Factors affecting Supplier Relationship Management: An AHP Approach

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Abstract. Supplier Relationship Management has been attached paramount importance with a view to maintaining a superior performance of the supply chain in a manufacturing industry. Both academic and corporate are striving hard to establish a long term understanding with the manufacturer and supplier as this will pave the way for a greater success. This paper provides an insight to understand the Supplier Relationship Management and the significant factors affecting the relationship. An attempt has been made to prioritize or rank the Key factors and subsequently Analytical Hierarchy Process (AHP) has been resorted as a tool to rank the different sub factors of the Key factors responsible for the afore-said supplier Relationship management. Indubitable, this paper will guide the budding managers of the manufacturing industries as to how to create the buyer supplier bond which will be fulfilling and will provide a win-win situation.

Keywords: Supplier Relationship management (SRM), Analytical Hierarchy Process (AHP), Buyer supplier relationship

1. Introduction

Paradigm of modern business era has changed completely that competition is no longer between companies rather it is between supply chains. Supplier relationship management (SRM) playing key role and become relevant management area for sustainability in this globalised competition. Reason is Global competition forced organizations to focus on innovation to add flexibility to the existing process to be highly customer responsive and to manufacture customized products but this can’t be achieved through one or two area of excellence like production or distribution. Complex, customized & unpredictable demand, shortened life cycle of product can only be fulfilled from innovative components and services those are through procurement. Academic and corporate interest in buyer-supplier relationship area increased remarkably only to build strong and long term relationship as SRM is one of the emerging areas of emphasis of today’s procurement practices. Focus of SRM has changed from cost minimization to value creation and promise delivery Hong and Kwon (2012) [17]. Suppliers are not defined as who supplies goods rather as strategic partners of firm because of their important role in value chain require good understanding of customer’s need. SRM is emerged as global management network that involves skills & knowledge only to enhance supply chain performance Lintukangas (2011) [16]. To sustain in the global competition the relationship has to be strong, long term and developed continuously. But the developed relationship should be not be competitive rather cooperative Loppacher et al (2011) [15]. Short term
and long term goals of suppliers to fulfill the needs of buyers, short terms are delivery, order cycles time and quality & long terms are strengthening supplier’s managerial, product development and process competences. To develop SRM suppliers should be proactive and it is based upon the mutual interest of both suppliers and buyers. So Aim of the paper is to study the factors affecting mutual interest of both suppliers and manufacturers to maintain long term relationship. Paper is organized as follows. Section 2 reviewed past literature and extract factors, Section 3 represents methodology to be used, Section 4 entails discussion and section 5 concludes the paper.

2. Literature Review
Good amount of research has been reported in this area. In electronic database we have searched for papers using keywords like- supplier relationship management, Supplier Manufacturer Coordination. Numerous papers have been reviewed to obtain the factors affecting SRM. Reviewed papers from 200 to 2017 are represented in tabular form showing focus and findings of eminent authors in different journals.

Table 1

| Author | Findings |
|--------|----------|
| Eskandari et al. (2010) | A model based on linear demand was introduced. Simulation optimization is used to develop optimum decision variables so that above coordination problem effectively analyzed and solved. |
| Hematyar and Chaharsooghi (2014) | Due to high demand uncertainty and return of product it is difficult for retailer to determine order quantity. Hence Insurance contract was proposed to solve coordination problem. It is also compatible for both the manufacturer and retailer & solution is better than other contract. |
| Alaei et al (2014) | Although RFM (Retail fixed mark up) policy can’t coordinate the channel but can bring considerable improvements over the channel. Each member’s profit can be improved through this about 96%. |
| Giannakis, M. (2012) | Importance of procurement in supplier relationship management. Four fundamental dimensions mainly focused are Trust, Power, Commitment and Involvement |
| Sucky and Durst (2013) | Focus on importance of supplier development programme. Balance of cost incurred and benefit gained from supplier skill and capability enhancement |
| Gan and Sethi (2004) | Three specific cases were considered where first Pareto-optimal sharing rule was considered and then combined with external actions like- Order quantity, production volume to obtain Pareto-optimal solutions. |
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| Habib M. (2014) | Study showed the detailed SCM evolution in product Industry. A Tertiary Educational supply chain management model is discussed using Structural equation modeling & its future implication for the betterment of society also highlighted. |
| Moyaux et al (2007) | Order is assumed to be a 2D vector & two principles are proposed based on each dimension. Firstly ordering policy should be lot for lot, secondly during variation of market consumption company should react once. Each time company should specify the reason of under or over order to the suppliers through information centralization |
Modern Practices like TQM, JIT practitioners have lower unit manufacturing cost, higher quality and hence competitive. Supplier Development is a long term resource consuming business activity which requires commitment from both manufacturing firms and supplier.

A model is developed to find the impact of price dependant and stochastic demand on return policy. Communication strategies play key role to improve supplier Performance

Working capital is important. High Cost capital and advance for Raw Material affect Lower tier smaller firms dealing with simple parts as they have to wait long for payment.

From Finnish food industry it is revealed that power relation strongly influence nature of relationship. Further Actions, decisions, Strategies to be used in the supply chain are determined from the nature of relationship.

Detailed literature review shed light on different factors affecting SRM. Due to different demand for products, skill of labor, venture capital, nature of market these factors varies from country to country. Each factor represents its unique contribution towards long term relationship. Different factors and sub factors are enlisted below.

**Objective to maintain long-term relationship**

Long term relationship can only be maintained through alignment of local objective, communication, trust, commitment, value addition and satisfaction between buyer and manufacturer. In long term relationship simple supplier becomes strategic partner. So sub factors with notations which affecting the long term relationship are

- Open communication (LTR1)
- Mutual trust (LTR2)
- Role & Responsibility (LTR3)
- Joint action for value creation (LTR4)
- Common goal (LTR5)

**Continuous improvement orientation**

Continuous improvement is must. Today's market will soon get extinct by the overpowering innovations and aggressive strategies of competitors. For continuous improvement the sub factors to be focused are

- Supplier Development program (CI1)
- Benefit Measurement (CI2)
- Supplier evaluation (CI3)

**Supplier Competency**

Competency refers to the ability of supplier to do the assigned job accurately and precisely. Ability of a supplier to deal with supply and demand efficiently by incorporating the principles of industrial management such as lead time and various models to minimize cost and increase output. Various sub factors are

- Supplier quantity discount (SC1)
- Supply lead time (SC2)
- Supply Uncertainty (SC3)
- Quality Issue due to delivery (SC4)

**Management Vision & Mission**

Managers are the pivotal point in the supply chain as they are the ones who are responsible for implementing their prowess to the smooth maintenance of supplier relations. The various factors included in this section are as stated below.
Good Management Practice (MVM1)
Established Mutual Relationship (MVM2)
Top Management Support (MVM3)

3. Methodology

Extraction of factors and sub factors is not enough. For decision making or to set a managerial guideline ranking of factors is must. Several Methods are there to rank the sub factors under main factor such as- Nominal Group Technique (NGT), Descriptive Analysis. But AHP (Analytical Hierarchy Process) is a multi criteria decision making preferred technique to rank the sub factors. AHP makes pair wise comparison of sub factors. So experts are asked to make pair wise comparison of sub factors on 1 to 9 scales.

Table 2 Scale and Rating used in AHP

| Scale                      | Rating | Scale                      | Rating |
|----------------------------|--------|----------------------------|--------|
| Equally Preferred          | 1      | From Equally Moderately Preferred | 2      |
| Moderately Preferred       | 3      | From Moderately to Strongly Preferred | 4      |
| Strongly Preferred         | 5      | From Strongly to Very Strongly Preferred | 6      |
| Very Strongly Preferred    | 7      | Very Strongly to Extremely Preferred | 8      |
| Extremely Preferred        | 9      |                             |        |

Table 3 to 6 representing Comparison Normalised Matrix with weight obtained from AHP analysis

Table 3 Comparison Normalised Matrix with weight for sub factors of Objective to maintain long-term relationship factor

| Comparison Matrix | Normalised Matrix | Weight |
|-------------------|-------------------|--------|
| LTR1  LTR2  LTR3  LTR4  LTR5 | LTR1  LTR2  LTR3  LTR4  LTR5 |        |
| LTR1  1  0.142  0.333  0.2  0.5 | 0.055  0.084  0.058  0.015  0.025 | 0.047  |
| LTR2  7  1  4  6  8 | 0.388  0.593  0.704  0.478  0.41 | 0.514  |
| LTR3  3  0.25  1  5  7 | 0.166  0.148  0.176  0.398  0.358 | 0.249  |
| LTR4  5  0.166  0.2  1  3 | 0.277  0.098  0.035  0.079  0.153 | 0.128  |
| LTR5  2  0.125  0.142  0.333  1 | 0.111  0.074  0.025  0.026  0.051 | 0.057  |

Table 4 Comparison Normalised Matrix with weight for sub factors of Continuous improvement orientation factor

| Comparison Matrix | Normalised Matrix | Weight |
|-------------------|-------------------|--------|
| CI1  CI2  CI3 | CI1  CI2  CI3 |        |
| CI1  1  0.2  3 | 0.157  0.149  0.272 | 0.192  |
| CI2  4  1  0.2  6 | 0.789  0.745  0.636 | 0.723  |
| CI3  0.333  0.142  1 | 0.052  0.106  0.090 | 0.082  |

Table 5 Comparison Normalised Matrix with weight for sub factors of Supplier Competency factor

| Comparison Matrix | Normalised Matrix | Weight |
|-------------------|-------------------|--------|
| SC1  SC2  SC3  SC4 | SC1  SC2  SC3  SC4 |        |
| SC1  1  0.25  0.333  2 | 0.117  0.038  0.201  0.117 | 0.118  |
| SC2  4  1  0.2  6 | 0.470  0.155  0.120  0.352 | 0.274  |
| SC3  3  5  1  8 | 0.352  0.779  0.603  0.470 | 0.551  |
| SC4  0.5  0.166  0.125  1 | 0.058  0.025  0.075  0.058 | 0.054  |

Table 6 Comparison Normalised Matrix with weight for sub factors of Management Vision & Mission factor

| Comparison Matrix | Normalised Matrix | Weight |
|-------------------|-------------------|--------|
| MVM1  MVM2  MVM3 | MVM1  MVM2  MVM3 |        |
| MVM1  1  5  2 | 0.588  0.555  0.600 | 0.581  |
| MVM2  0.2  1  0.333 | 0.117  0.111  0.100 | 0.109  |
| MVM3  0.5  3  1 | 0.294  0.333  0.300 | 0.309  |
4. Discussion
From AHP analysis it is revealed that Mutual trust is most important sub factor with a weight of 0.514 to accomplish the objective of maintaining long term relationship between manufacturer and supplier. For strategic partnership trust is must it leads to more transparent and seamless flow of information, risk free investment and higher satisfaction in building such relationship. Again Benefit measurement with a weight of 0.723 proved to be a sub factor through which continuous improvement of relationship possible because it is challenging to sustain in the keen competition without measuring improvement of skill & capabilities of suppliers. Further supplier uncertainty ranked highest with a weight of 0.551 to measure supplier competency in supplier selection. Finally Good management practice with a weight of 0.581 is found to be the driving factor in setting the management vision to build relation.

5. Conclusion
Supplier relationship management is the backbone of supply chain management. Now a day’s Suppliers are not defined as who supplies goods rather as strategic partners of firm because of their important role in value chain in understanding of customer’s need. SRM is emerged as global management network that involves skills & knowledge to enhance supply chain performance & to meet the short term and long term needs. So to improve performance of whole supply chain it is high time to focus on the high ranked sub factors under each extracted factor obtained from AHP analysis. An attempt is being made in this paper to represent significance of factors and its sub factors that affecting supplier relationship. This paper will be a managerial guideline to build and maintain buyer supplier relationship.

6. Reference
[1] Eskandari H, Darayi M and Geige 2010 Proceedings of the 2010 Winter Simulation.
[2] Hematyar S and Chaharsooghi K 2014 International Journal of Materials, Mechanics and Manufacturing 2 202-209.
[3] Alaei S, Behravesh M and Karegar N 2014 Prague Economics Papers 2 198-216.
[4] Giannakis M 2012 Int. J. Procurement Management 5 368-408.
[5] Chen Y M 2010 Journals of computing 2 42-47.
[6] Gan X, Sethi S P and Ya H 2004 13 135-142.
[7] Habib M 2014 Open Journal of Social Sciences 2 238-246.
[8] Moyaux T and Draa B C 2007 IEEE transactions on system, man & Cybernetics 37 396-409.
[9] Amoako-Gyampah K and Boye S S 1998 International Journal of Production Economics 54 143–161.
[10] Yao Z, Leung S C H and Lai K K 2008 European Journal of operation research 187 275-282.
[11] Prahinski C and Benton W C 2004 Journal of Operation management 22 39-62.
[12] Saranga H 2009 European Journal of Operational Research 196 707–718.
[13] Kahkonen A K 2011 International Journal of Procurement Management 4 386-401.
[14] Sucky E and Durst S M 2013 International Journal of Procurement Management 6 92-127.
[15] Loppacher J S, Cagliiano R and Spina G 2011 Int. J. Procurement Management 4 156-180.
[16] Lintukangas K 2011 Int. J. Procurement Management 4 1-19.
[17] Hong P and Kwon H B 2012 International Journal of Procurement management 5 452-469.