

L1 Sourcing decisions 1

- 1 of the imp. decisions in supply chain is to choose who will perform supply chain tasks, such as producⁿ, storage, transportaⁿ, etc.
- sourcing decision is superset of outsourcing decisions — decide to outsource or do it in-house
- once decision to outsource is taken, we need to find the best partner (vendor).
- Outsource includes all the processes e.g. for purchasing the goods & services for the org., in order to fulfill the demand raised by the customer.
- outsourcing is successful if the 3rd party makes the supply chain more responsive / efficient.
- To identify & select the vendors, the managers need to decide the criteria of evaluaⁿ.

L2 Sourcing decisions 2

- Ques. relevant to outsourcing are -
 1. does outsourcing benefit firm & vendor
 2. does " increase the uncertainties for firm
- steps -
 1. planning - overall policy, buy or make decision
 2. supplier evaluaⁿ - evaluaⁿ parameters
 3. contract & negotiaⁿ

4. delivery planning - purchase logistics, timings, quantity

- diff. btw. outsourcing & offshoring
- benefits of effective sourcing - several vendors then benefit of comp., economies of scale - there aggrega", coordina" of the produc" opera", contracts allowing sharing of risk.
- Outsourcing helps because the firm doesn't have to have uneconomical opera", whereas supplier can work on scale. Scale can be for transpora", warehousing, info., purchasing, etc.

L3 Sourcing decisions 3

- supply chain surplus is generated when the 3rd party can provide lower costs & higher quality relative to the firm.
- Higher quality is derived when the 3rd party is a specialist & ∵ it makes sense for the firm to outsource for the 3rd party. Lower costs are the results of the 3rd party.
- when outsourcing doesn't help -
 1. when vol. is too large.
 2. uncertainty - req. are highly var.
 3. too much specific resources.
- risks of using a 3rd party - reduced

customer contact, loss of supply chain visibility, leakage of sensitive data, by introducing a 3rd party in a broken supply chain, underestimating the cost of coordination, loss of internal capability & growth.

- 3PL - provides one or more logistics activities relating to flow of prod. by firm itself.
- 4PL - designs, builds & runs the entire supply chain process.
- Contracts - Indep. ac^{co} taken by 2 parties in a supply chain often results in profits that are lower than those that could be achieved if the supply chain were to coordinate the actions.

Eg. buyback or returns contract, revenue sharing.

By Supplier Selection

- We have seen how imp. sourcing decisions are to an org. It is imp. if correct sourcing partners are selected. Supplier selec^{co} becomes critical. We have to factor several attributes.
- Attributes - network, price premium, etc.
↳ So, we give ranking (1 (highest) - 3 (low))

L5 Apriori Algo.

- Unsupervised learning \rightarrow associate rule mining
 ↳ to understand how can the suppliers be grouped based on similarity.

$X_j \in \{0, 1\} \Rightarrow$ Market Basket analysis
 s_j be set of values for X_j

$$\text{Pr} \left(\bigcap_{j=1}^p (X_j \in s_j) \right)$$

- Find subset of integers $K \subset \{1, 2, \dots, k\}$

$$\text{Pr} \left(\bigwedge_{k \in K} (Z_k = 1) \right)$$

set K is cf item set. The probab. can now be estimated from the data.

- Market Basket analysis

$$\hat{\text{Pr}} \left(\bigcap_{k \in K} Z_k = 1 \right) = \hat{\text{Pr}} \left(\bigcap_{k \in K} Z_k = 1 \right) = \frac{1}{N} \sum_{i=1}^N \prod_{k \in K} Z_{ik}$$

↳ Z_{ik} is value of Z_k in the i^{th} row

this is the support ($T(K)$) of item set.

- Apriori algo. sets a min-threshold (t) on support. Each of the high support item sets then leads to the associa" rules. The elements Z_k into 2 disjoint subsets A & B.

antecedent \leftarrow consequent

- Confidence $T(A \Rightarrow B) \rightarrow$ conditional probab. of

$$C(A \Rightarrow B) = \frac{T(A \Rightarrow B)}{T(A)}$$

B given A

- lift - Ratio of confidence & exp.

$$\text{confidence} \\ L(A \Rightarrow B) = \frac{C(A \Rightarrow B)}{T(B)}$$

L6 Apriori Alg. Implementation

coding