White Paper

“Collaborative End-to-End Supply Chain”
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For the 27th consecutive year, KEDGE Business School Global Supply Chain Management Program, ISLI, organizes and hosts the Supply Chain Forum. Unique meeting place and crossroad for ideas and discussions on the evolution of the supply chain, the Forum gathers every year more than 300 international supply chain leaders.

New challenges, technology evolutions, new consumptions models are on the rise. Supply chain leaders have to innovate constantly to face these issues.

This year, the Supply Chain Forum offers to discuss these challenges around 5 round tables animated by high profile supply chain leaders on the following themes:

1. Managing the Supply Chain in a VUCA world
2. Smart & Digitalized Supply Chain
3. Collaborative End-to-end Supply Chain
4. Omni-Channel Supply Chain
5. Sustainable Supply Chain

The discussion and a summary of the proposed solutions will be grouped together in a White Paper so that each participant can keep some of the elements of the discussion around the main question that we are proposing this year: How to collaborate, perform, evolve, now?

White paper
“Collaborative End-to-End Supply Chain”
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OVERVIEW

End to end supply chain is a business strategy that connects all the nodes of the supply chain together from the first supplier to the final consumer through real-time information. In order to achieve an end to end supply chain, the concept of “collaboration” within a supply chain should be introduced.

Collaboration in the context of supply chain can be viewed as “two or more independent companies working jointly to plan and execute supply chain operations with a greater success than when acting in isolation.” (Simatupang & Sridharan, 2002) It will help during the decision-making process and will also reduce demand uncertainty and improve the general performance of the supply chain. The benefits of this strategic end to end view on Supply Chain operations are, for instance, improved service level, better forecast accuracy, reduced inventory costs and increased sales’ levels.

This paper seeks to provide an insight on how to achieve an end to end collaborative supply chain. Thus, the term “Collaborative End to End Supply Chain” is first defined. Then, the paper concentrates on the value added by collaboration throughout the supply chain. The next section is about the important factors to take into consideration when building a collaborative supply chain and the tools used for collaboration throughout the supply chain. The following section presents the implementation process of the end to end collaboration strategies. The last part proceeds through an insight of the measurement of collaboration in a supply chain. After concluding, a practical insights section gives this paper a very practical approach, with interviews of Industry leaders who share their opinions and experiences on this topic.

Supply chain is a vast and complex field of study and there are many avenues which still remain virgin to research. Linking all the fields in the network through the concept of collaboration is a single step towards attaining the goal of creating a true meaning to “end-to-end supply chain”.
What is a collaborative end-to-end supply chain?

There are two types of collaboration in a supply chain. The first one is referred as vertical collaboration where organizations along a supply chain work together to achieve a common goal. The second type is called horizontal collaboration and it consists of two or more competing or non-competing supply chains working together to achieve a common goal. For example, Multi-Pick service provided by third part logistics companies allows two or more companies sharing their transportation. Because of the specific orientation about horizontal collaboration, this White paper will concentrate on vertical collaboration so that the work focuses on the design of collaborative end to end supply chain and not so much about the networks design that horizontal collaboration incurs.

An end to end vertical collaboration is about creating an efficient supply chain by collaborating and integrating along the supply chain where all players in that supply chain are included. It aims to achieve a state of a seamless production and distribution network. We use the term vertical collaboration to specifically define collaboration between two or more players of the same linear supply chain.

There are different kinds of practices in vertical collaboration, the most well-known are Vendor managed inventory (VMI), Co-managed inventory (CMI), Collaborative planning forecasting and replenishment (CPFR) and so on. These practices can be implemented between two organizations along the supply chain. It helps build vertical collaboration in small sections of the supply chain, but to achieve an end to end collaborative supply chain, we need to look at a larger scale.

Figure1.: End to End Supply Chain Collaboration Illustration; summarize the use of collaborative tools in different supply chain stages. VMI and CMI are commonly used between two organizations in a supply chain. For example, this is illustrated by the arrows between Supplier and Factory; Factory and Distributor; Distributor and Retailer; Retailer and Consumer.

Likewise, CPFR, MECC (Multi-Enterprise Cloud Connectivity) and TMR (Third-Party Managed Replenishment) services are more likely to be implemented throughout the supply chain improving information flow. This means that the consumer’s demand flow will pass through the supply chain from end to end decreasing the bullwhip effect and thus creating a much efficient network. The arrows represent the extent to which each tool can be implemented within a supply chain. For example, companies that implement CPFR through their supply chain can get a seamless network flow from the supplier to the consumer as illustrated below.
Why it is important to implement a collaborative end-to-end supply chain?

Achieving a collaborative end to end supply chain is difficult but worth the effort. A successful supply chain relationship will bring more than just cost efficiencies and economic conveniences. Collaboration throughout a supply chain brings competitive advantage and value added to your network.

Through collaboration among the different supply chain players, best practices focus on how to manage the different processes and activities in the supply chain thus giving more operational efficiency. The access to the buyer’s planning largely contributes to this efficiency. This in the long run reduces operating costs for all partners. Inventory will be managed by just in time (JIT) policy rather than keeping excess stock, this will reduce inventory carrying cost.

Thanks to end to end supply chain collaboration, redundant uses of resources are eliminated. Shared resources among the supply chain partners reduce fixed cost, given they are similar or create more value if they are complementary resources. Examples of such resources are IT systems, Warehousing facilities to mention a few.

**Reduce transportation costs:**
Through an end to end supply chain collaboration, the partners may optimize a pallet configuration that’s optimized to suit a customer’s restocking processes, which will reduce labor costs, and also optimizes truck fill. This will diminish transportation costs from distribution center or manufacturer to the customer. The end to end visibility will reduce late order deliveries and avoid unnecessary express shipping cost.
**Reduce Replenishment Cycle time:**
End to End supply chain collaboration reduces replenishments cycle times through shared planning, continuous information sharing and process alignment among the supply chain players. This point is connected to the reduction of safety stock by having more control over shipment quantity and time of the buyer.

**Customer Satisfaction:**
Improvements in customer satisfaction and service level can be achieved. With materials or products moving from supplier to final customer faster and more efficiently, customer order will be fulfilled correctly and on time and therefore improve customer service quality.

**Gaining Market Advantage:**
Supply Chain Collaboration promotes a firm’s ability to capitalize quickly on market opportunities (Uzzi, 1997). Through synchronization of decision making, it makes it more efficient for a product to be introduced to the market, by quicker problem solving. Collaboration among supply chain players also leads to more innovation and easier introduction of new products or services for the end customer. Placing the customer closer in terms of delays and layers of supply chain between suppliers and end customers, will help reduce demand information distortion and add more flexibility in terms of responsiveness.

**Higher Supply Chain Resilience & Risk Reduction:**
With all partners working together, the risk of sourcing materials will be highly reduced due to the improved sharing of demand information, that can be done even in real time. Also inventory planning can be better optimized with less information distortion and less Bullwhip effect in the Supply Chain.

**Stronger supply chain structure and relationship:**
If all Supply chain partners are integrated in the same network, communication between them will be easier: orders, deliveries, bank payments etc. can be done faster and very efficiently and therefore making working together convenient.

**Create visibility across the Supply Chain:**
When we say visibility in context of Supply Chain, we mean the ability of not only the finished product as well as all the components to be tracked from the manufacturer to the final consumer.
In today’s complex business world, visibility is of utmost importance as supply chains have become more complex with multiple stakeholders and as many companies use outsourcing and thus creating more nodes in an existing supply chain.
**Enabling more Flexibility:**
Through end to end supply chain collaboration, not only are better forecasts of the customer demand achieved, but also more flexibility and responsiveness to demand changes, eliminating stock outs and in turn building your customer loyalty and increasing sales.

With supply chain collaboration, flexibility across the supply chain can be achieved. Flexibility means to be more responsive across all the actors of the supply network, external and internal actors: suppliers, third-party companies, information system providers and carriers, and all departments of an organization. Flexibility mainly concerns the gathering of information of market demands and exchange this information between any two or more organizations. (Grigore, 2007)

**Important factors to build a collaborative end-to-end supply chain**

A successful end to end supply chain collaboration occurs when all partners work together towards their common goal. This can be achieved if and only if all below factors are being taken into account:

**Trust**
Being trustworthy is very important, trust to customers, to suppliers and internally to your employees. Trust will create strong brand reputation, customer loyalty, and strong bond with your suppliers helping one another during difficult times and gain respect from your competitors.

**Culture**
Understanding your partner’s Organizational culture is a very important factor for a successful collaboration. Organizational culture includes working environment, company mission, ethics, expectations, values and goals or Objectives. Organizational culture should be respected by all supply chain partners in order to collaborate seamlessly.

**Strategy**
Companies are using different strategies depending on the situation or challenges they are facing, while selecting supply chain partners, it is critical to understand your partner’s business strategies for the collaboration to be successful. Few examples of business strategies to be considered are price- skimming, product differentiation, growth strategy and acquisition strategy.

**Power**
Power in Supply chain has become a very critical factor for companies aiming to be competitive in the market. According to Borgström & Hertz (2007). “Power is the capability of a firm to influence the behavior of other firm or having a potential to affect the situation of supply chain”
Maintaining power between trading partners is very important. Power balance is significant in determining the strength of collaboration that can be reached between supply chain partners. It is important to note this power relationship will impact the quality of overall collaboration. If there is one player that takes the advantage, it generally results into weak collaboration levels. This is mitigated by the current market situation (Globalization) that forces companies to collaborate with their trading partners regardless of balance or imbalance of Power.

**Long term perspective**

Instead of making short term relations, all Partners should agree from the beginning to build an appropriate long term collaboration. This will include sharing metrics that analyze more than a year, plans and forecast beyond one year, long term objectives and clear state the directions of both partners. Collaborative end to end supply chain can be achieved only if all partners will react together for short-term challenges and get involved in strategic long term vision together as well.

**Collaboration on Strong area or character**

Most of the companies use collaboration as a way to compensate their weaknesses. Most of these kinds of collaboration doesn’t last long. Successful collaborations are those build by strong side or character from all trading partners.

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Figure 2.: Important Factors to Build a Collaborative End-to-End Supply Chain, own contribution
**Vendor-managed inventory (VMI)**

![Vendor-managed inventory illustration](image)

**Figure 3.: Vendor-Managed Inventory Illustration**
(Adapted from Professor Thierry ROQUES course- Inter-Organizational Relationships)

**Vendor-managed inventory (VMI)** is a family of business models in which the buyer of a product (business) provides certain information to a vendor supplier of that product and the supplier takes full responsibility for maintaining an agreed inventory of the material, usually at the buyer's consumption location (usually a store). VMI gives the vendor visibility of the actual demand, sales trend and promotion impacts.

The objective of Vendor managed inventory is to reduce the Bullwhip Effect by reducing company’s inventory holding cost and create benefits for the vendor and the buyer by letting the vendor manage and decide the replenishment of the inventory of the buyer. The buyer should provide real-time visibility of its actual sales volume and demand forecasts to the vendor because the replenishment is triggered by the vendor based on an agreed reorder point policy. (Disney & Towill, 2003)

**The basic process of VMI:**

- The buyer provides the vendor store-level sales and inventory information on a daily or weekly basis by using different IT systems.

- The VMI system monitors activity, calculates forecasts and order points and suggests replenishment orders to the vendor on at least a weekly basis.

- The vendor’s analyst or customer service specialist reviews the replenishment recommendations, makes any necessary adjustments, then generates a purchase order for the items to be replenished.

- A purchase order acknowledgement is sent to the buyer.
Without the buyer’s confirmation, the vendor ships the replenishment order directly to individual stores or to a distribution center with individual store containers for cross-docking.

Risk regarding VMI:

Vendor side:
- More tasks and costs regarding to the buyer’s inventory.
- Not receiving inventory benefits from inventory management.

Buyer side:
- Risk issues (Vendor has access to your business information).
- The vendor might have worse ability of managing your inventory.
- Giving up control of some aspects of your business.
- Difficult to change supplier after implementation.

Example of VMI implementation between Retailer and consumer: The case of Amazon’s Dash Replenishment Service (DRS)

As shown in Figure1. VMI is possible to realize between end consumer and retail stores. A good example of this is the case of DRS Service in Amazon that reorders products for the consumers when the product is running low.

“Your customers link their Amazon account to your experience, and select the products they want to automatically reorder. Your device measures and tracks usage and when the supplies are running low your device place an order using DRS and we ship the product to the customer on your behalf.”

(Developer.amazon.com)
Co-managed inventory (CMI) is a collaboration practice between a supplier and its customer. When applying the CMI method, the products are stored and replenished at the customer’s promises. Although after the products are sold, they are replenished by the supplier, the replacement of products is done only with the knowledge and permission of the customer.

Co-managed inventory (CMI) is very similar to vendor managed inventory (VMI), the supplier takes responsibility to manage the replenishment process of the inventory and develops forecasts in the customer’s system accordingly. The supplier reviews all information and generates order in customer’s system. However, the main difference between CMI and VMI is that in case of CMI the order placed by the supplier is just a recommendation and is not a confirmed order unless the customer approves it. In case of VMI, the order generated by the supplier on the customer’s behalf is a confirmed order and the supplier is responsible to deliver the product and bill the customer for the materials delivered. (Mbaskool.com)
Collaborative planning, forecasting and replenishment (CPFR)

CPFR is a business practice that combines the intelligence of multiple trading partners in the planning and fulfillment of customer demand. CPFR links sales and marketing best practices, such as category management, to supply chain planning and execution processes to increase availability while reducing inventory, transportation and logistics costs.” (Bozarth, 2011)

The term, CPFR ® is a registered trademark of the Voluntary Interindustry Commerce Standards (VICS) Association. VICS is made up of a number of large consumer goods manufacturers and retailing corporations that set out to improve manufacturing scheduling and responsiveness to demand fluctuations. (McClellan, 2007)

For example, according to a study from IHL Group (2015), commissioned by Order Dynamics, Overstocks and out-of-stocks cost retailers $1.1 trillion globally in lost revenue. Overstocks are responsible for 3.2 percent in lost revenue for the average retailer, and out-of-stocks, 4.1 percent.

Earlier studies also showed there was some issues with the methodology and these companies (part of VICS) came together to establish new operational guidelines to reduce these fluctuations and improve cost and inventory management.
The guidelines are based on the observation that significant business improvement opportunities were possible through more effective practices, for example:

- Reducing lost sales due to a mismatch in demand and supply in front of the customer would create revenue opportunities.

- Collaboration could have a major impact on the management of the value chain uncertainty and process efficiencies, the drivers for building and holding inventory.

- The return-on-investment from CPFR for most companies could be substantial. Investments in the technology necessary for CPFR are relatively small compared to the technology such as ERP systems that it leverages. The other area of potentially significant investment is the change management required to move to a corporate culture that supports collaboration.

- Technology investments for internal integration can be leveraged through extending these enabling technologies to trading partners. These technologies include the investments in enterprise systems and supply chain planning systems.

Before any company implements CPFR, they should first evaluate the current situation of the company. This will enable the company to have an appropriate vision for CPFR.

**CPFR Activities**

- Strategy & Planning: There should be ground rules for any collaborative relationship. This activity serves to establish the rules. For the plan to be effective; develop a collaborative business plan that is consistent with the goals of individual partners and the supply chain alike.

- Demand & Supply Management. This activity measures the customer demand and shipment requirements for products over a planning period. Forecasts that support the plan are made during this activity. The forecast is also used as a baseline to make the order forecast.

- Execution. During this activity, the sub activities in the supply chain process are implemented. These include; Placement of orders, shipments, receipt and stocking of products, payments.

- Analysis. This is where the planning and execution activities are monitored for exception conditions. The results are summed to get a comprehensive result and Key Performance Indicator metrics are measured. The results are shared with the involved parties for continuous improvement. However, for CPFR to be implemented successfully, there needs to be a formally established agreement between the trade partners identifying the key performance indicators that are
consistent with the objective of the collaboration. The roles and responsibilities for each partner should also be clearly communicated.

Whereas these Collaboration Activities are presented in logical order, there is no predefined sequence to follow, a lot of companies are involved in all of them at any moment in time. Collaboration may also focus on just a subset of the four activities (such as Strategy & Planning), while the rest of the process is performed through conventional processes.

**TMR and 3PL collaborative services in Supply Chain**

Companies use a lot of raw materials and component for their final products; this requires a lot of work in terms of forecasting, ordering and receiving these materials. In order to reduce this workload nowadays companies source separate a third party Service Company to assist in all these logistics activities. Third Party Managed Replenishment (TMR) is unique types of collaboration where a third-party company (TPC) collaborates with other trading partners on stock, replenishment and inventory control plans.

TPC will be the one handling all decision on behalf of the focal company and deal directly with suppliers, customers and other trading partners, meanwhile a focal company can concentrate on the core business activities like production and service quality issues.

With the recent year’s recognition, changes and growing of supply chain services, TPC are now offering more than just replenishment services; Full logistics services (Third Party Logistic Provider (3PL)). Examples of companies offering these 3PL services are DHL, K&N, Schenker, Exel Plc and many more.

3PL in Supply Chain world focus on all contracts that involves storing and shipping things (Logistic activities), 3PL Service providers are companies who offer those logistic activities services to other companies, and as mentioned earlier usual these are separate or independent companies apart from Sellers and Buyers.

To achieve an end to end collaboration, Supply chain partners can agree to use single 3PL company and with this as their collaboration strategy, operations and products flows can be centralized by service provider and well managed.
Transportation Based Services
Transportation means movements of goods from one place to another as its flowing from suppliers to the final consumers in Supply chain. Main activities involved in transportation services are as below:
- Tracking and shipment visibility
- Loading and Transport arrangements
- Customs clearance services
- Freight cost negotiation and rates managements

Warehouse or Distribution based Services
According to Hughes (2004) - “Warehousing is the set of activities that are involved in receiving and storing of goods and preparing them for reshipment.”
Storage needs arises day after day for both raw materials and final products. Due to this high demand, nowadays many private firms are turning to Distribution Centers business rather than just constructing warehouses. Below are some functions or services offered by 3PL in warehouse and distribution:
- Storage
- Identification
- Receiving good
- Preparation of records
- Updating records about receipts
- Loading, packing, delivery and distribution

Financial Based Services
Financial services relating to Supply chain activities also are part of 3PL services providing to their clients. Some of these financial based activities are as mentioned below:
• Freight payments
• Auditing and Managing Inventory
• Cost Accounting and Control
• Tools for monitoring, booking, tracing and tracking

Example of Third Party Logistics Services: AIRBUS

Airbus group is a global leader in manufacturing and designing of aerospace products. They are using Kuehne & Nagel (K&N) and DHL as their Third Party Logistic providers.

DHL is responsible for transportation based services, all materials and spare parts from suppliers are transported by DHL to Toulouse, France then delivered to Kuehne & Nagel (K&N). Kuehne & Nagel (K&N) is responsible for warehouse and distribution services, storage, receiving from DHL, Stock records updating, re-packing, loading, and delivery to Airbus when needed.

(ISLI Industrial Visit to AIRBUS)

Benefits of using 3PL as part of Collaboration Strategies:

• Cost reduction (Lower freight cost):
  Through cost analysis, process improvement and better freight cost option, 3PL companies will try to optimize their costs therefore giving a cost optimization without having to actually do it internally.

• Visibility:
  3PL companies have good Supply chain ERP system which simplify tracking and visibility of products and shipments at all times. Daily status reports from 3PL to all partners will also improve visibility of an end to end Supply chain system.

• Lower Capital Investment and Reduced cost of capital:
  Outsourcing of Logistics function will tremendously reduce investment cost (Capital cost). Instead of investing in Facilities, equipment and human resources all these can be saved by using 3PL services.

• Enough time to focus your main business activities:
  With 3PL handling all supply chain activities, companies get enough time to focus on the core business activities. This improves a lot service quality and customer satisfaction
- Improved cash flow:
  As mentioned earlier outsourcing logistic activities by using 3PL will reduce capital investment and result to Cash flow improvement. This cash can then be well utilized in other core business activities and increase overall company profit.

**Challenges facing Companies Not Collaborate with 3PL Service providers:**

- Avoiding bad representation and reputation damage:
  3PL provider will be representing their clients in many business transactions which means reputation of these companies will be on the hands of their 3PL service provider. Service quality provided by the 3PL company is very critical to the entire supply chain system. Companies still don't trust completely 3PL service provider as they are afraid of their reputation and the low level of control this strategy implies.

- Reduce contacts with final customers:
  With outsourcing Logistics activities to a 3PL company, the link between customer and supplier to the main company is broken. This communication gap might result into loss of critical information like feedbacks from your customers or suppliers and other business updates. Due to that, many companies prefer to have their own internal Supply chain function handling all logistics activities and be in touch with their Suppliers and customers. (Munson, 2013)

- Privacy and Security (Leakage of sensitive data and information):
  Working with 3PL companies means sharing your critical information with a third-party company, and this is not an easy decision to make. Handing over your sensitive data to another company will always be a challenge to an end to end Supply Chain Collaboration and all partners need to assess all important factors for the collaboration to be successful, factors like Trust, Culture and Power as mentioned earlier.

**Multi-enterprise cloud connectivity (MECC)**

In order to talk about Multi-enterprise cloud connectivity (MECC), Electronic Data Interchange (EDI) should be introduced along with the practices mentioned before; VMI, CMI, CPFR and TMR. Electronic Data Interchange (EDI) is the computer-to-computer exchange of business documents in a standard electronic format between business partners. By moving from a paper-based exchange of business document to one that is electronic, businesses enjoy major benefits such as reduced cost, increased processing speed, reduced errors and improved relationships with business partners. (Cohen, 2013) EDI, with the help of technology, has now evolved into a new technological solution, Multi-enterprise Cloud connectivity.
Multi-Enterprise Cloud connectivity (MECC) is a technological collaboration solution that enables trading partners to collaborate at all time with real time information, less IT costs and be able to provide better service quality to customers. MECC allow all supply chain partners to exchange information and work closely with real time information.

“Enterprise Cloud Computing is the special case of utilizing cloud computing for competitive advantage through breakout opportunities like cost savings and, more importantly, for business innovation in terms of unprecedented speed and agility with vastly improved collaboration among business partners and customers”. (Mulholland & al., 2010)

MECC uses a variety of fast and secure connection protocols to allow organizations to integrate with their network over their storage, computer, and even user environments issues. The biggest achievement is how easy it is to create these connections and how they can help transform a business. In the past, these connections were made manually and required a lot of administration but with the current level of technology major providers are offering easier ways to integrate with their cloud resources.

Generally, cloud connectivity provides three main services based on the technology level between trading partners as mentioned below:

- **System to system Connectivity:**
  This is also known as Business to Business (B2B) connectivity or Software as a service (SaaS), this service is offered to companies with high level of technology sharing their ERP information. This is a very high level of collaboration between companies where all partners will have access to a lot of information from their partners at all time.

- **Web portal Access:**
  Web portal access is offered to companies with low level of technology where simple manual process and information collaboration is required. Very limited information will be shared between supply chain partners by using very simple system.

- **Email Based information exchange:**
  This is a very low collaboration type where partners do not need to share a lot of information and not very often. Supply Chain partners with sporadic connection needs.

Cloud connectivity is operating as a control tower system connecting all supply chain partners with the service provider and creating trading community or network. This Network System is then integrated to individual Supply chain partner’s systems to provide the same information with clear understanding to all partners.
Below diagram explain the benefit of Cloud connectivity to an end to end collaborative Supply Chain:

As seen from above diagram (Figure 7), real time information flow from control tower, Cloud Connectivity provides unprecedented visibility and the real-time ability to react, resulting in an intelligent supply network. With this advantage, Supply chain partners can easily connect to one another and make quick decision when needed. Connectivity also provides infrastructure advantages such as dynamic provisioning, multi-tenancy, improved server utilization, and datacenter efficiency. (Accenture Report on Supply Chain Management In The Cloud)

**Challenges of Multi-Enterprise Cloud Connectivity (MECC):**

- **Security and Privacy**
  Though security and privacy is reliable in cloud connectivity but still, it’s one of the main challenges, handing over your most important and private business data to an external third party is not an easy decision to make. All trading partner needs to know the cloud provider (service provider) has fully secured cloud environment
• **Service quality**
The quality of service provided by cloud connectivity is also one of the keys factors delaying companies moving their business application towards MECC. Until today companies feel not assured that MECC can provide adequate service to run their business smoothly, especially in terms of availability, scalability and general performance.

• **Downtime and accessibility**
Service quality is not the only concern when it comes to MECC, accessing your data in time when you need them also is the basic requirements for companies and a key challenge for MECC. Cloud connectivity services is provided via *Internet connection* and not local connection which means, if internet is down, cloud services will not be available as well, thus data cannot be accessed.

• **Access to data**
Another concern on MECC is Data, companies are often complaining about losing ownership of their data after moving to cloud connectivity system. It's very challenging to select how and where your data are going to be stored. The key question to Supply Chain Partners concerning data is ‘How much control do I have over my data and server?’

• **Transition to the cloud**
Cloud connectivity is very new technology, evolving every day and still need a lot of system improvements in order to meet company needs. It’s still very challenging to find cloud service that will meet objective or aims of companies 100%. Transitioning to Cloud service is very complex and involve a lot of processes. It’s very important for companies to select cloud service that aligned with their business model. Due to that transitioning to cloud is the first concern for companies to be able to identify challenges and look for solution with selected service provider in order to facilitate successful cloud environment for all and individual Supply Chain partners.

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**How to implement a collaborative end-to-end supply chain**

**Planning:**
Planning if to be simply defined is a management function where one or many solutions are discussed to reach an optimum solution which balances needs and demands with the resources at hand. The goals and objectives can be identified which need to be achieved, this process also helps in formulating strategies as well as in final implementation. Planning directs and helps in monitoring whether all steps are in the correct sequence or not.
It goes without saying that to implement successfully any project it requires planning. Implementing an End to End Collaboration is a difficult task and requires many factors to be taken into consideration and if not planned well this implementation can be more damaging than beneficial.

**Shortlisting Partners:**
The choice of a partner is an important factor affecting collaboration. Finding the right partner requires careful screening and can be a time consuming process. Developing an understanding of partners' expectations and objectives can also take time. (*Dacin & al., 1997*)

Any organization deals with several suppliers, distributors and customers. To achieve a collaborative Supply chain, it is of utmost importance to shortlist the right partners as it can be very detrimental in the future if we make a mistake in the selection. For example, the biggest supplier might not be your best partner as they might have too much power over you. You have to take into consideration all the important factors mentioned earlier into consideration for implementation and ask the right questions about what do you want to achieve with the collaboration.

**Selection of the right tools:**
An earlier section of this paper talks about the tools which can be used for an organization to achieve end to end collaboration and choosing the one which suits the organization the best is very important. There are many options for organizations like using technological tools such as EDI or using a strategic orientation such as VMI or CMI. It is not always necessary that a complex strategic model of CPFR which was one of the latest collaboration techniques be used for organizations to achieve collaboration. The main point is that companies should evaluate the needs of the organization and then decide on the method to adopt to achieve collaboration. (*Sari, 2008*)

**Continuous management Review:**
Management of the firm is required to measure the performance of the implemented solution against the strategic objectives. Adjustments can be made to improve the effectiveness as the firm moves towards an end to end collaborative supply chain.

![Collaborative End-to-End Supply Chain Implementation Illustration, own contribution.](image)

Figure 8. : Collaborative End-to-End Supply Chain Implementation Illustration, own contribution.
How to measure a collaborative end-to-end supply chain

Previous studies have been done on measuring Collaboration. Simatupang and Sridharan (2005) introduced a collaboration index to measure the level of collaboration using a three-dimensional framework of Information sharing, Decision synchronization, Incentive alignment. This framework uses a 5 points scale to evaluate the level of adoption of each collaboration practice which in turn contributes to measuring the level of Information sharing, Decision synchronization, Incentive alignment.

Information sharing:

Information sharing may refer to the sharing of data among the supply chain partners and the ability to see and monitor data of a product as it passes through each process of a supply chain.

A few criteria that can be used to assess the level of information sharing are speed, reliability, timeliness and accuracy of the information.

Our organization consistently shares the following information with our suppliers:

1. Demand forecast
2. Points of sale (POS) data
3. Price changes
4. Inventory holding costs
5. On-hand inventory levels
6. Inventory Policy
7. Supply disruptions
8. Order status or order tracking
9. Delivery schedules

Simatupang and Sridharan (2005)
Decision Synchronization:

This may be defined as the ability to make decisions at different managerial levels for the purpose of achieving a common goal of optimizing the supply chain performance. This activity includes aligning the supply chain strategy, plan and execution. A way to assess the level of decision synchronization is through responsiveness of the chain partners towards customer demand fulfillment and effectiveness of the joint decisions on the supply chain performance.

Our organization consistently incorporates our suppliers input to:

1. Jointly plan on product assortment
2. Jointly plan on promotional events
3. Jointly develop demand forecasts
4. Jointly resolve forecast exceptions
5. Consult on pricing policy
6. Jointly decide on availability level
7. Jointly decide on inventory requirements
8. Jointly decide on optimal order quantity
9. Jointly resolve order exceptions

Simatupang and Sridharan (2005)

Incentive alignment:

This refers to the process of sharing costs and benefits of the collaboration efforts among the participating partners (Simatupang and Sridharan 2002b). This incentive alignment may be assessed by looking at the fairness in the compensation and the accountability.

Our organization consistently:

1. Shares saving on reduced inventory costs
2. Gives delivery guarantee for a peak demand
3. Provides an allowance for product defects
4. Subsidies for retail price markdowns
5. Agreements on order changes

Simatupang and Sridharan (2005)
It can be argued that the level of collaboration has a positive correlation with the operational performance of a firm.

In a company where collaboration is deliberately implemented throughout the supply chain, the level of collaboration may be measured by developing a scale correlating supply chain performance to the collaborative initiatives. The Figure 8. below shows questions that managers need to ask for each collaboration practice. These questions will enable the manager to measure the level of success in the collaboration efforts of the company.

![Figure 8. Key Questions of Collaborative End-to-End Supply Chain Illustration](image)

Inspired by Singhry and al., (2015)

For all the questions above, proceed to ask; by how much? What are the actions that have led to this improvement? What can be done to even improve the collaboration further?

If there have not been any changes, then you need to ask, what is the cause? Answers to these questions will help the manager establish which collaborative initiatives are working well and new collaborative initiatives to improve the end to end supply chain performance.
CONCLUSION

This white paper, explains and helps in understanding the meaning of a “Collaborative End to End Supply Chain”, why is it important for an organization to have and implement such strategy. The paper slowly progresses into the major factors to consider before implementing a collaborative end to end supply chain and what are the main tools that are used to emulate collaboration. Finally, the paper shows some insights about how to measure the level of collaboration within the supply chain.

This paper also leads to another research question: can there be a quantitative measurement tool created to measure the level of collaboration for an organization?

The executive insights that follows will give the reader a practical outlook to the topic from industry leaders. It also helps to understand what is the level of collaboration between all supply chain nodes in the real world?
A. Mr. VAZIRANI Aditya, VP Corporate Strategy, Robinsons Cargo & Logistics Pvt Ltd.

Robinsons Cargo and Logistics Pvt. Ltd is one of the leaders in providing air, sea and logistic services since 1954. Traditionally with the best business practices, time defined products, customer orientation and efficient supply chain management. Mr. VAZIRANI Aditya is the Vice President of Robinsons Cargo & Logistics Pvt Ltd. And below are his insights on the topic.

1. What is your brief opinion and understanding on End-to-End COLLABORATIVE supply chain?

Where a customer and its several vendors along each aspect of the chain are mutually benefiting from the exchange of information and service to ensure smoother service levels and retaining the customer for a longer period even though they are competitors in their own field.

2. Have you ever implemented or tried to achieve an end to end collaborative supply chain in an organization you've been a part of? If yes, what were the major challenges faced? If no, what have been the main reasons for not going towards an end to end collaborative supply chains?

As a service provider, we are bound by the requirements of our customer, even though it is extremely idealistic that several service providers can get along with each other and play fair it is not always the case. Each company has their own targets and growth trajectories through strategies. We as Robinsons employ a neutral aspect thorough flexibility and work towards our goal of satisfying our customers’ requirements and needs.

3. How does an end to end collaborative supply chain provide competitive advantage to all supply chain partners?

It adds value to your organization and those in the ecosystem around. If you can assist a customer by decreasing costs and increasing productivities and efficiencies the length of the relationship is sweetened because of the extra value added. It then eliminates the chance of another company to come in and try and swipe the customer away. Being technologically integrated is also a bonus, because changing this means incurring extra unwanted costs which in turn if looking at the ROI of the change might be negligible and possibly could backfire.
4. If there was a tool to measure the level of collaboration across the supply chain, which of these factors would be of utmost importance?  
level of visibility/transparency, increase in profitability, increase in gross sales, increase in customer satisfaction, value creation or any other suggestion?

Interpersonal relationship comfort levels, communication amongst all functions at all levels would be a good measure also. Profitability would be a byproduct of Gross Sales but that is only possible because of Customer Satisfaction which has been induced by value creation which was made possible by the transparency of the relationship.

5. Since you have experience of developing markets, is the business environment different in developing economies than developed markets which have a coherent influence in implementing end to end collaboration?

Having worked in both developed and now a developing market, the biggest factor that differentiates the two markets is trust. And the trust deficiency is at all levels from the transporter to the LSP to even manufacturer and vendor. The concept of collaboration is forced upon by customers because most of them are MNC and adopts what their parent companies are doing. But inherently, they too are uncomfortable because it is managed locally. I had floated the idea of pooling cargoes and that was shot down immediately, even after showing the customer the advantages of pooling. The reluctance factor is paramount due to the resistance to change of the older methodology of thinking which is prevalent in developing economies. It is actually detrimental as creating and implementing end to end collaborations would further secure a business to be more prevalent in that space and also closer to the customer than previously.

6. Is end to end collaboration in the literal sense a possibility in real business or will it be limited to 2 to max 3 nodes in the supply chain?

I think there are several drawbacks but if good partnerships are created through mutual trust and understanding it could be possible with more than 2-3 nodes. But again, this is human dependent and not technology dependent if humans are taking the decision and not a computer.

7. If you were to build an end to end collaborative supply chain what would be the first step towards it?

Creating an end to end collaborative supply chain isn’t an easy task. At the very outset, one would have to see the impact that it would have on every stake holder that is involved in this new format/idea. Getting the buy in from the existing stakeholders is imperative because if they are not on board with the idea this is a failed exercise from the beginning.
The stakeholders involved need to be able to see the value add that this exercise would have on their:

a) Company’s performance

b) Their bottom line

c) What kind of investment would it take from their side, d) the effort vs the pay off.

There are two ways to do this, and it depends on the power that the customer has over his/her vendors – where they force them into doing something because they have a longer term vision as if they force their vendor they are also banking on the fact that their vendor is capable of handling the new roles and responsibilities. Or secondly, bring them across the table when their vendor is an equal or larger player than themselves who would be more open to the idea where the power play doesn’t get used.

8. **The logistics industry is a facilitator to the entire supply chain and not a separate node in itself, is end to end collaboration possible?**

Yes, it is possible because as a service provider and LSP, we offer different services to various customers and have to deal with others also in order to smoothen the supply chain of our final customer. It is finally dependent on the needs of the end customer. I could have many ways to cut my competition, but some are specialists at what they do and we are specialists in what we do as we have a better handle on local knowledge. So, we have to work together.
B. Dr. RANGNEKAR Amit, Director Operations & Distribution, Centaur Pharmaceuticals Ltd.

Centaur Pharmaceuticals ranks among India’s few, fully integrated pharmaceutical firms with proficiencies across the pharmaceutical value chain. Centaur leverages its synergies across API, R&D, CRAM, Clinical Research and formulations to provide end-to-end solutions to prestigious pharmaceutical partners.

Dr. RANGNEKAR Amit is the Director of Operations & Distribution in Centaur Pharmaceuticals Ltd. And below are his insights on the topic.

1. What is your brief opinion and understanding on End-to-End COLLABORATIVE supply chain?

End to End Collaborative Supply Chain (ETE CSC) includes transportation, distribution and warehousing. The ETE CSC encompasses all links in the supply chain including suppliers, manufacturers, distributors, wholesalers, retailers and consumers. The ETE CSC can be looked at from various perspectives.

- Companies look for efficiency in costs and time, minimizing inventory and maximizing availability.
- Manufacturing units look to optimize legacy costs, latent inventory issues and taxation benefits.
- Supply chain partners look at minimizing investments, maximizing profits and customer satisfaction.
- Transporters are fragmented and unorganized, hence offer low costs but lack scale which may result in service inefficiencies.
- Customers look for easy availability and accessibility.

2. Have you ever implemented or tried to achieve an end to end collaborative supply chain in an organization you’ve been a part of? If yes, what were the major challenges faced? If no, what have been the main reasons for not going towards an end to end collaborative supply chains?

At Centaur Pharmaceuticals, we operate through company owned & managed warehouses where stocks are transferred through a transportation network of regional specialists and a few pan India operators. The warehouses bill products to fragmented wholesalers who in turn bill to stand alone retailers through unorganized transporters. Centaur Pharmaceuticals have tied up with Emiza, a full stack ETE CSC, operating in the state of Uttar Pradesh in North India, which has a population equivalent to that of Brazil. Emiza is initially offering transportation solutions for the entire region from the distributor (warehouse) to the wholesaler, which would help us substantially reduce freight costs, and have a single point of contact for all our transportation needs. Emiza would manage the FTL (Full truck load) / LTL (Less than
truck load) economies. Subsequently they would offer transportation solutions from wholesaler to retailer, and then backward linkage from our manufacturing unit to the warehouses. If this works out, we may also explore their warehousing services, to complete the ETECSC loop.

3. **How does an end to end collaborative supply chain provide competitive advantage to all supply chain partners?**

A seamless collaborative supply chain could substantially reduce costs and waste from the system leading to a smoother interface, transparency and efficient service. The competitive advantage to supply chain partners would be in terms of inventory cost savings, just in time delivery, improved demand predictability, and optimal utilization of resources. Many firms look only at the visible costs like freight rates and delivery times, but do not factor in invisible costs like service levels, storage conditions, FTL (Full truck load) / LTL (Less than truck load) economies and support infrastructure, all of which may hamper the supply chain efficiency.

4. **If there was a tool to measure the level of collaboration across the supply chain, which of these factors would be of utmost importance?**

The following factors are important and they are ranked in order of importance.

- Increase in gross sales
- Level of visibility/transparency
- Increase in profitability
- Increase in customer satisfaction
- Value creation

5. **Since you have experience of developing markets, is the business environment different in developing economies than developed markets which have a coherent influence in implementing end to end collaboration?**

Developed markets are largely organised markets with a high degree of consolidation within the distribution chains, transporters and warehousing service providers. The supply chain in developed markets, including the suppliers, manufacturers, wholesalers, retailers and the transporters are all largely fragmented, and face major infrastructural challenges. To put in place a collaborative supply chain to manage in this context is very difficult, unless the institutional voids are filled up. Once organised players step in, collaborative end to end supply chains can gain momentum as firms could leverage the synergies of a collaborative effort, and pass on the benefits to customers. Industries likely to be first movers in a collaborative supply chain offering in India would be FMCG (foods, beverages, dairy, personal care, home care) pharmaceuticals, chemicals, automobiles and consumer electronics.
6. **Is end to end collaboration in the literal sense a possibility in real business or will it be limited to 2 to max 3 nodes in the supply chain?**

Ideally end to end collaboration could be a reality if the scope to operate for such players’ increases, which can only happen with favourable policies, supporting infrastructure and the entry of players with global expertise. As industries realise the benefits of an ETECSC, its evolution will gain traction in India across nodes, but which would take some more time to develop.

7. **In the context of the pharmaceutical industry, where business confidentiality is a major concern, how can we achieve an end to end collaboration as well as mitigating risk?**

In the pharmaceutical industry, regulatory compliance is critical hence ETECSC players who offer hassle free end to end solutions across the pharmaceutical value chain would be preferred. A collaborative supply chain with the least number of channel partners would mitigate the risk of incompliance, ensure better adherence and efficiency, and command a premium from price insensitive but demanding customers.

8. **If you were to build an end to end collaborative supply chain what would be the first step towards it?**

I would map the supply chain by identifying all the moving parts, analysing the data, gauging the level of opportunity, and by understanding the cost structures and inventory spend within each piece. In the absence of a benchmark, I would need to create a mirror to track the progress, and fine tune on the go. Any supply chain would only be as strong as its weakest link, hence synchronising the process is important from the perspective of an effective and efficient delivery.

9. **Is sharing really caring when it comes to addressing end to end supply chain costs? (Mckinsey research question)**

For an efficient ETECSC, transparency and trust at every stage is critical among the supply chain partners. Collaboration can be achieved by sharing resources, data, costs, activities, competencies and by standardizing processes to remove waste. However, it is important to draw a line whom you share with, what and how much?
C. BAUBERT Alexandre, Vice President Global Distribution, Schlumberger

Schlumberger is the world’s leading supplier of technology, integrated project management, and information solutions to the international oil and gas industry with operations in approximately 85 countries. Mr. BAUBERT Alexandre is the Vice President Global Distribution of Schlumberger and below are his insights on the topic.

1. In your opinion, what is an end to end collaborative supply chain?

The typical reaction you get when someone asks you this question is “where is the start, where is the end”. End to end Collaborative supply chain is a broad terminology to call for process optimization, between all of the actors (Customers, suppliers) in a chain of supply, the flow of information and materials to deliver what is required, on time, on cost, on location.

2. Have you implemented or tried to achieve an end to end collaborative supply chain in your organization? What are some of the successful projects that have been implemented?

Yes in North America:

- Operations Planning Centers (Sales, Operations Planning, Service Delivery) that take care of the end to end job planning, including Scheduling, asset management, workforce management, logistics and inventory management.

- Distribution Control Towers (Product Control Tower, Logistics Control Tower) have been set up to centralize the Inventory management and international logistics processes for optimization and to provide the customer an end to end solution.

3. What were the major challenges faced?

Like most new projects that require change, Integration of different processes and systems and getting people on board were challenges we faced.

4. What is the significance of end to end supply chain collaboration in achieving competitive advantage?

There are a number of ways an effective end to end collaboration helps an organization to gain competitive advantage; an effective collaboration would mean eliminating duplicate efforts (process, technology), reducing your inventory levels to an optimum level while keeping an excellent customer service level. This would reduce unit support costs and working capital. If you can run a very efficient supply
chain at the lowest cost possible, you already have an edge against your competitors. In today’s world, businesses compete through their supply chains. Asset utilization is a key KPI for this industry, and one way it is improved is through end to end collaboration.

5. **In your opinion, if there was a tool to measure the level of collaboration across the supply chain, which factors/KPIs would be of utmost importance?**

Collaboration is not a measurement. Collaboration is an enabler to improve performance, which is typically structured in;

- Quality (Customer Service Level, Quality of Products)
- Costs (Unit Supply Chain structure costs, other supply chain costs)
- Delivery (On time Delivery)

If a supply chain excels at these three performance factors, then it is safe to say the collaboration is working well.

6. **What in your opinion are the drawbacks in supply chain collaboration?**

- Getting too fancy. In some cases, collaboration may lead to even more supply chain complexity.
- Collaboration has to have a mean, a goal. If it is not well defined then it will be difficult to get a positive result.
- People do not always understand what Collaboration means

7. **In your opinion, is end to end collaboration in the literal sense a possibility in real business or will it be limited to 2 to max 3 nodes in the supply chain?**

Yes, it can be fully “vertically integrated”, from raw material to final delivery, however, very few can make it.
REFERENCES


- Simatupang, T.M. and Sridharan, R. (2005), The Collaborative Index; A measure of supply chain collaboration.


- Munson, C. (2013), When a Western 3PL Meets an Asian 3PL, Something Magical Happens, (Kindle Edition), Pearson Education Inc. FT Press, 07458 New Jersey USA