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Level of Awareness of IT Enabled Tools and Its Effectiveness in Supply Chain Management Practices

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Abstract: The emerging markets of Indian economy have been a focal point of studies about Supply chain management practices. Anyhow Information technology has become the most inevitable part of these Supply chain practices over the years. How far these Information technology enabled tools are used by manufacturers in their day to day activities can determine the success rate of the company itself. Kerala is one such market where manufacturers are still reluctant to emerging global practices and yet untapped potential lies in the area of logistics and supply chain in manufacturing sector. Present study is aimed to understand the relationship between Awareness level and Effectiveness of the IT enabled tools in Supply chain Practices of these Manufacturers. The research is through a well structured questionnaire about the usage of Information technology in Supply chain practices by Manufacturers in Kerala State. The study reveal that there is significant relationship between the Awareness of IT enabled tools in Supply chain practices and overall effectiveness of these practices in manufacturing sector.

Keywords: Electronic Data interchange, Enterprise Resources Planning, Inbound Logistics

I. INTRODUCTION

Supply chain management has been evolving rigorously in the last few decades. Companies who understand the potential of the practices in supply chain management have been researching on this and have become successful in their day to day operations. Kerala is one state where the numbers of manufacturing companies are very less compared to the neighboring states. A study regarding the awareness level of Information technology enabled tools in SCM practices will be beneficial for the upcoming industries as well as the existing companies who wish to initiate a separate body of SCM department.

The research is based on a well structured questionnaire which is the part of a bigger study. The manufacturing sectors in Kerala state have been divided into three for the study. Small scale companies comprising of investments in plant and machinery within 25 lakhs to 5 crore, medium scale companies comprising of plant and machinery worth 5 crore to 10 crores and large scale companies with an investment in plant and machinery above 10 crores. In the state of Kerala the registered numbers of small scale companies are 3532 as per the Kerala state industrial Development Corporation in 2013-2014 survey and medium scale companies are 54 in number and large scale 37 in which 6 are of cooperative sectors. This authentic population is taken for the study and a structured questionnaire is developed and the Awareness of production team regarding the usage of IT enabled tools such as ERP, CRM, SCIS, Barcoding, EDI etc including internet has been surveyed.

The awareness of IT enabled tools in this sector can create tremendous change in the functioning of these manufacturing industries and they can be of great usage to the future generation. Moreover the trends in the market can give suitable difference in the working of any industry such as the development of tracking softwares have revolutionized the postal and courier sectors as the ordinary customer can know where his delivery has reached and how much time it will take to reach the destination. It has also made the players alert that the customer is tracking his item and wherever there is a missing of such item, the customer is able to track and regain it. So the demands on the firms also increased with its efficiency and accuracy. Manufacturing sector also reaps the benefit of such practices through implementation of IT enabled tools in their supply chain practices. Here the study becomes a part of the Inbound logistics and Outbound logistics alone due to its vast area of coverage and the limitations implied on the researcher. Descriptive analysis is used to define the results with inferential analysis using Chi square analysis methodology. The association between the awareness of IT enabled tools in SCM practices and the effectiveness of SCM practices are taken into analysis and the results has been drawn using SPSS software.

II. OBJECTIVES

The study is aimed to understand the Awareness about the IT enabled tools and its effectiveness in SCM practices of manufacturing industries in Kerala.

III. METHODOLOGY

The study was conducted as a descriptive research. The study is based on primary data obtained from manufacturing industries in Kerala through a structured questionnaire. A total of 2523 small scale manufacturing companies, 54 medium scale and 37 large scale companies are defined as the population for the study. From the population 300 small scale units, 30 each medium and large scale industries are chosen as the sample using stratified random sampling technique. Chi-Square analysis, ANOVA and Correlation analysis are the major statistical tools used for the analysis of the data collected for the purpose.

IV. DISCUSSION

Industry trends like Outsourcing, Privatization, Customization, Globalization, Time to market and Pricing motives have forced enterprises to adapt efficient and effective Supply chain management Technologies, Practices, and Policies. Customers expectations are increasing and companies are facing more and more uncertain environments of competition. To survive, companies will find that their conventional supply

chain integration will have to be expanded beyond their boundaries so as to integrate all stakeholders. Adoption of Information Technology tools is vital for such efforts. (Nair, Prasanth R. *et al.* 2009) b. Companies those are not practicing SCM may be having different opinion among them. Some may be due to the lack of knowledge, lack of capital or lack of consistency or the fear of unknown factors. Anyhow here the research is only focusing on the awareness of this aspect.

Supply chain management being the activity starting from the procurement of raw materials from mother earth to the end customer giving a happy feedback to the adjacent players, all the players having their cross functional roles to be played, supply chain spreads all over the manufacturer, distributor (wholesaler), retailer, customer and even before these players the primary player supplier.

The awareness of IT enabled tools are classified into seven basic dependent variables here and these dependent variables are again contributed to different sub variables.

The uniqueness of the study is that (research gap), here the research identifies a different set of individual variables which are acting as the basis for the awareness of the supply chain practices.

Dependent Variables

- 1) Data Warehousing
- 2) Logistics Decision
- 3) Facilities
- 4) Operations
- 5) Sourcing
- 6) Pricing
- 7) Cross Functional Aspects

European Agency for Safety and Health at Work in 2009 has documented a report based on workplace stress. It noted that the impact of workplace A set of structured questions with five point rating scale have been used to survey the dependent variables.

Data ware housing: It is one major area where the SCM practices are of much importance. The data to be precise, accurate, retrieved, gathered, sent, resent, accessed etc is of prime importance in the SCM practices of any organisation. So in this research, the data warehousing practice is also made a factor of prime importance.

Logistics Decision: This makes the practices successful or failure in a particular duration when it comes to SCM practices. The practices can decide the customer satisfaction and all the other factors such as lead time , cycle time are classified under this dependent variable.

Facilities: The development of new warehouse and its design, the location, departmental incorporation etc have a pivotal role in the awareness of IT enabled tools practice in SCM.

Operations : The awareness and knowledge of data re- garding the entire operations of the organisation is a valuable sub variable regarding data awareness in the context of SCM practices.

Sourcing: This is one major area from where the procure- ment process is done. The knowledge of the vendors are of great importance of the production department as the quality factor relies on the vendor rating.

Pricing: being the end product of all the total activities in SCM, companys development and progress depends on the pricing of the product. So considering this, pricing is taken as a major factor.

Cross functional Approach: Supply chain is a practice where functions are inter- cooperative in nature. Every player in the chain is bound to all the activities in the chain, so here the cross functional activities done by the players of SCM are of great importance.

All the above factors are taken as the independent variables who contribute to the awareness of IT enabled tools in SCM practices of manufacturing industries.

V. DATA ANALYSIS

The survey was conducted in all the three sectors of manufacturing, including Small, Medium and Large scale manufacturers.

Table 1
Distribution of Manufacturing Industries in Kerala

| <i>Scale of Industry</i> | <i>Frequency</i> | <i>Percent</i> |
|--------------------------|------------------|----------------|
| Small | 300 | 83.3 |
| Medium | 30 | 8.3 |
| Large | 30 | 8.3 |

The total sample consists of 8.3 percentage of medium and large scale companies each, while the small scale man- ufacturing companies are in majority with 83.3 percentage. It implies that the numbers of medium and large scale companies in Kerala state are much less when compared to neighboring states.

From the above table it can be understood that the level of automation is much higher as fully automated companies constitutes to the maximum and semi automated companies are also high. Manual operating machineries are very low in number when taken into comparison.

Here the percentage of the specific IT enabled tools is clearly mentioned through the table. Internet is commonly used by almost 75 percentage of companies as rest are using other means like RFID, ERP etc.

The survey further reveals that the level of improvement of SCM practices can be 73 percentage better when compared with an opinion of 27 percentage low.

Table 2
Distribution of Level of Automation of Manufacturing Industries in Kerala

| <i>Automation based classification</i> | <i>Frequency</i> | <i>Percentage</i> |
|--|------------------|-------------------|
| Fully automated | 188 | 52.2 |
| Semi automated | 109 | 30.3 |
| Manually operated | 63 | 17.5 |
| Total | 360 | 100 |

Table 3
Distribution of IT enabled tools used in Manufacturing Industries in Kerala

| <i>Currently used IT tools</i> | <i>Frequency</i> | <i>Percent</i> |
|--------------------------------|------------------|----------------|
| ERP | 8 | 2.2 |
| Bar coding | 10 | 2.8 |
| Internet | 269 | 74.7 |
| Others | 73 | 20.3 |
| Total | 360 | 100 |

Table 4
Supply Chain Practices through Implementation of IT Enabled Tools

| <i>Level of improvement</i> | <i>Frequency</i> | <i>Percent</i> |
|-----------------------------|------------------|----------------|
| Low | 97 | 26.9 |
| Moderate | 138 | 38.3 |
| High | 125 | 34.7 |
| Total | 360 | 100 |

Table 5
Distribution of Level of Awareness about IT enabled Tools in SCM Practices

| <i>Level of Awareness</i> | <i>Frequency</i> | <i>Percentage</i> |
|---------------------------|------------------|-------------------|
| Low | 96 | 26.7 |
| Moderate | 173 | 48.1 |
| High | 91 | 25.3 |
| Total | 360 | 100 |

The above table depicts that the level of awareness of IT enabled tools in SCM practices are there in Kerala industry as 73 percentage of them agree to it and only 27 percentage replied that the awareness is low compared to other states.

VI. IT ENABLED TOOLS AND SCM PRACTICES

To study the significant difference between IT enabled tools used in organizations and the dependent variables, a hypothesis is developed.

VII. HYPOTHESIS I

Null Hypothesis: H₀ - There is no significant difference among IT enabled Tools used in Company with respect to factors under study.

ANOVA is used to analyze the above hypothesis and the results are given in table 6.

From the ANOVA table it can be clearly understood that the overall awareness about IT enabled tools in SCM practices depends on the various IT tools used. Data warehousing, Logistics decision, Facilities,

Operations and Cross functional aspects are having significance at 5% level while Pricing is having significance at 1 % level. Sourcing is not significant throughout.

So it can be explained that the various IT enabled tools used has a major role in the awareness creation in manufacturing sector about the use of these tools in SCM practices. Bar coding and ERP are more familiar with the industry than other sides. Internet is used by almost all the organizations in one or the other way.

Level of Awareness about IT Enabled Tools and Level of Effectiveness in SCM practices: To study the association between the level of awareness of IT enabled tools in supply chain management and how effective they can be in these practices, the following hypothesis is developed.

VIII. HYPOTHESIS II

Null Hypothesis: H0 - There is no Association between Level of Awareness of IT Enabled tools in SCM Practices and Level of Effectiveness in SCM Practices.

Chi square analysis is used to test the hypothesis and the results are provided in table 7.

From the analysis it is clear that there is a clear association between the Awareness of IT enabled tools in SCM practices and the Effectiveness of SCM practices of manufacturing companies as H0 is rejected and alternate hypothesis is accepted. The inference is that there is a significant association between the Awareness of these IT enabled tools in SCM and the Effectiveness of SCM.

Awareness of it Enabled Tools in Supply Chain Practices and Overall Effectiveness in SCM Practices:

To understand the correlation between the awareness of IT enabled tools in Supply chain practices and Overall effectiveness of these IT enabled tools in Supply chain management, Pearson correlation coefficient is found

Table 6
IT Enabled Tools and SCM Practices of Manufacturing Industries in Kerala

| | <i>Tools used in company</i> | | | | <i>f Value</i> | <i>p Value</i> |
|--------------------------|------------------------------|-------------------|-----------------|----------------|----------------|----------------|
| | <i>ERP</i> | <i>Bar coding</i> | <i>Internet</i> | <i>Others</i> | | |
| Data Warehousing | 31.75 | 38.2 | 32.01 | 30.15 | 6.727 | 0.000** |
| Logistics Decision | -6.82 | -1.23 | -5.26 | -6.66 | | |
| Facilities | 21.38 | 23.6 | 20.71 | 18.99 | 7.872 | 0.000** |
| Operations | -2.33 | -0.84 | -3.19 | -4.51 | | |
| Sourcing | 20.63 | 23.2 | 19.98 | 18.51 | 6.72 | 0.000** |
| Pricing | -3.02 | -1.55 | -3.37 | -4.27 | | |
| Cross Functional Aspects | 21.5 | 23.2 | 20.3 | 19.45 | 4.905 | 0.002** |
| Overall Awareness | -3.51 | -1.48 | -3.14 | -3.33 | | |
| about IT enabled tools | 22 | 23 | 20.91 | 20.71 | 2.504 | 0.059 |
| in SCM Practices | -1.6 | -2 | -2.7 | -2.94 | | |
| | 22.38 | 23.3 | 20.62 | 20.37 | 3.208 | 0.023* |
| | -1.6 | -1.16 | -3.31 | -3.18 | | |
| | 23.50 (1.41) | 24.40 (1.26) | 21.54 (2.68) | 20.81 (3.37) | 6.486 | 0.000** |
| | 163.13 (12.16) | 178.90 (4.25) | 156.08 (18.14) | 148.99 (23.50) | 8.389 | 0.000** |

The Value within the bracket refers to SD ** represents significant at 5% level * shows significant at 1% level

Table 7
Level of Awareness of IT Enabled Tools in SCM Practices and Level of Effectiveness in SCM Practices

| <i>Level of Awareness about IT enabled tools in SCM Practices</i> | <i>Low</i> | <i>Moderate</i> | <i>High</i> | <i>Total</i> | <i>Chi-Square</i> | <i>p-Value</i> |
|---|------------------|-------------------|------------------|--------------|-------------------|----------------|
| Low | 63 (65.6) [67.0] | 14 (14.6) [8.1] | 19 (19.8) [20.2] | 96 | | |
| Moderate | 18 (10.4) [19.1] | 112 (64.7) [65.1] | 43 (24.9) [45] | 173 | 115.756 | 0.000** |
| High | 13 (14.3) [13.8] | 46 (50.5) [26.7] | 32 (35.2) [34.0] | 91 | | |

The Value within () refers to Row Percentage, and [] refers to Row Percentage ** denotes significance of factors at 1% level

The correlation between Data warehousing and Logistics decision is found to be 0.783, ie, 78.3 percentage positive relationship between these two exists. Similarly Data warehousing and Facilities has 70.1 percent positive relationship between them at 1 percentage level of significance. All the factors have positive relationship within them when correlated to each other. Which indicates that Awareness level of IT enabled tools have a positive correlation regarding the overall effectiveness of SCM practices.

IX. PRACTICAL IMPLICATIONS

The future of any organization depends on the most efficient response the company can provide to its customers. Hence SCM is one and the most focused area in entire management aspect nowadays. The response time taken by the organisation determines its efficiency and effectiveness and hence it can be stated that SCM is the new point of competence where companies can develop their own models. Efficient SCM practices can be enhanced through modern technological advancement. Information technology has its own advantage and since the integration of IT in manufacturing fields from late 1960s has made the manufacturing a great place to deal with. Manufacturing support systems have been developing all over the world since last few decades and Kerala is one place where potential is high when compared to the standards.

Table 8
Awareness of IT enabled tools in supply chain and overall effectiveness in SCM practice

| <i>Factors of Awareness of IT enabled tools in supply chain</i> | <i>Data Warehousing</i> | <i>Logistics Decision</i> | <i>Facilities</i> | <i>Operations</i> | <i>Sourcing</i> | <i>Pricing</i> | <i>Cross Functional Aspects</i> | <i>Overall Effectiveness in SCM Practices</i> |
|---|-------------------------|---------------------------|-------------------|-------------------|-----------------|----------------|---------------------------------|---|
| Data Warehousing | 1 | 0.783(**) | 0.701(**) | 0.691(**) | 0.446(**) | 0.320(**) | 0.480(**) | 0.619(**) |
| Logistics Decision | | 1 | 0.775(**) | 0.681(**) | 0.462(**) | 0.405(**) | 0.525(**) | 0.715(**) |
| Facilities | | | 1 | 0.697(**) | 0.435(**) | 0.345(**) | 0.418(**) | 0.638(**) |
| Operations | | | | 1 | 0.616(**) | 0.447(**) | 0.464(**) | 0.642(**) |
| Sourcing | | | | | 1 | 0.719(**) | 0.486(**) | 0.602(**) |
| Pricing | | | | | | 1 | 0.501(**) | 0.592(**) |
| Cross Functional Aspects | | | | | | | 1 | 0.592(**) |
| Overall Effectiveness in SCM Practices | | | | | | | | 1 |

** denotes significant at 1

Once the benefits of IT enabled tools are made clear, the manufacturing field itself will integrate IT as a part of production process.

- IT enabled tools can create a faster communication network when compared to the traditional way
- International coding can be easily done and understood through IT enabled tools
- Tracking is made easily possible and the data sharing have become more effective and flawless
- Cost of quality can be much reduced through usage of IT enabled tools in SCM practices

X. FINDINGS

- Data warehousing is the major area which is to be taken into consideration when understanding IT enabled tools and their use in SCM practices.
- The Logistics decision, Facilities, Operations, Sourcing, Pricing and Cross Functional approaches are the major contributing factors to the creation of Awareness in SCM practices about the benefits of IT enabled tools.
- Level of Awareness about IT enabled tools in SCM practices has association with the level of effectiveness of total SCM practices.
- All the factors taken as dependent variables for awareness creation of IT enabled tools have positive correlation with each other and also overall effectiveness of SCM practices are proved to be dependent on these factors.

XI. CONCLUSION

IT enabled tools play a vital role in the international trade today. It is with this aid that the global firms are successful in their business models. In India, the Indian postal service had their successful upliftment from the failures in late 20th century with the enabling of IT enabled tools. Manufacturers of higher class such as Hinduja group and other pioneer players use IT enabled Supply chain practices for the ease of functioning. If made practical, within a short span of a decade, manufacturing companies in Kerala will prove their supremacy and effectiveness through these technologies by enhancing their SCM practices using the latest IT enabled tools in their inbound and outbound logistics.

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