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"TADS" Approach in Supply Chain Agility

M. Balaji, Dr. G. Karuppusami, R. Sudhakaran, A. Chobiya Ashwini

Abstract— In the continuously changing and demanding market environment, the product capabilities alone are insufficient to retain the market hold. Rather, the supply chain must also keep changing accordingly. This may in turn help the firm sustain the market with the old products. It is certain that when the innovation in the product is quite infeasible or not cost effective, the firms should concentrate on their supply chain and its enablers and try to make existing chains flexible. To quantify the efficiency of the chain, a model called "TADS" is proposed. This paper discusses the functions of TADS, the prior works carried on it and enumerates the desirable effects of adapting TADS in the firms to make their supply chains more responsive in order to survive in the contemporary market scenario.

Index Terms— TADS, Supply chain agility, supply chain enablers.

1 Introduction

THE present scenario of the market demands both the manufacturing organizations and service organizations to become more flexible and adaptive to the ever changing customer needs. Customer satisfaction is the driver that has the greater impact. They not only focus on the products but also the way it reaches their hands. For this purpose the firm needs to be most effective in managing its supply chain. Thus the supply chain management is defined as "Design, planning, execution, control, and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand and measuring performance globally." Not just managing the supply chain will bring about the best result, the supply chain also needs to be more adaptive to the changing market and customer demands. Such flexibility in supply chain is called the supply chain agility.

It is defined as, "SCA is an operational strategy focused on inducing velocity and flexibility in the supply chain". Supply chain agility involves both management and technology. Even though ample number of works on supply chain agility has been done so far, the work on TADS is much limited. This paper deals with the impacts of the total agile design system. To find the level of agility in the firm's SC a parameter called the "Agility Index" is to be computed. It can be calculated through number of techniques. Quite often by the responses from the employees of the organization for a set of questionnaires or simple computational techniques.

2 Agile Supply Chain

An agile supply chain is an integration of the business partners to enable new competencies in order to respond to rapidly changing, continually fragmenting markets. The key enablers of the agile supply chain are dynamics of structure and relationships configuration, the end – to-end visibility of information, and the event-driven and event-based management. An agile supply chain is a key enabler for enterprise agility.

The agile supply chain is *market sensitive*. By market sensitive it is meant that the supply chain is capable of reading and responding to real demand. Most organizations are forecast-driven rather than demand-driven. In other words because they have little direct feed-forward from the marketplace by way of data on actual customer requirements they are forced to make forecasts based upon past sales or shipments and convert these forecasts into inventory.

The breakthroughs of the last decade in the form of Efficient Consumer Response (ECR) and the use of information technology to capture data on demand direct from the point-of-sale or point-of-use are now transforming the organization's ability to hear the voice of the market and to respond directly to it.

Specifically, the agile supply chain should possess the following characteristics:

2.1 Market Sensitiveness

Market sensitivity incorporates demand for individualized products and services with quicker delivery time and fast response to sudden changes in order quantity and specification.

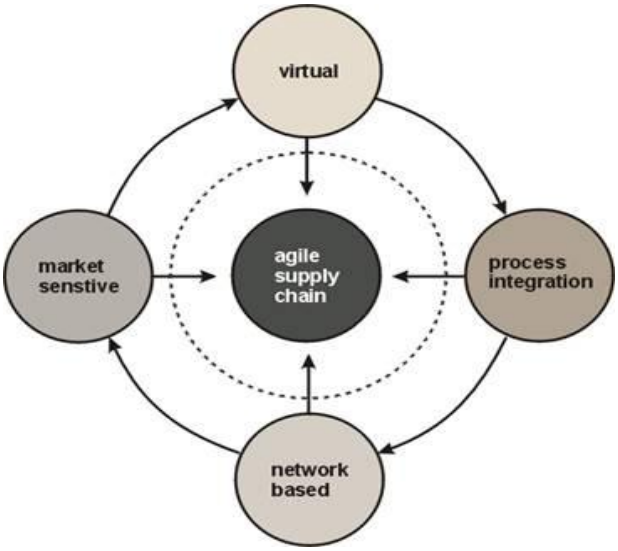
2.2 Virtual Integration

Virtual supply chains are information-based rather than inventory based with a focus on instantaneous demand capture, interpretation and response.

2.3 Network Integration

This requires better structuring, coordination and management of the relationships with the partners in a network committed to better, closer and more agile relationships with their final customers.

- *M.Balaji., M.E.,M.B.A.,M.I.I.E.,is working as Asst prof(SRG), Department of mechanical engineering, Kumaraguru college of technology, Coimbatore, India, E-mail: balpurush@rediffmail.com*
- *Dr. G. Karuppusami is the Director- Karpagam university, Coimbatore, India.*
- *R. Sudhakaran, M.E.,is working as Asst prof(SRG), Department of mechanical engineering, Kumaraguru college of technology, Coimbatore, India.*
- *A.Chobiya Ashwini., is currently pursuing masters degree program in Industrial engineering Kumaraguru college of technology, Coimbatore, India, PH-09677964662. E-mail:* chobiyaashwini@gmail.com



2.4 PROCESS ALIGNMENT

By process alignment is meant collaborative working between buyers and suppliers, joint product development, common systems and shared information.

These characteristics make an agile supply chain to be highly responsive to customer preferences in short interval of time. But supply chains cannot become agile overnight. There are certain enablers which would help to transform a supply chain into an agile entity. Some of them are collaborative working between supply chain partners, joint product development, common systems and shared information. Understanding these enablers is important as they not only impact the agility in the supply chain, but also influence each other. The identification of the enablers that are at the root of some more enablers (called driving enablers) and those which are more influenced by others (called driven enablers) would be helpful for the top management contemplating to transform their supply chain into a truly agile entity. Also an objective evaluation of those enablers which are most important for agile supply chains would be an aid to managers for benchmarking and understanding the areas needing improvements.

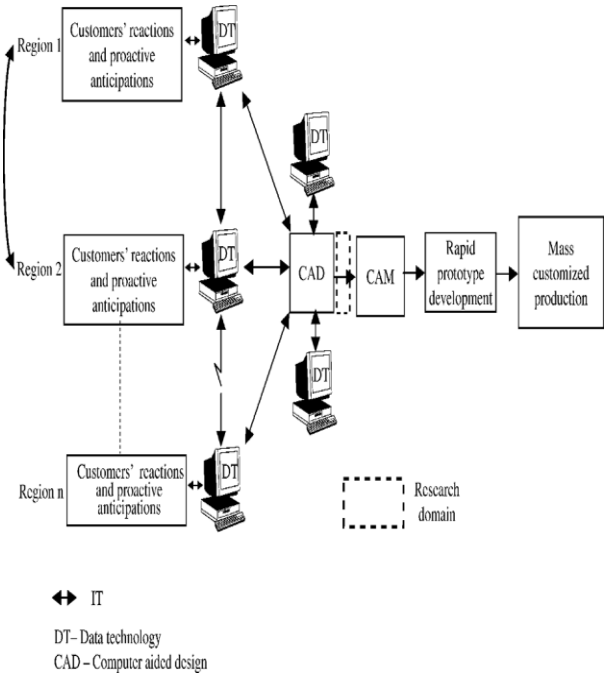
3 LITERATURE REVIEW

The origin of ASC was by the institutionalization of agility forum at Iacocca Institute, Lehigh University, USA in the year 1990. From then on number of works has been under taken in ASC. Yet only a very work explains about quantifying the agility. One such model developed in the recent past is the "Total Agile Design System". S. Vinodh & G. Sundararaj & S. R. Devadasan on "Measuring organisational agility before and after implementation of TADS". The ever increasing competition compels the modern organisations to react quickly in accordance with this kind of dynamic demands of the customers, which is referred to as agility, and currently researchers are addressing these capabilities under the field agile manufacturing. The success of achieving agility lies in designing agile-friendly products. In this direction, very little researches have been pursued. In order to fill this gap, a model called total agile design system (TADS) is proposed. The implementation study conducted to examine this model in a traditional manufacturing company is briefly appraised. A scoring model has been used for measuring agility before and after implementation of TADS. The implementation study revealed the improvement of agility by 10%. This improvement is appreciable in traditional manufacturing organization where only the mass production-based practices are only currently practiced. Their work is much appreciated here. Y.Y. Yusuf, A. Gunasekaran, E.O. Adeleye, K. Sivayoganathan on 'Agile supply chain capabilities': Determinants of competitive objectives. Changing customer and technological requirements force manufacturers to develop agile supply chain capabilities in order to be competitive. Therefore, several companies are stressing flexibility and agility in order to respond, real time, to the unique needs of customers and markets. However, the resource competencies required are often difficult to mobilize and retain by single companies. It is therefore imperative for companies to co-operate and leverage complementary Competencies. To this end, legally separate and spatially distributed companies are becoming integrated through Internet-based technologies. The paper reviews emerging patterns in supply chain integration. It also explores the relationship between the emerging patterns and attainment of competitive objectives. The results reported in the paper are based on the data collected from a survey using the standard questionnaire. The survey involved 600 companies in the UK, as part of a larger study of agile manufacturing. The study was driven by a conceptual model, which relates supply chain practices to competitive objectives. The study involves the use of factor analysis to reduce research variables to a few principal components. Subsequently, multiple regressions were conducted to study the relationship amongst the selected variables. The results validate the proposed conceptual model and lend credence to current thinking that supply chain integration is a vital tool for competitive advantage. Suzanne de Treville , Roy D. Shapiro , Ari-Pekka Hameri 'From supply chain to demand chain': the role of lead time reduction in improving demand chain performance. To improve demand chain performance, is it better for parties in a supply chain to focus first on lead time reduction, or instead concentrate on improving the transfer of demand information upstream in the chain? Even though the theory of supply and demand chain management suggests that lead time reduction is an antecedent to the use of market mediation (i.e., adjusting production to fit actual customer demand as it materializes) [Harvard Business Rev. 75 (2) (1997) 105] to reduce transaction uncertainty in the chain, which can be conceptualized as the primary goal of supply chain management [J. Operat. Manage. 11 (3) (1993) 289], demand chain parties often are observed in practice to begin with information transfer improvement, ignoring the problem of long lead times. In this paper, we propose a framework for prioritizing lead time reduction in a demand chain improvement project, using a typology of demand chains to identify

and recommend trajectories to achieve desirable levels of market mediation performance.

M.N. Faisal*, D.K. Banwet and R. Shankar 'Supply chain agility: analyzing the enablers'. Supply chain agility is important as it provides the capability to quickly adapt the changing market requirements. So every organisation is working towards transforming their supply chains into agile entities. But, it needs a proper understanding of variables that impact the agility of supply chains. Using Interpretive Structural Modelling (ISM), this paper has developed a hierarchy of these variables. Further, Graph Theoretic Approach (GTA) is applied to quantify the most important variables as deduced from ISM model and to understand the interdependencies among them. The results show that not all the variables require the same focus; instead there is a set of variables known as driver variables which needs maximum attention. An agility improvement index is proposed based on these driver variables to compare various supply chains on agility improvement efforts. Integration of ISM and GTA is a unique effort in the area of supply chain management.

Sanjay Jain 'Supply chain management tradeoffs analyses'. Supply chain management involves understanding complex interactions between many factors and using the understanding to achieve balance between conflicting objectives. Simulation is a very useful technique to evaluate the impact of changes in factors such as inventory control and business process parameters. This paper describes a simulation based study for analyzing the tradeoffs among service level, inventory and lead times for a large logistics supply chain. The study highlights the use of simulation in understanding seemingly non-intuitive results and guiding the effort for performance improvement.



The review of the above papers revealed certain interesting facts about the researches on measuring agility. Since the characteristics are numerous, it is advisable to group them under different categories while measuring agility in organizations. The current researchers are in the pursuit of applying modern software-oriented approaches, namely, neural network and fuzzy logic for measuring agility in organizations. However, it is not clear whether these principles are simple enough to provide the quantified value of agility. It appears that the scoring approach for quantifying agility would be a feasible proposition.

4 Total Agile Design System

"TADS" quantifies the industry's SC agility through adapting the technological advancements. In TADS the varying customer requirements are translated to design requirements using various technologies. This transformation of the voice of the customer is termed the "Quality function Deployment". Once the design requirements have been finalized, then by making use of CAD software packages, the design engineers can derive digital designs of the customers' aspirations. Before analyzing the manufacturing feasibility of the digital designs, scientific analyses (if found necessary) need to be carried out. This phase is termed as CAD/CAM interfacing. This is followed by analyzing the manufacturing feasibility of the developed designs using appropriate CAM software packages. After performing the scientific simulation, the manufacturing phase could be initiated. Alternatively, for short-run production, RP and RT technologies could also be utilized. Various RP and RT technologies are exclusively available for performing design visualization, functional testing as well as for rapid product development. This is done generally for manufacturing the agile products similarly to create an agile supply chain the requirements of the customers or what they assume to be the improvement to be made in the supply chain has to be known well in advance before implementing TADS. For this purpose the survey is most often used. In the survey number of factors called the "supply chain enablers" is provided to the customers for whom their responses are translated to compute the parameter called the "Agility Index".

Often the agility index is computed with the following formula:

Agility Index = score /Total score.

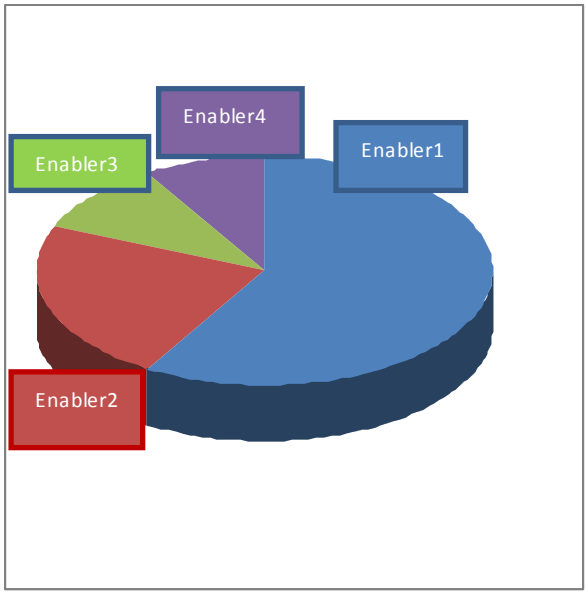
With this the agility of the company before and after TADS can be computed quantitatively. Thus the TADS is the quantitative tool to assess the qualitative asset of the firm.

5 Supply Chain Enablers

A number of enablers are available for computing the score of

the SCA. Few are unwillingness of geographic spread and access to customer, poor collaborative relationship among supply chain partners, lack of commitment of top management, lack of strategic planning, financial constraints, lack of trust among partners, lack of information and technological system, and resistance to change. In TADS the above enablers are given weightage according to some prioritization methods.

An example is shown below:



ENABLERS	SCORE
Lack of information and technological system	600
Financial constraints	200
Lack of trust among partners	150
Resistance to change	50

6 Conclusion

The supply chain agility can be achieved with the improved co-ordination among the different levels of supply chain which is the greatest asset of the SC. Thus by improving the co-ordination among the phases, negative impacts of the "Bull-Whip effect" can be minimized to a greater extent. It makes the supply chain more profitable and flexible. Indian industries invest a great deal in terms of raw material movement from suppliers and in delivering goods and services to customer. One of the primary goals of a successful supply chain is to be agile in nature, which can be obtained by its flexibility in delivery schedule and responsiveness. The barriers hindering however pose considerable challenges for both managers and policymakers in industries. Thus, the management needs to address these barriers more carefully in the supply chains. In addition, what is needed in this volatile market is the redesigning of the supply chains to achieve lean and the flexible supply chain and evaluation of the flexibility with the help of agile quantification tools. By implementing TADS the supply chain agility can be improved around 10-12% on the whole, which can be even made to perfection in the longer run. Improvement in agility will reflect the increased ROI and most importantly create delighted customers.

7 Acknowledgement

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