

# Multi-layer flow management model in Supply chain management

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**Abstract.** Definition of the Multi-layer flow management model scope. This scope should be taken into consideration as a basis for creation of a synergic and holistic setting for a collaborative supply chain management. The approach is not based on the analysis of each operation and process and their “sub-optimization”, rather relies on a holistic view, that takes into account strategies, goals, systems, geographical dispersion, time dispersion, demand patterns and product portfolios of all parties incorporated into the collaborative supply chain through synergic connections.

**Keywords:** Multi-layer flow management model, Supply chain, Flow management, Collaborative supply chain, Value stream, Synergy, Holistic approach

## 1. Introduction

The speed of information, loose of geographical allegiance of entities, radical changes in demographics on the globe and great shifts in the dynamically emerging and disappearing connections, are causing that the factor change, meant in this paper as a managed and aimed activity, in the means of ability to adapt to the new conditions, ability to search and define new solutions, alternatives and ways, ability of continuous improvement and others, is becoming the main theme of these days for the managements.

The need for optimization of design, management, control and coordination of the value stream flows in these days is becoming even bigger challenge in the light of the actual global recession and changes ongoing in all fields. Even further, these activities, or changes, are not an internal problem to the organizations any more. The globalization, spread of the markets, changes in demands, etc. are causing that the collaboration and a collaborative supply-chain must emerge to deal with the needs, wants, demands and expectations of the end-customer.

As to the collaboration in the supply chain, this theme has been widely discussed in many years, and a wealth of concepts is available at hand. As an example Efficient Consumer Response (ECR) in the fast moving consumer goods sector, or Vendor Managed Inventory (VMI), Collaborative Planning, Forecasting and Replenishment (CPFR) or Supply-chain Reference Model (SCOR) initiatives provide a rich basis of strategies for the establishment of collaboration amongst supply chain partners.

These models, strategies or philosophies are by them self powerful tools that can establish a well defined links between the entities. While many successful implementations have been reported, Toyota and Wall-Mart just as examples, there has not yet been bigger spread that was originally hoped for. One of root-causes for the slow progress to date, may be due to a lack of a holistic and synergic approach in design, management, control and improvement of the collaborative supply-chains from the point of view of changes.

The goal of this paper is to present a starting point for an approach that can be used in definition, management, control and improvement of the collaborative supply-chain, with the aim at the holistic view and synergies that emerge from the links not only between the entities but also operations, services, products, strategies, etc. and incorporates the change as an all the time present process.

I draw upon models that are already developed and used, with more over successful implementation in real world, to illustrate what companies need to do, to fully benefit from the collaborative efforts.

The outcome of this is the Multi-layer flow management model as presented in Fig. 1.

I conclude that the efficiency and effectiveness of any collaborative supply chain relies on the integration of internal and external operations and processes into one synergic setting. This setting cannot be based only at the analysis of each operation and its “sub-optimization”, but really needs to be approached from a holistic view, that takes into account not only operations but also, people, cultures, strategies, goals, systems, geographical dispersion, time dispersion, demand patterns and product portfolios of all parties incorporated into the collaborative supply-chain.

## **2. Concept of the Supply chain and Value stream**

This part of the text is presenting a brief depict of the basic philosophies how to approach the flow management issues.

### **2.1. Supply chain managemnt**

In the 1980s the term Supply chain management has started to spread dramatically in the vocabulary of the management. This had the goal to express the need and effort for integration of the whole chain of processes, from the original suppliers to the end users.

The basic idea of this integration into the supply chain is to get higher efficiency and effectiveness in the whole process of serving the customer, from the starting point to the end-user.

This effort is supported by the idea that, if all relevant information is available to the users, the supply chain as a whole has better starting point for the absolute goal and that is to serve the customer demand. This should lead to better sales, lower inventory, lower leadtimes, higher flexibility and better quality.

The supply chain management can be perceived as another evolutionary step, that starts with all the functions, operations and processes as defined and used by logistics and moves through their integration not only internally, but especially externally, into higher levels of functionality and thinking.

### **2.2. Value streams**

Value stream mapping is a very commonly used technique in Lean management to identify opportunities for improvement. In a build to the standard form Shigeo Shingo is suggesting that the value adding steps should be drawn accross the centre.

All the non-value adding steps should be then drawn as vertical lines at right angles to the value stream. This method of visualisation separates the value stream, so the responsible people, mostly management can take the proper decisions about the improvement focus.

This method was and is still popular because it is spreading the philosophy of value added vs. non-value added operations.

The better the condition of the value stream (the ratio between the value added and non-value added steps defined by the customer), the better starting point we have to serve the customers needs as the basic goal of each organization.

# Multi-layer flow management model

## Strategic level



Strategic level is defining the framework of the flow management (scope, timeframe, execution, strategies, scenarios, etc.), and is enabling the proper design, management and improvement of the lower levels.

As an illustration the CPFR model is used as an outline for the framework visualization.



## Tactical level

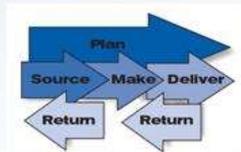


The tactical level defines the flow of decisions, information, material, products, services, etc. that supports and allows the strategic level to full-fill the final goal of the whole flow, and enables the collaboration of the entities that the flow consist of.

As an illustration the SCOR model - high scope view, is used as an outline for the flow framework visualization.



## Entity level

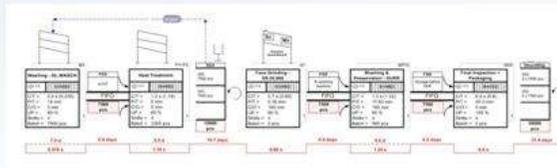


The entity level defines the flow of decisions, information, material, product, services, etc. inside of each entity that the flow (in this case the supply-chain) consists of. It supports also the tactical and strategic levels of flow management. Prime function of entity level is to enable the value stream as the basic prerequisite for the customer demand satisfaction.

For the illustration the SCOR model - level 1 view, is used for the framework visualization



## Value stream level



The value-stream level defines each operation that adds value and each operation that does not add value to the end-product, that is the objective of the whole flow. This level is defining the work and operations that need to be performed so the customer as the end-user, or the last entity in the flow is satisfied, and the goal of the flow is achieved.

For the illustration a Value-stream map is used in this case for the framework visualization.

Fig. 1. Multi-layer flow management model.

### 3. Multi-layer flow management model

The previous mentioned philosophies of supply chain and value added vs. non-value added operations are leading us to the idea of interconnectivity between the suppliers and customers at the most basic level – value stream and via the basic connections between the entities defined in the entity level.

This degree of connectivity depends on many factors. It is not the aim to define and classify all of those in this paper. But we can assume that at some point of this connectivity a collaboration state emerges. The collaboration state is achieved, when not only the value streams (first level) and information flows (entity level) are connected, but also a coordination framework exists and is spread throughout the supply chain with the goal of its optimization at all stages and in all forms.

This coordination is achieved through a tactical level (third level) of flow management model based on the idea of an integrated management system build through the management systems of all participating entities. Such a system can be only effective and efficient when a proper system of “agreements” or strategies is setuped.

This is when a strategic level of the flow management model comes into consideration and use. The strategic level is defining the framework of the flow management. The framework consists of such themes as scope, timeframe, execution, strategies, scenarios, rules of engagement, and others that need to be considered when the collaboration is setuped between all the entities incorporated into the supply chain. The strategic level is through this system of “agreements” enabling the proper design management, control and improvement of the lower levels of flow management.

There is no rule which is saying how to start implementing the model. There are many approaches, and each situation will trigger a different implementation plan. It is but more effective when we setup the framework, then introduce the information coordination and management basis for the supply chain and as the last step we implement the changes in the flows. The figure 1.1 is showing the Multi-layer flow management model with all four levels. As for the representation of processes in those layers, I chose successful models used by many companies world wide for supply chain optimization.

### 4. Conclusion

The goal of this paper was to present a starting point for an approach that can be used in design, management, control and improvement of the collaborative supply chain, with the aim at the holistic view and synergies that emerge from the links not only between the entities but also operations, services, products, strategies, etc. and incorporates the change as an all the time present proces.

### References

- DISNEY, S.M., and TOWILL, D.R. *Bullwhip Reduction in Supply Chains: The Impact of VMI*, International Journal of Operations and Production Management, Vol. 23, No. 6, 2003
- FISHER, M. L., *What is the right supply chain for your product?*, Harvard Business Review, March-April, 1997
- FISHER, M. L., *Supply chain inventory management and the value of shared information*, Management Science, Vol. 46 No. 8, 2000
- HOLMSTROM, J., SMAROS, J., DISNEY, S.M. and TOWILL, D.R., *Collaborative supply chain configurations: The implications for supplier performance in production and inventory control*, 8th International Symposium of Logistics, Seville, 2003
- STERMAN, J. D. *Modeling Managerial Behavior: Misperceptions of Feedback in a Dynamic Decision Making Experiment*, Management Science, Vol. 35, No. 3, 1989