEDIUM ENTERPRISES:

The significant feature which distinguishes any company especially the SMEs (Small and Medium scale enterprises) from the others is the implementation of its management system including the production, distribution, marketing, human resource management and so more. It is the responsibility of the owners to make the decisions. It has been observed that majority of the SMEs are one-man enterprises or those formed by two partners. In such a case, the owners are responsible for all the liabilities of the company and the firm's assets. This ensures that they are ready to bear the risks of the company and the personal risks as well.

When we talk about the SMEs, it is the sole responsibility of the owners to create a social structure within the organization which is usually linear and follows the autocratic management style. This type of the company structure usually reflects one-man management hierarchy, the decision flow in a quick manner, easy maintenance of discipline, less elastic and flexible activities and so more. Another significant characteristic of the SMEs is the nature of the financial management wherein the capital of such companies is the result of the creations of the funds of the owners (or partners) which is given support by the union funds, loans or credits. An important quality determinant which could be considered by talking about the share in the market is the role of the small and mid-sized companies in the satisfaction of the individual needs of the customers or the clients. This is a significant factor which might outplay the influence created by the demand and the supply.

In addition to the quality of the services offered by the Small and Medium Scale Enterprises (SMEs), the customers or the general public usually make use of the vital characteristics like the number of employees, the value of the assets, the financial results and much more. When talked about the management practices like the distribution channels, the production, the marketing of the goods and services; there could be spotted an issue in the role of the distribution of the competitive advantage of the small and mid-sized companies. The essence and importance of proper distribution channels are represented by the set of activities which focus on the marketing of the products and services in a proper form, time and place. These activities must be balanced with the other marketing factors to stimulate the efficient functioning of the distribution channel in any Small and Medium Scale Enterprises. The main role of an efficient distribution channel is to overcome the time, spatial and

ownership barriers which would separate these enterprises from their targeted customers. In addition to these, the distribution channel must be able to provide great customer satisfaction with the best quality on time, in the appropriate place, in the most comfortable way, and at competitive prices. However, this state could be achieved only when the SMEs would adopt an effective distribution channel. The choice of an appropriate distribution channel with a specified structure ensures increased sales volumes and significant throughput and profits. Therefore, proper implementation of the distribution channel within an SME organization can enhance their chances of assured success.

ANALYTICAL HIERARCHY PROCESS (AHP):

The Analytical Hierarchy Process is a structured technique for organising and analysing complex decisions based on Mathematics and Psychology.

It has application in group decision making and is used around the world in a wide variety of decision situations in fields such as government, business, industry, healthcare, shipbuilding and education

Rather than prescribing a correct decision, the AHP helps decision makers find one that best suits their goal and their understanding of the problem. It provides a comprehensive and rational framework for structuring a decision problem for representing and quantifying its elements for relating those elements to overall goals and for evaluating alternative solutions.

The AHP converts the evaluations to numerical values that can be processed and compared over the entire range of the problem. A numerical weight or priority is calculated for each element of the alternatives. These numbers represent the alternatives' relative ability to achieve the decision goal. In AHP the comparison of the factors or elements happens in a rational and consistent way. This capability distinguishes the AHP from other decision-making techniques.

LITERATURE SURVEY

Julija Petuhova, Yuri Merkuryev and George J. Klir et al (2005) carried out simulations to measure distributor's performance before and after applying the supply-side collaboration. Their results show that the supply-side collaboration can improve distributor's performance in terms of more accurate service level realization and better stabilizing effect.

Pandian Vasant (2004) attempted to model decision processes with multiple criteria in business and engineering leads to concepts of multi objective fuzzy linear programming.

Hasan Selim and Irem Ozkarahan (2006) have developed a supply chain distribution network design model. The goal of the model is to select optimum numbers, locations, and capacity levels of plants and warehouses to deliver products to retailers at the least cost while satisfying desired service level.

K. Venkata Subbaiah et al (2009) Supply chain management is the plan and control of material and information flow among suppliers, facilities, warehouses, and customers with the objectives of minimization of cost, maximization of customer services and flexibility. The supply chain of a business process comprises mainly five activities viz., Purchase of materials from suppliers, transportation of materials from suppliers to facilities, production of goods at facilities, transportation of goods from facilities to warehouses and transportation of goods from warehouses to customers.

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Bayraktar, D., et.al (2003) Competitive international business environment has forced many firms to focus on supply chain management to cope with highly increasing competition. Hence, supplier selection process has gained importance recently, since most of the firms have been spending considerable amount of their revenues on purchasing. The supplier selection problem involves conflicting multiple criteria that are tangible and intangible.

A. Amid, et al (2011) Supplier selection is one of the most important activities of purchasing departments. This importance is increased even more by new strategies in a supply chain. Supplier selection is a multi-criteria decision-making problem in which criteria have different relative importance. In practice, for supplier selection problems, many input information are not known precisely. The fuzzy set theories can be employed due to the presence of vagueness and imprecision of information. An analytic hierarchy process (AHP) is used to determine the weights of criteria. The proposed model can help the decision maker (DM) to find out the appropriate order to each supplier and allows the purchasing manager(s) to manage supply chain performance on cost, quality, and service.

Amir Abbas KananiNezhad et al (2013) The logistics network design has attracted much attention as companies have become more global, and more responsive to redesign distribution networks more frequently to operate at the lowest costs while providing the best customer service. A logistics network consists of suppliers, manufacturing centers, warehouses, distribution centers, and retail outlets as well as channels for the flow of raw materials, work-in-process inventory, and finished products between the facilities.

OBJECTIVE OF THE STUDY

The main objective of this research paper is to find the composite weight of the factors or which factor has more influence in the selection of the distributors for small and medium companies which are in profit making business.

RESEARCH METHODOLOGY

The study was based on primary data. Interview Schedule was constructed for the collection of data using structured questionnaires. Data for this study were collected by means of a survey conducted in and around Visakhapatnam district. The structured survey questionnaires were in English and those were distributed to randomly selected 72 participants. Participants were the manufacturers of small and medium enterprises in and around Visakhapatnam district. The following are some of the factors considered in the selection of distributors.

- 1) Number of years in business
- 2) Size and quality of sales force
- 3) Transportation savings
- 4) Inventory strength
- 5) Reputation
- 6) Market coverage

- 1) Number of years in business: The number of years the distributor is in the business.
- 2) Size and quality of sales force: The size of the sales team and the quality of the sales team like performance, commitment, experience etc.
- 3) Transportation Savings: It is concerned with the environmental performance and improves the efficiency of network by reducing mileage, fuel consumption, greenhouse gas emissions, noise and congestion. To achieve time and place utilities.
- 4) Inventory Strength: Possesses sufficient stock to meet and satisfy the requirements of the wholesalers, retailers and customers and can act as a buffer guarding against uncertainties in supply and demand.
- 5) Reputation: The reputation, well establishment and leadership of the distributor in the business
- 6) Market coverage: The number of active retail and/or wholesale outlets that sell a specific firm's brands in the given market, which a distributor possesses.

Data thus collected were posted in a master table to facilitate further processing. The AHP analysis of the data were done through MS Excel in computer.

AHP MODEL CALCULATION

The following are some of the factors are considered in the selection of distributors such as number of years in business, size and quality of sales force, transportation savings, inventory strength, reputation and market coverage and a survey has been done with considerable sample of the size 72 taken from the manufacturers of small and medium enterprises in and around Visakhapatnam district consisting of various manufactures from varied sectors by considering the above mentioned six factors in the form of a questionnaire. A pair wise comparison is made by using a satty scale which is a relative scale to measure how much would one prefer regarding one factor with respect to another factor. After collecting the data from the respondents, the AHP methodology was applied to determine the relative weightage of the factors in the selection of distributors. Consistency check is done as per AHP procedure.

The consistency ratio is computed to verify whether the inconsistency is acceptable or not. If the value of consistency ratio is smaller than or equal to 10%, the inconsistency is acceptable. If the consistency ratio is greater than 10% we need to revise the subjective judgement.

ANALYSIS AND DISCUSSION:

Different manufacturers of small and medium enterprises were interviewed for identifying the priorities of factors for selection of the distributors. Conducting surveys is an unbiased approach to decision making. We can collect unbiased survey data and develop sensible decisions based on analysed results. By analysing result, we can immediately address topics of importance, rather than waste time and valuable resources on areas of little or no concern.

Once the data collected from the 72 respondents based on the factors we calculate the average values (AHP scores) and rounded to the nearest integer and then the column normalisation and row normalisation were done and finally the critical weight of the factors were determined.

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Here in the following table, 1 implies Number of years in business 2 is Size and quality of sales force, 3 is Transportation savings, 4 is Inventory strength 5 is Reputation and 6 is Market coverage

Table 1: Critical Weight of the factors

S.No.	1	2	3	4	5	6	Row Total	Critical Weight
1	0.398565	0.47619	0.45685	0.294118	0.184615	0.304348	2.114687	0.352448
2	0.199283	0.238095	0.304567	0.294118	0.246154	0.173913	1.456129	0.242688
3	0.132855	0.119048	0.152283	0.294118	0.369231	0.217391	1.284926	0.214154
4	0.079713	0.047619	0.030457	0.058824	0.123077	0.086957	0.426646	0.071108
5	0.132855	0.059524	0.025381	0.029412	0.061538	0.173913	0.482623	0.080437
6	0.056938	0.059524	0.030457	0.029412	0.015385	0.043478	0.235193	0.039199
Grand Total							6.000203	

The weightage of the factors are ascertained for the selection of the distributors who play pivotal role in supply chain management. The factors such as a) Number of years in business b) Size and quality of sales force c) Transportation savings d) Inventory strength e) Reputation of distributor and f) Market coverage are considered in the selection of the distributors. For this, AHP methodology has been applied to ascertain the weightages of the factors. The normalised score are as follows, it is 0.352448 for number of years in business, 0.242688 for size and quality of sales force, 0.214154 for transportation savings, 0.071108 fir inventory strength and 0.080437 for reputation and 0.039199 for market coverage. From this, it is found that number of years in business have to be considered for highest weightages followed by size and quality of sales force, transportation savings, reputation, inventory strength and market coverage respectively in the selection of distributors.

Table 2: Ratio of Weighted sum to Critical weight

	1	2	3	4	5	6	Weighted Sum (WS)	Critical Weight (CW)	WS/CW
1	0.352448	0.485376	0.642463	0.355538	0.241311	0.274392	2.351528	0.352448	6.671987
2	0.176224	0.242688	0.428309	0.355538	0.321748	0.156795	1.681303	0.242688	6.927836
3	0.117482	0.121344	0.214154	0.355538	0.482623	0.195994	1.487136	0.214154	6.944235
4	0.070490	0.048538	0.042831	0.071108	0.160874	0.078398	0.472238	0.071108	6.641131
5	0.117482	0.060672	0.035692	0.035554	0.080437	0.156795	0.486633	0.080437	6.052374
6	0.050350	0.060672	0.042831	0.035554	0.020109	0.039199	0.248714	0.039199	6.344919

$$\lambda_{\max} \text{ Average} = \sum (WS/CW)/n$$

where WS, CW and n are weighted sum, critical weight and number of factors respectively.

$$\begin{aligned} \lambda_{\max} &= 39.582482 / 6 \\ &= 6.597080333 \end{aligned}$$

$$\begin{aligned}\text{Consistency Index (C.I.)} &= \lambda_{\max} - n / n - 1 \\ &= 6.597080333 - 6 / 6 - 1 \\ &= 0.597080333 / 5 \\ &= 0.119416\end{aligned}$$

$$\text{Consistency Ratio (CR)} = \text{C.I.} / \text{R.I.}$$

Since the R.I. (Random Index) value is 1.24 for 6 determinants from the table value

$$\begin{aligned}\text{Therefore, CR} &= 0.119416 / 1.24 \\ &= 0.096303\end{aligned}$$

As per the AHP results, the value of consistency ratio is 0.096303 which is less than 0.1 or 10%. Hence it is concluded the subjective or qualitative judgement is in order

CONCLUSION:

Distributors play a vital role in the supply chain as they serve as a bridge between manufacturers and customers. This link has become even more important in today's increasingly globalized marketplace. The important factors such as number of years in business, size and quality of sales force, transportation savings, inventory strength, reputation and market coverage will affect the performance of the distributors and distributor ranking is also important for quota allocation to them by the manufacturer in order to sustain their reputation in the market. Here AHP technique has been employed and found to be suitable to determine the relative weightage of the factors or to prioritise the composite weight of the factors.

REFERENCES

1. Amid, S.H.Ghodsypour and C.O.Brien (2011), 'A weighted max-min model for fuzzy multi objective supplier selection in a supply chain', ELSEVIER, "International journal of Production Economics", volume 131, Issue 1, Pages 139-145.
2. Amir Abbas KananiNezhad, Emad Roghanian and Zahra Azadi (2013), 'A fuzzy goal programming approach to solve multi-objective supply chain network design problems', International Journal of Industrial Engineering Computations, Pages 315-324.
3. Bayraktar, D., and Cebi, F., (2003), 'Supplier selection using analytical hierarchy process' in Proceedings of PICMET'03. Portland, Oregon, USA, Pages 20-24.
4. Hasan Selim and IremOzkarahan (2006), 'Application of fuzzy multi-objective programming approach to supply chain distribution network design problem' Springer Berlin / Heidelberg, Vol. 4293, 415-425.
5. Dr. Naveen Nandal, Dr. AarushiKataria, Dr. Meenakshi Dhingra. (2020). Measuring Innovation: Challenges and Best Practices. International Journal of Advanced Science and Technology, 29(5s), 1275 - 1285.
6. JulijaPetuhova and Yuri Merkuryev (2005) [George J. Klir and Bo. Yuan, 'Fuzzy Sets and Fuzzy logic, Theory and Applications'], Indian Reprint, Prentice Hall of India Pvt. Ltd., New Delhi.
7. K. Venkata Subbaiah, K. Narayana Rao and K. Nookeshbabu (2009): 'Supply Chain Management in a diary industry – A Case study' Proceedings of World Congress on Engineering, Vol.1.595-599.
8. Pandian Vasant (2004), 'Application of multi objective fuzzy linear programming in supply production planning problem', Senior Mathematics Lecturer, Department of Mathematics, American Degree Program, Nilai International College, 71800 Nilai, Malaysia.