Servicification through Supply Chain Segmentation

One physical supply chain, multiple virtual supply chains

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Abstract

Generally, companies use "One-size-fits-all" strategy and have standardize processes and policies to cater to all type of Sellers. Having one strategy can lead to significant cash flow leakage and potential sales loss, as we might end up over-serving few sellers at the cost of undeserving ones.

This paper aims at designing the multi-channel, segmented model with different policies for serving millions of Big & Small; Veterans & Amateur Sellers who need Logistics Services to successfully conduct their retail operations. Under this model, different sellers with different products and profile will be served through different Operational modes, processes & policies. By understanding the Seller's profile (Load, Volumetric profile, Category) and their behavior (Consistency, frequency, load pattern) of the Sellers, we can design a tailor-made solution thereby maximizing both seller service and company's profitability.

Keywords

Segmentation, Supply Chain, Differentiation, Supply Chain Segmentation Approach, e-commerce

1. Role of Logistics in e-commerce Retail in India

With the rise of Internet & Smart Phones penetration in India, there has been a significant change in the way people communicate and do business. E-Commerce has taken significant stride to achieve sales of over $ 31 billion in 2016, and is expected to grow to $ 119 billion by 2020. This growth is driven by various supply and demand side factors. Few important factors are increasing penetration of Internet and Smart Phones in the country, migration of people from rural to urban areas, product offerings across various categories at a discounted price, combined with ease of payment and easy return policies, drive sales of e-commerce business.

However, Logistics forms the backbone of e-commerce retail industry; it has emerged as a key differentiator in terms of enabling services to cater to the needs of Indian customers. It is one of the key enabler to launch few unparalleled services like Cash-on-delivery, slotted pickup and delivery, and instant refund. This has contributed significantly to the business growth. The logistics sector catering to e-commerce retailing in India was valued at USD 0.2 billion in 2014 and is projected to witness a CAGR of ~48 per cent in the next five years to reach USD2.2 billion by 2020. Many e-commerce retailers have their in-house logistic arm, while others collaborate with various logistics service provider to fulfil their business requirement.

2. Overview of the Logistics process – Supply to Deliver

E-Commerce retail companies have mix of Inventory-based and Marketplace business model. Products purchased online by the customers, will be fulfilled either from the Inventory placed in the Warehouse or through multiple Sellers selling on e-commerce platform. Once the product is purchased on the website, it undergoes a range of process, before it can be delivered to the customer at his doorstep.
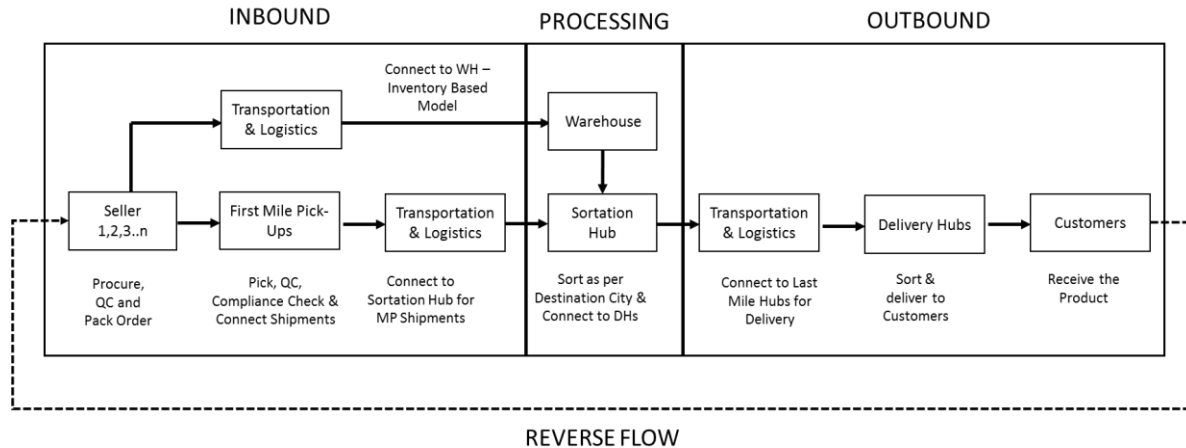

Fig 1: Supply Chain Structure

The detail processes are as explained below:

It starts from picking up the shipments from Seller's location and connecting it to Sortation hub / Fulfilment Centre (FC). In case of Market place model, products are quality checked, packed and labeled at Seller's location, the logistics partner connect the Ready-to-connect Shipments to Sortation hub. While in case of Inventory led model, the products are procured from Seller well in advance, basis their sales projection, and are labeled and Stored in the FC until an order is placed.

In Marketplace model, the shipments are connected to the Sortation hub, from where it is connected via land / air to the final destination hub. The destination hub, then delivers the shipments at customer doorstep.

Another important aspect of e-commerce is the Reverse supply chain. The returned goods are picked from the customers, connected back to Sortation hub, which is turn connects it to the source – Seller. The returned goods, basis the product condition, are cycled back into the inventory, refurbished, restocked and relisted.

3. Literature Review

In e-commerce Market Place model, the logistics Service providers have to deal with wide range of products and markets to cope with the varied Customers' need (Lovell Schnetzler et al. A Methodology for the Segmentation of Supply Chains Page 4 et al., 2005). Thus, in order to cater to these varying need of customers the companies have adopted this approach of Supply chain Segmentation. The assumption here is that the customers across geographies have different requirement, different expectation and are prepared to pay for differentiated Services (Barratt, 2004: 33). Lovell (2005) states that supply chains must be matched with varying customers' requirement. The different factors such as product, market, source, geographic factors have been considered to segment supply chain. The focus of this contribution is because of the different customers' need in terms of product requirement, delivery time expectation and quantum of order. Thus, a unified Supply chain with common design, structure, process and operating model would not be efficient to cater to the heterogeneous demand of the Customers (Christopher and Towill, 2002). Further, in order to deliver on unique proposition of high market performance expectation e.g. shorter lead time and customized product delivery, the logistics service providers are attempting to achieve this competitive advantage by managing relationship with the sellers. In order to build and maintain collaborative long term relationship with these Sellers, companies define specific criteria to first segment these Sellers and then set interaction criteria that defines

the level of engagement. One such approach of Segmenting Sellers basis business objectives has been discussed in (Paul W. Schroder & David M. Powell): "A Better Way to Engage with the Suppliers". Many dimensions of segmentation both on Service and commodity requirement is highlighted, these two dimensions are at the center to the business objective of delivering quality product, innovating at optimized cost. Further, in order to handle different type of products with varying demand, there has been literature on designing lean, agile and leagile Supply Chain Strategies.

4. Case for Segmentation

In ecommerce logistics environment, segmentation has become critical, for segmentation help companies in planning, forecasting, allocating resource, transportation among many. It involves grouping Customers, Sellers basis their characteristics and need. It involves treating products, customers, channel segments, and stores differently according to their different characteristics or needs. We can use segmentation for below mentioned activities:

- Reducing Procurement lead time for fast moving SKUs
- Serving different categories of customers with different services at different point in time
- Using localized transport channels to cater to different customer segments
- Optimum allocation of resources – freight and Manpower to cater to fluctuating demand

In order to Segment Company's supply chain, there are three prevalent models: Customer based Segmentation, Business Process based Segmentation and Source/Seller based Segmentation.

5. Supply Chain Segmentation

Supply chain segmentation is the alignment of customers' demand and supply capabilities to ensure business sustenance, growth & net profitability across different segments. The basic concept is that the supply chain can be segmented into various processes, with each processes designed to provide range of services depending on customer's demand. For example, few services are designed for optimum lead-time to market, capacity – freight & human resource planning while others are designed for Value added services like multiple mode of Payment.

5.1 End user Attribute based Segmentation

Customer-based segmentation groups customers with similar characteristics and needs and then develop supply chain operations to meet those specific requirements. For example, Customers in Metro cities desire for shorter order fulfilment time, to Customers in Tier 2 city emphasizes on availability of product. Similarly, customers ordering high value items expect a shorter delivery time and opt for Cash-on-delivery payment mode as opposed to customers ordering low value items. Thus, the service-level agreements (SLAs), differs for different group of customers. Further, some customers buy products for which demand is uncertain and highly variable, while another group may buy products for which replenishment characteristics is fairly predictable.

Further, Customers in different cities have different levels of value for the business, customers in Tier 1 cities are strategically more important for business than in tier 2 and below cities. By segmenting the customer's basis different demographic, geographic and psychographic attributes we can customize on desired Service level, risk levels, planning & inventory management strategies.

5.2 Business Process based Segmentation

In order to ensure business growth and keep themselves ahead of the competition, companies aim to build reliable, technology enabled and efficient supply chain processes at competitive price. In traditional Supply chain segmentation approach, business process were designed to satisfy the critical success factors of the company's business, all the success metrics Cost, reliability & speed where uniformly optimize across product categories. However, in modern Customer centric approach, business process are customized basis different segment groups. For example- company might encourage less than FTL to be sourced and connected to Customers, in case of high margin products. The business process segmentation also takes into account the type of products – Size, Volumetric Mix (eg: high volume low margin product, low volume high margin product), type of product (eg inflammable nature / fragile products need special handling) needs to be handled differently.
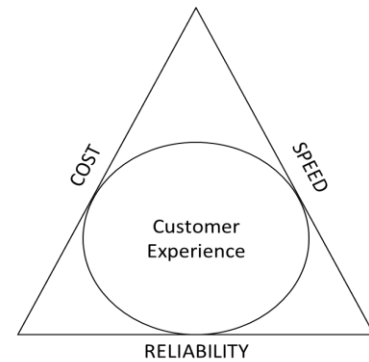

Fig 2: Key Business Success Metrics in Logistics

5.3 Supply Network Segmentation

Supply based Segmentation design considers identifying, assessing and profiling different Big & Small Sellers catering to Customers' demand. In Marketplace model, the logistics company has to cater to different types of Sellers with different load profile, volumetric mix and level of variability. Depending on the Seller's profile, Logistics Company would design its supply chain for efficiency and quality for high volume low variability segments, at the same time for agility in case of High volume low variability segments. The various parameters which companies use to segments their seller base are as listed below:

- Product Profile – Volume, Price, Type, Quality Expectations & Life Cycle Stage
- Demand Variability & Service level expectations (including SLAs and method of fulfillment)
- Geographic location, transportation mode, custom, tax and government regulation
- Multi Source Versus Single Source Supplier; Commodity Vs Specialized Item
- Terms of Service – Payment, Quality & Timeliness of Service

By understanding, the product profiles of every seller companies can make profit across each supply chain segment. Segmentation can help managers to drive for efficiency by utilizing financial, technological, human and physical resources in the best possible ways. For example: in case of High volume, low variability nodes, the companies can create value by running FTL between the nodes, however in case of low volume high variability nodes the challenge is to develop specific routes and plan so as to maximize the load carried by each lorry. Further, the logistics companies build strategic relationship with these Sellers who housed high volume, low variability products, for these products contribute significantly to the business. . In order to build this relationship, they provide them with various value added services like Pick up at preferred time slot, perform multiple pickups per day, have escalation resolution team and organize various engagement program.

Another significant challenge in Logistics is to be agile and efficient. Segmentation can help companies to cater to a set of product portfolio through efficient supply chain while others through agile supply chain. For example Mobile Accessories can be catered through efficient supply chain while high end Mobile phones need to be catered through agile supply chain. Further, in case of low average selling price items, companies can optimize for cost, however for high value items, supply chain need to be designed for agility for customers' anxiety may be high for high value items. In addition, for high value items, supply chain need to be designed for product safety, as the risk of carrying those shipments is high.

Segmentation also helps companies to build operating models depending on type of products. For example in order to cater to the perishable products, companies must design for shorter lead time, as compared to fragile products which must be designed for special packaging and handling mechanism to ensure safe delivery.

5.3.1 Observations: Data Collection & Analysis

Data is collected from multiple e-commerce companies. The data set under consideration has ~ 60,000 Sellers, selling about 50 million units per year. The companies considered either have their in-house logistics arms or get the load catered through third part logistics partners. The logistic partners provide pick up service to Sellers and delivery services to customers across thousands of pincodes across India. For all the types of segmentation below, we have considered the above mentioned data set. Out of the considered 60 K Sellers set, we found that in any given month only 50% of the Sellers are active or ship load through the platform. The details analysis of the Active 50% of the Sellers are in the below mentioned headers.

5.3.2 Proportion Volume Analysis based Segmentation

In order to Segment the Sellers, we have used Proportion Volume Analysis – this methodology will identify a subset of Sellers that has significant contribution to the load volume of the company, at the same time will also identify different set of Seller segments that will require different operating model, processes and controls.

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By analyzing the Sellers % and their contribution to the logistics business, we found that,

- Seller Type A: These are key indispensable Sellers which are very low in number and contribute significantly to the company's volume. These are generally manufacturers, suppliers and distributors who primarily does retailing through online channels. These sellers are critical for business and the logistics service providers need to build long term strategic relationship with them
- Seller Type B: These are high potential Sellers, who are significantly low in number compared to Type C and have moderate contribution to the business of the company. If these Sellers are supported, could lead to mutual growth for company and for the Sellers.
- Seller Type C: These are generally offline stores retailers who have adopted to Online business in order to increase their revenue
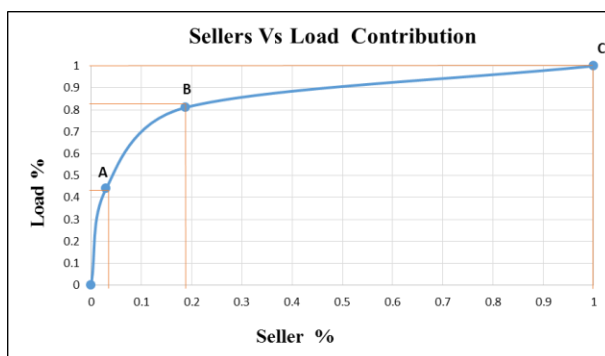

In the graph, the axes represent:

X-axis: $(\text{Seller}_{Type}) / (\text{Seller Base}_{pan\text{-}India})$

Y axis: $(\text{Load}_{Seller\,Type}) / (\text{Load}_{pan\text{-}India})$

Fig 3: Sellers and their load contribution

From the analysis it is clear that the company need to focus on these specific type of Sellers belonging to Category A; by focusing on the handful of Sellers it becomes easy for the logistics service providers to enhance their skills, manage large orders from single source at the same time maintaining high level of customer service.

Table 1: Companies Relationship with different Seller Segments

Segment	Relationship Type	Criticality for Business	Segment Objective
A	Strategic Alliance	High	• Developing and managing partnerships with these Sellers with focus on joint growth and value creation • Leveraging Seller capabilities in designing innovative process development processed • Collaborating with seller to drive differentiation to create value for customer & business
B	High Potential	Medium	• Work together with the Sellers and help them grow their business • Selectively increase spend with mutual growth
C	Low Capability	Low	• Maintain pure transactional relationship with Sellers

Also, as customers preferences are changing over time and has become more personalized and complex, logistics service providers have to do more to help these Sellers meet customer's expectation. This means customized orders, shorter delivery time and increased compliance. Further, the sellers also require support in terms of Planning, Inventory management, fulfil last minute order, reduce SLA and match customer demand thereby reducing stockout situation.

This trend is resulting in a new wave of services and support that logistics service providers offer to the Sellers. Given, that these services and support come at a cost to the Service providers, they intend to provide it to the specific group of Sellers (in our case to Seller Type A & B) who, though less in number, contribute significantly to the volume as shown in the graph. These Services are one/many among the following listed below:

Table 2: List of Value Added Services to Sellers

Processes	Objective	Services	Benefits
Service & Support	Profitable growth through superior service	• Packaging as a Service • Lean Implementation @ Sellers' premise • Convenience – Preferred Time Slot & Multiple Pick Up • Quality Check, Refurbishing, Re-Inventorization of Returned Product • Claims & Escalation handling • Performance Management	• Strategic partnership with the Supplier – Harder to replace • Long term association with the Company

Vendor Managed Inventory (VMI) System	Streamlined & efficient Sourcing & Storage level	• Size & Location of Warehouse
		• Inventory Planning
		   o Demand Forecasting & Planning
		   o Buffer Stock Planning
		• Visibility of Stock Holding
		• Efficient & Transparent Storage
			• Improved Supplier Cash Cycle
			• Reduced Supplier's Inventory level
			• Better forecasts & Fewer stockouts
			• Reduced Procurement SLA
			• Improved Customer Service Level

Technology & Platform Support	Improving Operational Performance of the Suppliers	• Automated Stock Replenishment System • Visibility of Shipments flow in Supply Chain • Business Intelligence	• Right Orchestration of Goods, fund in the system

5.3.3. Seller Performance Based Segmentation

In order to ensure high level of customer satisfaction, e-commerce companies have set high performance targets for Sellers. Basis, the set expectation, the logistics companies measure the performance of the Sellers and segment them into different groups. The reason for segmenting Sellers basis their performance is to:

- Establish & maintain a Service that provides a great Customer experience, which in turn increase repeat purchase and spread positive Word of mouth
- Ensure that the logistics partner is regulatory complaint, failing which might have serious implications
- Reduce the risk of damage, loss and claim while the shipment is in-transit

Below mentioned are few critical metrics on which Sellers performance is measured. Clearly, the metrics have direct impact on Customer Experience, business success and growth.

Table 3: Seller Performance Management Metrics

S. No.	Metric	Dimension	Definition
1	Packaging & Quality Check Metric	Quality Non Conformance%	The percentage of Shipments rejected due to Quality Check @Seller's premise by logistic partner
		Packaging Non Adherence %	The percentage of Shipments rejected due to packaging standard not met @Seller's premise by logistics partner
2	Regulatory Compliant	Regulatory Non-Complaint Shipment %	The percentage of Shipments rejected by logistics partner due to non-complaint - regulatory forms not available
3	Speed	Promised Vs Actual SLA (Late Dispatch rate)	Number of shipments that is not dispatched by the expected date by number of shipments dispatched in that period of time
4	Cancelation	Seller Cancelation %	Shipment % cancelled by Sellers once the shipments were marked as ready to be shipped
5	Return	Return %	The percentage of shipments returned by Customers
6	Reliability	Seller Fraud	Counterfeit, stolen or other suspected fraud shipments by Sellers
		Damaged/defective Item	% of shipments of damaged/defective complaint by Customer or logistic partner
		Mis-shipment	Order that is shipped is different from the one described
		Seller Rating by Customers	Rating given by Customer basis the experience they had buying with Sellers
7	Breach	Re-attempt %	Shipments marked as Ready for shipping but not handed over to Logistics partner
		Severity Index	Shipments marked as Ready for shipping but not handed over to Logistics partner even after multiple attempts

8	Escalation	Customer escalation	Number of escalation raised by Customers on shipments belonging to a particular Seller
		Seller Escalation	Number of wrong escalation raised by Sellers with Logistics partner

Each logistics service provider define minimum performance standards for all the metric, failing to perform on few metric, may restrict, limit or suspend the account of Sellers, depending on the severity of the index.

We have done an analysis on the performance of the Sellers on few of the above mentioned parameters – Cancelation, Breach and Reliability. For all the type of Sellers, we have calculated a composite score which is average of performance of Seller on Individual metric. Here, for the analysis, we have set the threshold at 4 sigma i.e. 99.4% for the composite score. This threshold will differ from one Service provider to another, depending on their capability to manage risk and absorb deviation in the supply chain.

We found that overall ~5% of the Sellers are performing at 4 Sigma level, while the next 3.5% of Sellers have their composite score above 99%. Below is the graph for Sellers who are performing above 99% level belonging to category A or B.
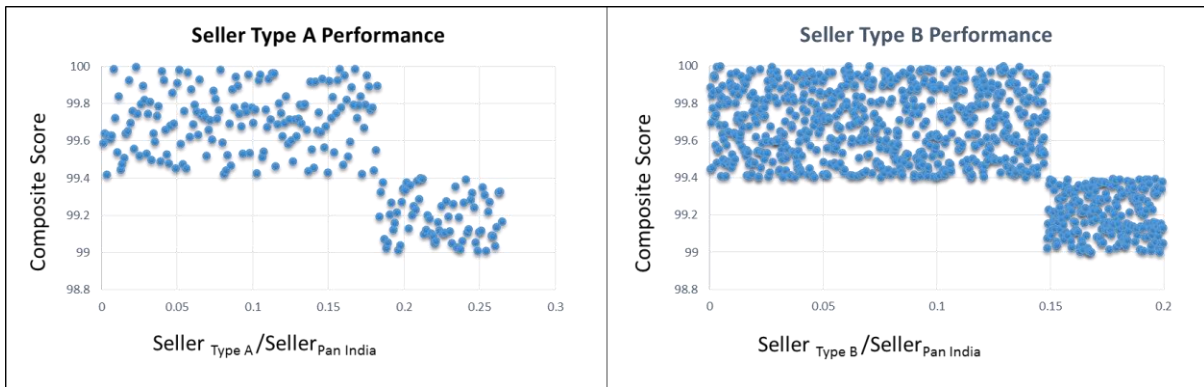

Fig 4: Seller Segments Vs Performance Score Card

Basis this Segmentation, the logistics Service providers can identify and focus on Sellers that need improvement; and undertake various activities like:
- Create visibility and provide timely information to the Sellers about their performance
- Conduct training for Sellers to apprise them of the dos and don'ts while selling online
- Organize Seller Connect Program to meet Sellers and resolve their queries & concerns
- Educate Sellers to proactively communicate with buyer to resolve their concerns

5.3.4. Geographic Segmentation

Geographic Segmentation is common strategy used by ecommerce player to identify regions with concentrated demand and supply clusters. With this segmentation, Metro cities become obvious choice with favorable demographics, better infrastructure and good road, rail & air connectivity. However, of late, there has been significant growth witnessed from Tier I and II cities as well.

We have done an analysis of Seller base spread across different regions. This is on the basis of Seller load, Seller base % city wise and category they are into. As would be expected, the top 6 metro cities has housed ~60% of the Active Seller base and contributes to ~70% of the load. But, interestingly, we have noticed that there are few Tier I & II cities which are holding substantial Seller base, contributing significantly to load more than share of few metro cities. The

top emerging cities in this list are Jaipur, Lucknow, Ludhiana, Meerut, Surat, Ghaziabad, Kanpur, Agra, Coimbatore, and Ahmedabad. These cities have become the largest Seller hubs.

Below shown is the graph of Seller base spread across top 13 Cities contributing 80% of the load, here the size of the bubble is indicative of the load contribution of Sellers from that particular city.

In the graph, the axes represent:

X-axis: City – Metro, Tier 1

Y axis: (Seller $_{city}$)/ (Seller Base $_{pan-India}$)

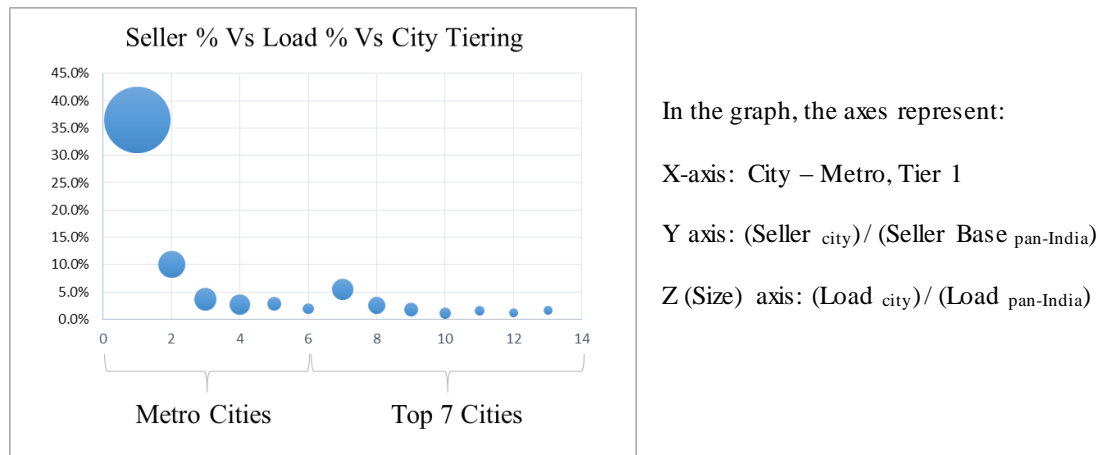Z (Size) axis: (Load $_{city}$)/ (Load $_{pan-India}$)

Fig 5: Seller Spread & their load contribution across cities

The top 5 Tier I cities, beside Metro have unique products like fabrics, home décor, handloom, leather, and these unique products are very popular among the consumers. Below mentioned are some of the insights:

- Tier II & Tier III cities have seen huge demand in lifestyle products (footwear, clothes, bags etc), luxury high-end products and regional specialty products. Given, that there is significant demand of regional products in different parts of the country, traditional businesses in these cities see great opportunities online
- India has ~2800 handicraft clusters, with ~12% of the clusters located in the State of Uttar Pradesh (UP) followed by states of Odisha (10%), West Bengal (9%), Maharashtra (7%) & Gujarat (7%)
- Various Tier III cities like Coimbatore, Tirupur, Kudli, Pondicherry and Panipat have housed major sellers from handloom and home furnishing categories
- Also, cities like Ludhiana, has woolen sweaters and cotton T-shirts industry, and hence major supplies is in clothing sector.

Thus, the supply chain needs to be designed and resources need to be planned basis the region specific categories product which the seller provide to the partners. For example: In order to pick up the same number of Shipments from a Seller in Agra to that of Seller in Surat we would require more number of Vehicles, for the volumetric weight per shipment for footwear is significantly higher than that of Apparel. Further, the Sellers in Tier I & II cities come with an added advantage, as the Infrastructure & Manpower cost is comparatively lower; hence cost of servicing them is low.

6. Conclusion

Thus, Segmentation has helped companies undertake various efficiency improvement measurements from new Planning methodology to Resource Optimization to Cost Reduction and Speed enhancement measures. SC has helped e-commerce retailer match their customer value, by adopting responsive strategy focused on speed, order fulfillment, service level and satisfaction. It also helps companies to narrow down their focus to highly concentrated areas of customer, thereby eliminating ineffective channels/regions. Thus, segmentation helps inform, optimize and plan for customize strategy to deliver the shipments at customers' doorstep.

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Biography

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was looking at end to end value chain for driving LEAN Six Sigma improvements. Currently he looking at transforming supply chain design to improve speed, reliability and cost for the logistics function of Flipkart. His interests include vendor development, manufacturing, simulation, optimization, design for six sigma and lean. He is member of ASQ, APICS, WERC.

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