SUPPLY CHAIN ENGINEERING

OF

SIPRADI ORGANIZATION

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Logistics Engineering

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Abstract

This thesis work is done in order to explore and elaborate efficient strategies, infrastructures and technologies that help Sipradi organization to optimize its supply chain. This work primarily aim to analyze current situation of organization's working process, circumstances, strategies, and challenges and then to suggest mitigating measures and tackling techniques for related issues with appropriate cost and profitability consideration. This project deals with the working circumstance and shoots supply chain optimization techniques and strategy for Sipradi organization (mainly for Sipradi Trading and Sipradi Auto Parts). Generally working process and issues regarding supply chain, information system, purchasing, inventory management, import and custom clearance, transportation and after sales services of the organization are analyzed over here. Apart from this, it further sum up my logistics learning, knowledge and experience, mainly from logistics engineering study, and convert it into concrete business optimization module. On the other hand Sipradi gets unbiased evaluation of its working process, strategies, infrastructure and organizational efficiency through this thesis as well.

This project is written under six major chapters. First chapter introduces the Supply chain engineering of Sipradi and present theoretical elaboration of accessories. Second chapter is for in-depth analysis of working process, system and strategies of the organization. In next chapter strength, weakness, opportunity and threats for Sipradi are evaluated. Then after in fourth phase problems and issues available in organization and its supply chain are outlined. Finally, solutions for each issues and their feasibility are thoroughly discussed and appropriate recommendations are suggested at last chapter of this work. Information are sourced from interaction and interview with company personnel in concern field, physical observation of company during internship period, books, course slides, internet and various other published works over here. These information are basically used for analysis of supply chain of the organization and figuring its' cost and efficiency optimization tools and techniques.

Keywords

Logistics, Sipradi, supply chain, recommendations

Miscellaneous

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1 Objective

This thesis work is written for SIPRADI organization which major in automotive and Allied sector in Nepal. The purpose of this work is to identify scope of improvement in Sipradi's supply chain and to explore appropriate tools and techniques for its supply chain optimization.

This work is done under six major chapters i.e. 1) Introduction to the topic, 2) Current situation analysis of the organization, 3) SWOT analysis, 4) Problem identification, 5) Solution for the problems and 6) Conclusion.

In this thesis, in one hand supply chain of the organization is structured and optimization techniques are discussed and on the other hand all the interconnecting marketing and financial aspects with their adjacent effect are analyzed from logistics point of view. During the current situation analysis phase of the organization, all its strategically practiced activity measures i.e. procurement, import and custom clearance, transportation, distribution, warehousing, material management and information systems are well analyzed. On the basis of these situation analyses, problems in Sipradi Supply Chain are identified and appropriate improvement strategies and tools required are purposed.

Sipradi is organization with various company unified with it. So while writing this thesis I am mainly concentrating on Sipradi Trading Pvt. Ltd. and Sipradi Auto Parts Pvt. Ltd. As, Supply Chain Engineering is quite a broad area, here in this work I am prioritizing those aspects of Sipradi's supply chain where there is remarkable scope, opportunity and feasibility of improvement.

Information are sourced in this work from books, course slides, internet, interaction and interview with company personnel in concern field, physical observation of company during internship period, and various other published works. These information are basically used for analysis of supply chain of the organization and figuring its' cost and efficiency optimization tools and techniques.

2 Sipradi Organization

Sipradi is one of the largest and well known brand names in Nepal. It majors in Automotive and Allied sectors with annual revenue more than 165 million USD. It is growing rapidly in Automotive, Energy, Lubricant, Financial Service, and Equipment business. Sipradi as a Brand is unified name of companies i.e. 1) Sipradi Trading 2) Sipradi Autoparts 3) Sipradi Earthmovers 4) Sipradi Energy 5) Sipradi Equipments and 6) Sipradi Assured.[1]

Sipradi trading Private limited (STPL) is a company under Sipradi brand that supplies private and commercial vehicles. It is sole distributer of vehicles from Tata Motors Ltd India, in Nepal. Sipradi Auto parts Private Ltd (SAPPL), primarily, is distributor of genuine sphere parts from Tata Motors. It also distributes automotive garage equipments from various companies in Nepal.[2]

Sipradi Earthmovers Private Ltd (SEML) measures in supply and services of excavators, wheeled products, cranes and road making equipments. SEML further distributes tractor and its parts and other agricultural equipments in Nepali market. Sipradi Energy Private Ltd (SEPL), on the other hand, specializes in alternative energy sectors. It sells solar equipments, invertors, UPS and batteries all over the country.[3]

Sipradi Equipment Private Ltd (SEPL) distributes BOSCH power tools from Bosch India Ltd. (a part of the Bosch Group, Germany).And Sipradi Assured works in pre-owed vehicle trading sectors. It sells and exchange wide range of vehicles and provides various appropriate after sales services, warranties, refurbishing and upgrading services using genuine spare parts and serve sound documentation assistance.[4]

[1] Reference: www.sipradi.com.np
[2] Reference: www.sipradi.com.np
[3] Reference: www.sipradi.com.np
[4] Reference: www.sipradi.com.np

2.1 Supply Chain Overview

2.1.1 Supply Chain & Supply Chain Management

Supply chain exclusively covers the material, information and cash flow across entire enterprise. Supply chain management is defined as wholesome process of planning, sourcing, integrating, manufacturing/making, warehousing and delivering product right from raw material up to the stage when it reaches to end customers, with ultimate theme of satisfying customers, optimizing cost and maximizing profit.

The supply chain is a concept of closely coordinated, cooperative networks, competing with other networks which focus is on managing processes that engage other firms as partners in managed relationships to perform the activities necessary to fulfil the process. The supply chain consists of a linear sequence of operations organized around the flow of materials from source of supply to their final distribution as finished products to ultimate users.[5]

Council of Supply Chain Management Professionals (www.cscmp.org) states that, "Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Supply Chain Management integrates supply and demand management within and across companies."

[5] References: Tage Skjott-Larsen, Juliana H. Mikkola, Philip B. Schary, 2007: Managing the global supply chain, 17 and Christopher, 2005

2.1.2 Supply Chain Engineering

Supply Chain Engineering, whereas, considers various modern production and operation management (POM) tools and techniques to mitigate the challenges of integrating all supply chain activities, making the system efficiently flexible and reducing operational and production cost in competitive global market. Different POM challenges and issues can be effectively managed via compressive analysis models and concept regarding outsourcing strategies, pricing policies, inventory control policies, radio frequency identification (RFID) technologies and other information systems, inventory strategies and so on. These all analysis are done in supply chain engineering process in order to optimize the supply chain, minimizing cost and maximizing profitability with appropriate service level consideration.[6]

2.1.3 Supply Chain Process

The interpretation of supply chain differs according to different management prospective. Supply chain is open to different views on constituents of supply chain offered by manufacturing, logistics and corporate sectors. Generally supply chain consists of processes such as Productions, Procurement, Demand management, Distribution and Returns management. [7] As shown in global supply chain module Figure 1, supply chain mainly consists of players such as suppliers, manufacturer, distributer, logistics service provider and customers. Production process relates all the activities that are performed in order to manufacture goods from raw materials and make them ready to sale to company customer in form of part/components/ semi finished goods/ finished goods depending upon the types and nature of organization.[8]

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[6] Reference : Dolgui, Alexandre, Proth, Jean-Marie, 2010: Supply Chain Engineering**,** Useful Methods and Techniques,1

[7] Referance : Tage Skjott-Larsen, Juliana H. Mikkola, Philip B. Schary, 2007: Managing the global supply chain

[8] Reference : www.newagepublishers.com/samplechapter/000975.pdf

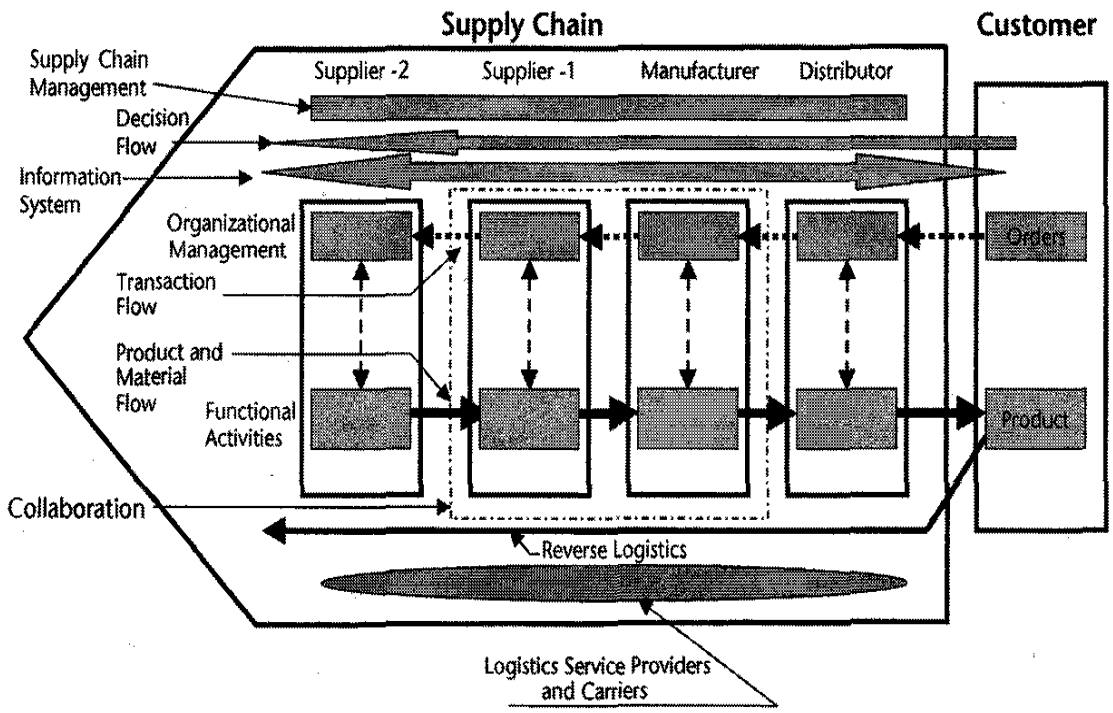

Figure 1 Global Supply chain

Skott-Larsen et al. Managing the Global Supply Chain

Procurement deals with all the activities that are required to acquire the products from external supplier to internal customer within company in each business organization.

Demand management denotes all the activities performed by each party in supply chain with the motive of optimization of product demand and manage its graph in company's favour with effective business strategy and assistance of effective speculation, offers and publicity.[9] Distribution offers all the activities that assure that the products are delivered and supplied to the final customers up to the final sales destination in sound manure. Return process deals with those activities which are performed to take care of the products with defects and damages to return it back to the supplier as per the business negotiation and warranty specification.[10]

[9] Reference : www.newagepublishers.com/samplechapter/000975.pdf
[10] Reference : www.newagepublishers.com/samplechapter/000975.pdf

2.1.4 Activity Deployment in Supply chain

In each supply chain there are specific series of activities that every party involved in supply chain perform in order to fulfil their business motive. Thus, each player in supply chain i.e. supplier, distributor and customer does their business oriented activities. These activities basically depends on company's role in supply chain but in specific case and nature of business company handles, activities gets modified and might differ to the general activity deployment.

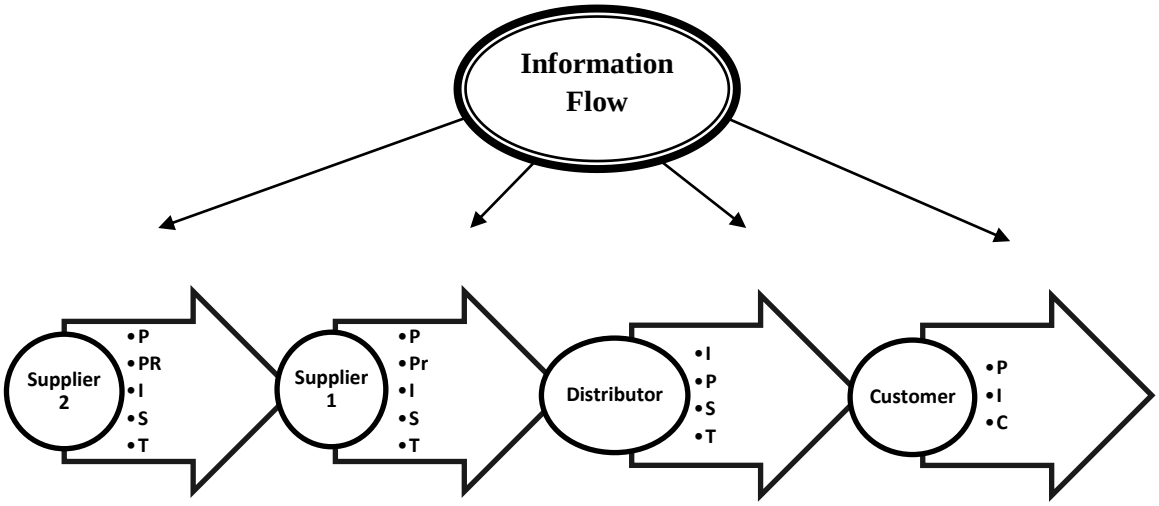

Figure 2 Activity Deployment in supply chain[11]

Where;

⇨ = Product Flow, P = Procurement, Pr = Production, I = Inventory, S = sales and marketing Activities, T = Transport, D = Distribution, C = Consumption

[11] Reference: Tage Skjott-Larsen, Juliana H. Mikkola, Philip B. Schary, 2007: Managing the global supply chain, 17

The basic business activity of supplier is to supply raw material, components or finished goods for manufacturing or to sale it as finished goods. As shown in figure 2, in every supply chain supplier performs activities such as procurement of required raw material, production and processing of them to the sellable items according to its primary customer's requirement, inventory of raw material and produced items, sales and marketing of them and their transport arrangement. Distributor on the other hand procure the goods, make inventory of them, does marketing of goods, sale them to the customer and make transport arrangement to the customer for the good sold. Similarly, final end in supply chain, customer makes procurement of goods, keeps them as stock and finally consumes as per their motive of purchase.

2.1.5 Supply chain and Value chain

Value chain concept was established by Michael Porter in 1985 in a seminal work (Competitive Advantage) on the implementation of competitive strategy for achieving superior business performance. Porter conceived value as the amount of buyers' willingness to pay for what firm offers.

"Value chain" is combination of nine different value adding activities performed with in the firm that work together to provide value to the customer. Those value adding activities that are performed within firm are: 1) Inbound Logistics 2) Operations 3) Outbound Logistics 4) Sells and marketing 5) After-sales services 6) Procurement 7) Research and development 8) Human resource management and Firm infrastructure. Porter further linked the value chains between the firms and formed Value System. This Porter's Value system in current era of global sourcing and strategic collaboration between multiple firms is referred as "Value chain".[12]

[12] Reference: Value Chains Versus Supply Chains by Andrew Feller, Dr. Dan Shunk, and Dr. Tom Callarma, 2006

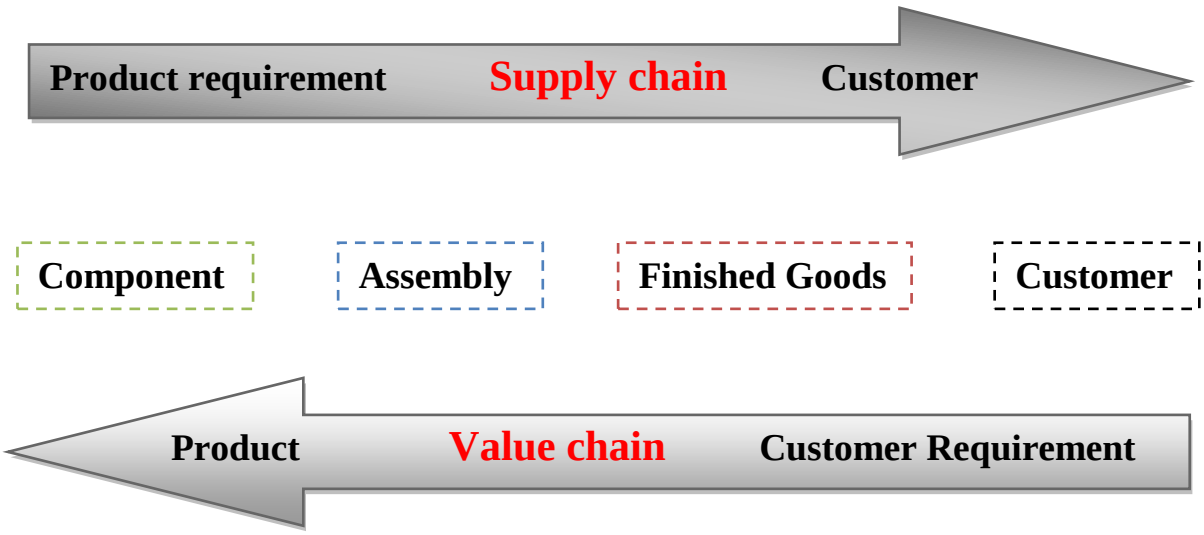

Figure 3 Comparisons between Supply Chain and Value Chain[13]

Supply chain in general is downstream flow of products flow from supplier to customer however value flow from other end. The source of value is customer so it flows in form of demand to supplier. The cash and order flow parallel to the value whereas supply flow in opposite direction. The primary difference between supply chain and value chain is general difference in perception. Supply chain is supply based and value chain is value based whereas both chains work on same network of companies that interact to provide goods and services. Supply chains emphasize on integration of supplier, manufacturer and distributor process in order to optimize business efficiency and minimizing the wastage where as value chain work in creating the value in eyes of customer. [14]

[13] Reference: Value Chains Versus Supply Chains by Andrew Feller, Dr. Dan Shunk, and Dr. Tom Callarma, 2006

[14] Reference: Value Chains Versus Supply Chains by Andrew Feller, Dr. Dan Shunk, and Dr. Tom Callarma, 2006

3 Current Situation Analysis of Sipradi Organization

3.1 Process Analysis

Currently, in overall Sipradi Supply chain the key players are Sipradi, its supplier, its dealers and final customers. Sipradi sells some of its products to both final customers and dealers where as it sells rest of product only to dealers. Customers with better enrich to organizational sells centre buys the products and service from there where as rest purchase them from local dealers of the organization.

Generally when Sipradi needs certain goods and products, it sends purchase order to its supplier. In response to the Sipradi's purchase order; when suppliers dispatch the prescribed goods, Sipradi in general, receive them at Raxual warehouse/store yard. As per supply, demand and pending customer order analysis, the concerned department in Sipradi head office figure out the quantity of goods required to be custom cleared. Hence, they release custom clearance memo to Birjunj office.

Concerned department in Birjunj works for the preparation of appropriate documents both for Nepal and India custom with assistance of local Custom Clearing Agents. They further make arrangement of proper transportation and labour force required for material loading, unloading and so on. When the sufficient fund and required legislation for custom clearance are arranged then goods are imported to Nepal and received and stored at Birjunj warehouse. As shown in figure 4, Sipradi's regional at Birjunj is entry point for the goods entering in Nepal from its supplier, it specialize in logistics activities i.e. warehousing, distribution, transport arrangement etc. Other then core logistics activities this Sipradi regional is also responsible for import and custom clearance function as well as local demand fulfilment function. From Sipradi, Birjunj as per the demand spectrums, goods are distributed to different Sipradi branch but exclusively to its head office Kathmandu.

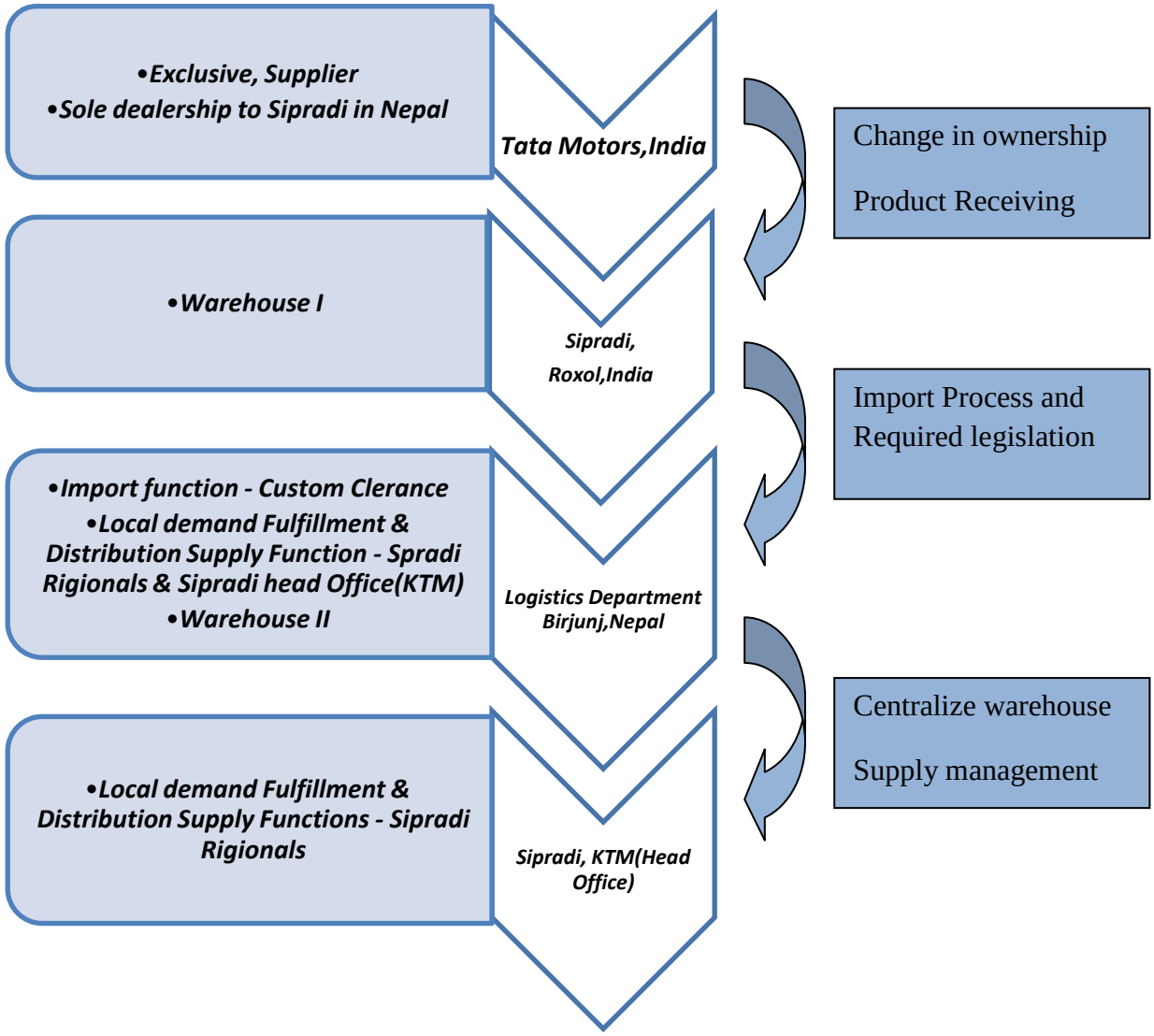

Figure 4 General Process Flow

3.1.1 Vehicles Supply Chain

Stage 1: Raxual Yard

Sipradi Trading exclusively supply all types passenger and private vehicles from TATA all round Nepal. When it purchases four wheelers from TATA, preliminary it stores them in storage yard at Raxaul, India. Raxual yard is its rental yard where payments are done as per the quantity of vehicles stored and duration of their storage.

Since there is huge sum of taxation in Nepal custom vehicles import, its wise strategy of Sipradi make Raxual storage in order to compute and simulate with price fluctuation of TATA vehicles and demand fluctuation of its customers. Apart from that, Raxual yard play key role as safe vehicles storing platform during the custom clearance, fund arrangement

Stage 2: Custom clearance

In this stage; Sipradi, Birjunj unit which responsible for all the major logistics activities required for vehicles to be delivered functionally to its final destination immerse into action. At first when clearance memo for vehicle is released from head office, Kathmandu, concerned clearance personnel of Sipradi collaborate with its clearing agent company at the both end (i.e. local clearing agent for India custom and Nepal custom) for efficient preparation of required documents and for the fulfilment of needed legislation. During this phase, they assure fund availability from head office account department in order to make sure that company has enough and safe sum of money for clearing the concern vehicles. After completion of all these clearance legislation, vehicles are allowed to import in Nepal and they are transported from Raxual yard to Sipradi, Birgunj.

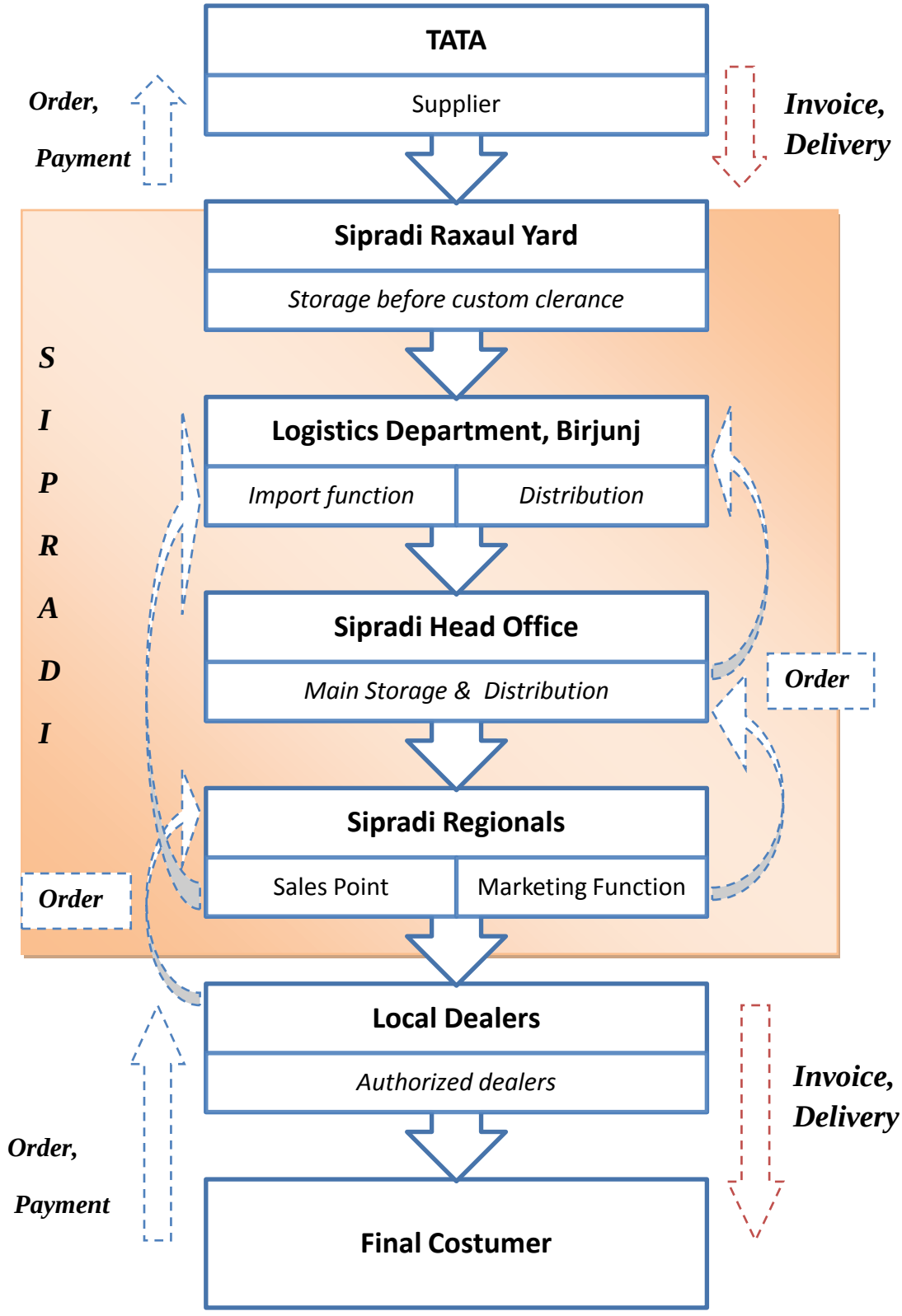

Figure 5 Vehicle Process Flow

Stage 3: Sipradi, Birgunj

Custom cleared vehicles are received and checked whether they are at same condition as it was received at Raxual Yard from TATA at Sipradi, Birgunj. If any damage is detected, those damages on product are claimed for compensation to the Yard owner who further claims it to insurance company. Here basic checking and observation is done for the product to be distributed nationally but for the vehicles to be supplied locally, within same region, detail inspections and maintenances are performed, and activities like scratch removing, painting, rust removing (if any) and so on are performed in order to make them ready to sell. From here vehicles are dispatched to different region but mainly to the Kathmandu head office which is highest selling point of Sipradis' vehicles.

Stage 4: Head office, Sipradi

Sipradi's head office at Kathmandu (KTM) is main player in organization's vehicles delivery chain. It is responsible for various key functions in this supply chain and act as process smoothening body with various strategic and functional responsibilities. It is mainly responsible for storage function, distribution function, payment (to supplier) function and purchase order (to supplier) decision function.

When Sipradi, KTM receive the vehicles, it evaluate and analyze the demand spectrum and sell the product its dealers (primary customer) and to the final customers. Sipradi's regional offices are generally the company owned sales points which are responsible for supplying Sipradi's products to its local dealers in belonging regions. They are also responsible for the marketing function of the company's product throughout the region. They supply automobiles to the local dealers who sell them further final customers in those regions.

3.1.2 Sphere Parts Supply chain

Stage 1: Import

Sipradi Auto parts, with sole dealership, supplies all range of TATA genuine sphere parts for the TATA vehicles all round Nepal. When TATA release required amount of sphere parts in response of Sipradi's purchase order, they are transported to Raxual- Birjunj port for custom clearance. With proper legislation and documentation, at first Sipradi, Birjunj through the local clearance agent company, clear the products from India custom at Raxual and then they are forwarded to Nepal custom. When required documents and legislation is performed, tax amount is paid to Nepal Custom and goods are imported to Nepal.

Stage 2: Sipradi, Birgunj

Sipreadi, Birjunj is the first and foremost point where the sealed goods from TATA are received and the quality and quantity of product are checked and verified. If goods are missing, damaged or found irrelevant then instant claim is made to TATA for errors compensation. If product are damaged or lost due to mishandling or carelessness either the loss is compensated from Transport Company or insurance company as per the nature of loss and damage. Thus received goods are stored at Birjunj, warehouse in specific location in order to get them with ease when required.

As shown in fig 6; from Birjunj warehouse, goods are dispatched to demand centre like head office Kathmandu, Sipradi' regional branches, local dealers in belonging region and to company's local maintenance department when required, with proper transport arrangements. Transport arrangement is either done through transport company or by company's own transportation vehicle according to the nature of transportation. The transportation mode depends directly on the urgency of the delivery, volumes of goods to be delivered or distance to delivery point.

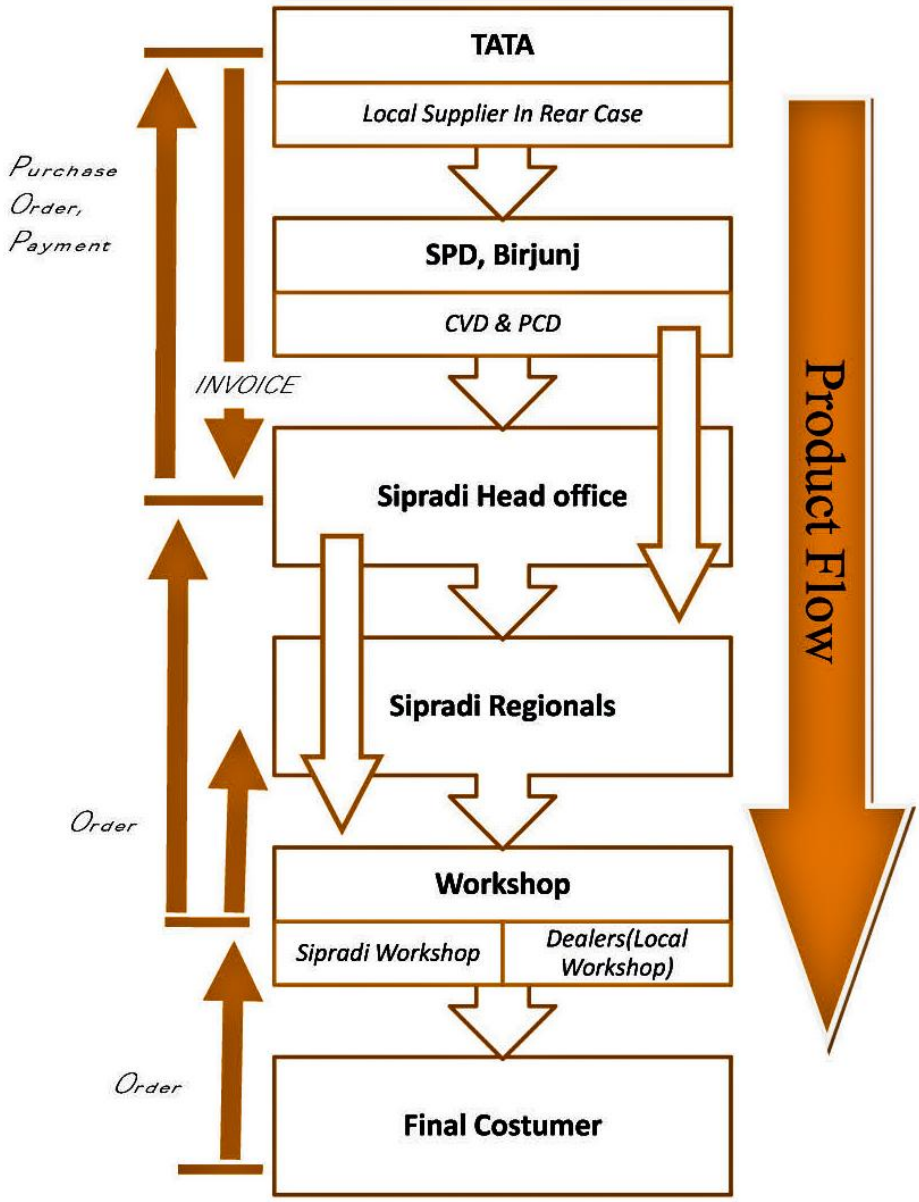

Figure 6 Sphere Parts Process Flow

Stage 3: Head Office

Sipradi head office, Kathmandu is most vital transaction centre in term of volume of goods it handles and sells and monetary task it performs. It contains most efficient warehouses with largest volume and variation of goods stored in it. As all the major management and account decision are performed in KTM head office, orders from Sipradi regional branches,

Sipradi workshop or local dealers/workshop in the regions and maintenance department are subjected at first over here. It makes decision of approving the quantity of order and from where and when they are to be supplied with the help of detail stocks and demand analysis of the products from different regional branches.

By proper analysis of level of stocks at different Sipradi regional units, Sipradi head offices make decision of from where the required parts are to be supplied. In some case if the products are of rear kind and if it's not so feasible to get it from other regional unit and TATA; either it buy the presold products from its dealers or from brand owned sphere parts supplier company to TATA in Nepal (with proper authorization from TATA motors).

3.2 Purchasing

Concept

Purchasing refers to the task of acquiring goods and services from different external organization in order to satisfy the company needs either for core business activities or for the support system to its core business activities. Purchasing, in general, is indeed management of external resources of a company in order to secure supply of capabilities, goods, services and knowledge required for smooth running, maintenance and management of company's business and support activities under most favourable conditions. Thus, it includes entire task for which company gets invoices from external parties. [15] Based on nature of company's business activities there are various service purchasing that a company makes for its smooth running i.e. facility services, financial services, IT services, operational services, R&D services, transportation and distribution services, human resource services and marketing services.[16]

[15] References: Arjan J. van Weele, 2004 ; Purchasing and Supply Chain Management
[16] Referances: Axelsson & Wynstra, 2002

Sipradi

As Sipradi specialize in supplying products throughout Nepal, manufactured by various manufacturers mostly in automobile sectors, purchasing is most important business activity it performs. Apart from purchasing goods from suppliers it purchases various services and resources in order to keep organization functional and for the generation maximum profit through its business activities. Sipradi invest major portion of its revenue on purchasing activities i.e. purchasing goods and importing them to sale. Other purchases are made on support activities required right from buying them from its supplier to delivering them to its customers.

During this transitional period of buying products from supplier to selling it to customer, core purchases that the company makes are financial services (from bank), transportation services (from transport companies for goods distribution), human resources services (for loading- unloading, transporting vehicle using drivers, experts for specialize projects)and facility services(cleaning services, construction tasks, facility maintenance tasks etc).

For the purchasing made for company's core business activities, Sipradi go through variety of process that verify the requirement of goods, avoids excessive stocks, maintains appropriate delivery time and assure the timely payment for goods to be delivered. When order of goods are made by regional office to head office with proper product specification, at first concern personnel tries to deliver product from available stocks within head office, if not available they checks stocks of products at regional warehouses. If those product are not available or is not in sufficient quantity or is needed for local consumption for the region then they release purchase order to the supplier. If it is not available with supplier as well or if supplier cannot deliver it within required timeframe then the pre-sold goods are purchased from local dealers of company to fulfil those orders. Apart from some exceptional circumstances, Sipradi, in general, makes Straight Re-buy (known products from known suppliers) from its strategic partners so there is low uncertainty of the purchase outcome. Its suppliers are its strategic partners and company has long term relation with them which eases the purchasing process of Sipradi a lot.

3.3 Import and Custom Clearance

Birjunj dry port in Nepal-India boarder is sole entry point of all the Sipradi's goods coming through land. Import process of Sipradi goods begins when clearance memo for them are released through head office Kathmandu. When clearance memo is released then documentation process for export authorization from India custom and import permission from Nepal custom begins through local agent companies (as they expertise on import-export documentation and required legislation).

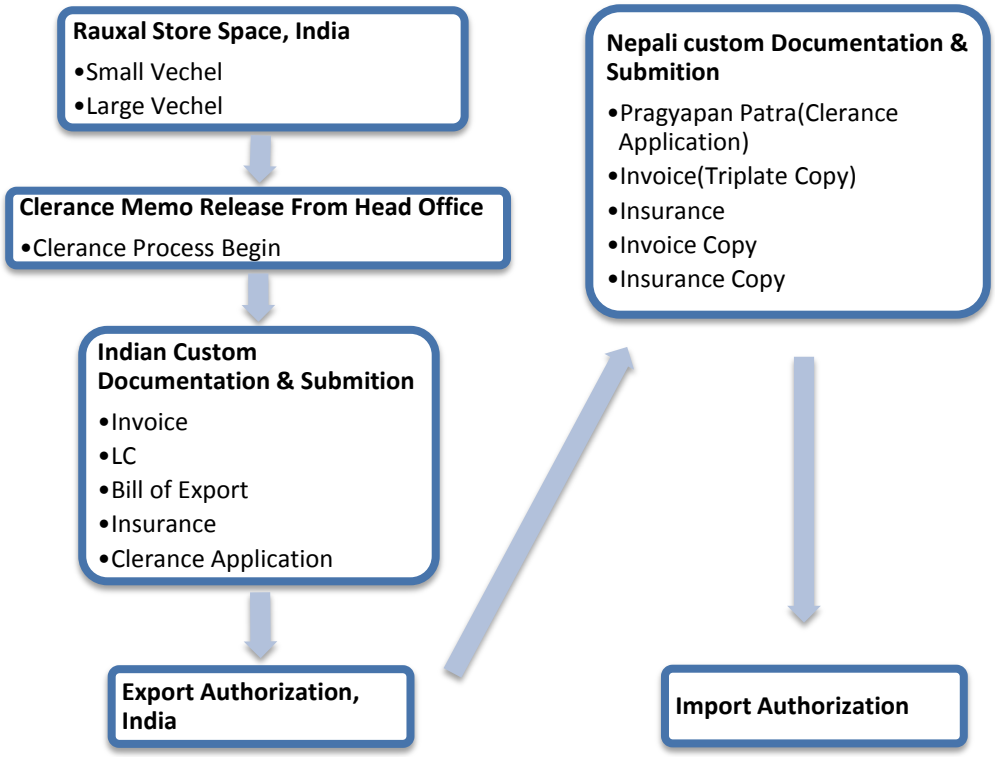

Figure 7 Custom Clearance Process Flow

For goods clearance at Indian customs documents i.e. invoice, letter of credit (LC), bill of export, insurance paper and clearance application is submitted. On the basis of these documents when export authorization is granted by Indian custom then goods are processed to Nepal custom for import permission and taxation. In Nepal custom documents i.e. invoice, insurance paper, insurance copy, invoice triplets copy, insurance copy and Pragyapan Patra (clearance application) are to be submitted. All the documents are subjected for evaluation then tax amount to be paid by Sipradi are calculated. When tax amount for those goods are paid to Nepal custom then import authorization is granted for these goods and then they are transported to Sipradi, Birgunj.

3.4 Dispatch Process

Sipradi in general performs its dispatch process under four major task heads i.e. a) Preparation of documents ,b) Preparation of dispatch ,c) Dispatch of goods and d) Document collection of goods if found damage and sort. Main purpose of 'dispatch document preparation' task is to confirm whether the goods can be dispatched or not. Through the execution of this task all the required formalities regarding dispatching of goods is completed. Preparation phase is done in order to arrange loading for vehicles and make them ready for dispatch. Finally as last phase of goods dispatch process all the necessary documents are collected and shorted if found damage in order to recovering damaged and short goods.[17]

[17] Reference: Sipradi's dispatch process manual; ISO9001:2008QMS-BLD-OP .O4

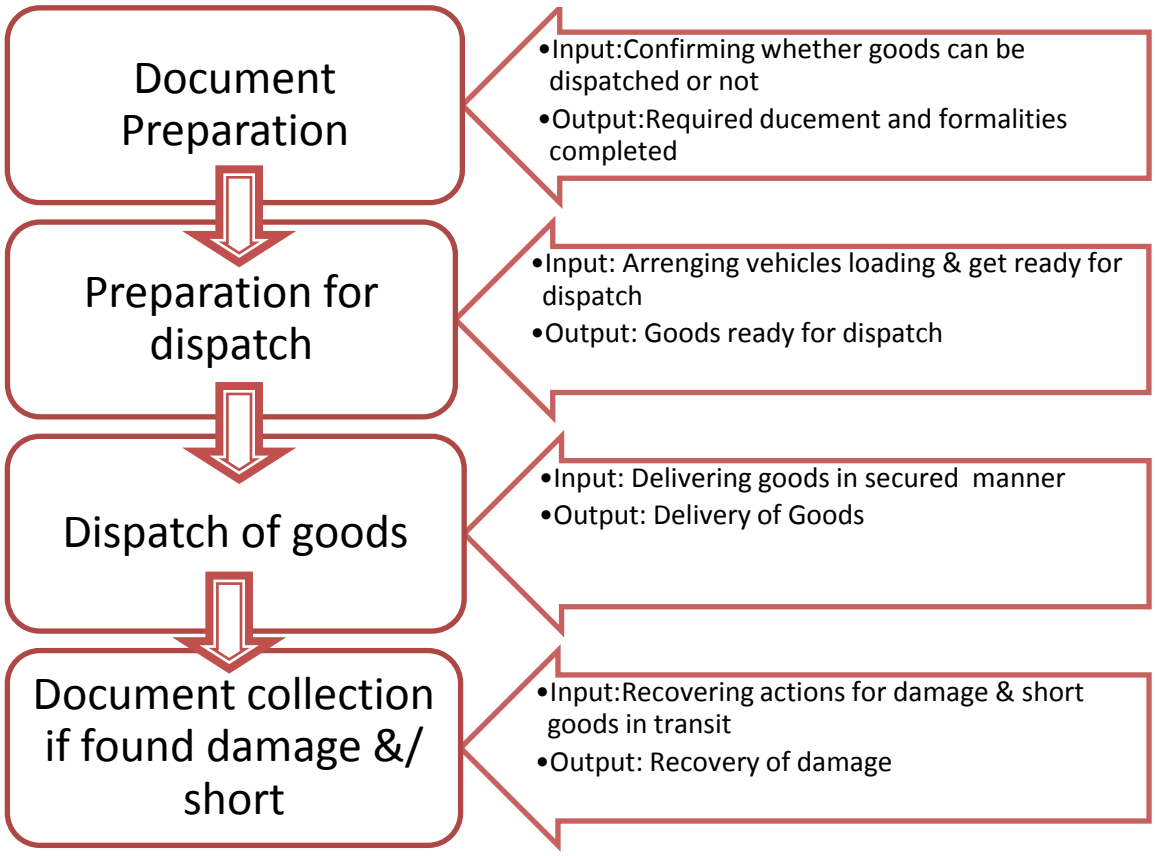

Figure 8 Goods Dispatch Process[18]

Sipradi perform this goods dispatch process under standardized operating procedure which help in maintaining systematic, uniform and quality operating procedure throughout the organization. The detail overviews of this standardize system is described with all the concerned procedure under its above mentioned task heads as follows:

- **Preparation of documents for dispatch:** At the first stage of this phase assistant manager &/ logistic officer receive dispatch order from dealer and branch. Then account manager ensures that payment from dealer has been received for the amount of product to be delivered. For goods to be dispatch to STPL branch quantity of stock is checked and Dispatch Note is issued by concerned officer then

[18] Reference: Sipradi's dispatch process manual; ISO9001:2008QMS-BLD-OP .O4

after. When the confirmation of payment is completed then invoice for dispatch is issued but in case of unavailability of sufficient stock dealers and branch need to be informed properly within same day of order.

- **Preparation for dispatch:** In this stage of goods dispatch process at first invoice/dispatch note is sent by account manager to warehouse for dispatch of goods. For the invoice or dispatch note concerning to sphere parts then packing arrangement is done by logistics manager. For invoice or dispatch note related to other goods transporter and vehicles are arranged. For the goods less then specified quantities then company's own vehicle is used for sending goods to transport. Sphere parts and batteries are needed to be loaded so loading arrangement is made by logistics officer when required.
- **Dispatch of Goods:** When the preparation phase for dispatch is complete then dispatch of goods begins. At first vehicles are loaded in warehouse with driver and store employees as witness. Then insurance company is informed about the type of goods, amount, quantity and destination for the purpose of transit insurance. During loading logistic officer is responsible for making sure that loading of goods is relates exactly to the parts and goods. Then after the bilty from transporter is collected.
- **Collection of goods if found damage or sort:** After the dispatch of goods if loaded vehicle found accident, damage goods or theft in transit duration then the detail of incident is informed to insurance company on the same day of incident otherwise the next day. Then documents i.e. police report, bilty, loss quantity, photo of damage goods and insurance policy is collected. Finally if thus damaged or sort goods quantity is less then specification by insurance company then they are recovered from transporter. [19]

[19] Reference: Sipradi's dispatch process manual; ISO9001:2008QMS-BLD-OP .O4

3.5 Inventory Management

3.5.1 Overview

Inventory is the set of goods and materials held in stock with the primary purpose of tackling demand fluctuation. Since, in general business environment there is always mismatch between supply and demand of goods, inventory play key role in fulfilling the demand when supply is disrupted. When products are stocked in safe amount, it makes huge impact on company's responsiveness to demand and increases product availability. [20]

In any business there might occur various issue such as a) production plant get shortage of raw material b) facilities/machineries get damaged c) production workers goes on strike d) goods could not reach stores due to transportation issues e) wrong delivery is made due to human errors or/and f) majority of product get damages due to transport mishandling. An occurrence of these circumstances raises temporary supply shortage or inadequate supply of the product that lead to product stock-out. Under these situations company loses margin and future sales, affecting directly on the company and supply chain profitability. Thus, in order to tackle with the supply disruption, demand fluctuation and to bring competitive advantage, company stock certain quantity of goods called safety inventory or safety stock.

There are three basic components in inventory i.e. cycle inventory, safety inventory and seasonal inventory. The cycle inventory is the average inventory between replenishment of goods, safety inventory is safe amount of stock held to compensate supply and demand uncertainties and seasonal inventory is inventory held in order to counter predictable demand variation in certain time frame.

3.5.2 Optimizing Inventory

Apart from holding inventories for dealing with supply and demand variation and maintaining certain service level, companies purchases in large lots and stock then in order to get advantage of economies of scale. Generally purchasing of goods in large lots

[20] Chopra and Meindl ,2006–3rd edition; Supply chain management

facilitates companies' opportunity to lower the total cost. It gets quality discounts and/ short term discount in material cost for purchasing goods in larger sale. When batch size is optimized it lowers unit fixed ordering cost. When a company has certain facilities with constant holding cost up to its limit then matching the holding capacity and facility of company lower the unit holding cost rather than making them in smaller quantity.[21]

In any business organization overstocking of goods might lead company into liquidation, obsolescence or holding where as under stocking causes lost margin and future sales. For matching the supply and demand of goods in company and strategically planning and holding optimum amount of inventory to be available in right amount and quantity at the time of requirement, inventory must be effectively and efficiently managed.

Thus, inventory management cope with demand and supply uncertainties in operational business environment and purpose efficient strategic inventory supply and stock solution. The strategic inventory management generates optimum service level of inventory with reference to inventory holding costs and yield maximum margin and future sales.

In present day business environment, the wide range use of internet makes product search easier, and product variety is grown in market. Customers are mostly willing to buy product promptly in optimize cost. This circumstance pushes the intensity of inventory management. In this business environment inventory forecasting needs to be more and more accurate. The accuracy level of inventory forecasting and efficient and strategic implementation of inventory management techniques lead company to hold optimum inventory level with all round consideration of service level, customer satisfaction, demand and supply uncertainties and business profitability.

3.5.3 Inventory Management Practice

Taking all these factors into consideration Sipradi has implemented various inventory management techniques and tools into practice. Of all the companies under Sipradi brand, Sipradi sphere parts deals with larger range and variety of products, as it have to deal with

[21] Chopra and Meindl ,2006–3rd edition; Supply chain management

numerous parts and components of the vehicles. Thus efficient inventory management is ‘must’ for Siradi sphere parts.

There are different inventory management strategy that Sipradi has under taken in order to maintain optimize service level and profitability. Basically the products are managed and stored at warehouse on the basis of ABC analysis. Since the items under C category cost very less to the company, they are stored at warehouse at safe and adequate amount whereas the items under A category are well engineered and stored with proper cost consideration.

The front selves, where fast moving products are stored are easily accessible for good loading and unloading. Each selves and racks are categorized with individual differentiable numbers and digits. Every stock keeping unit (SKU) is kept in their individual location so that they can be easily accessed at the time of requirement.

The major challenge SAPPL face for managing inventory is losses of products due to misallocation within warehouse due to human errors i.e. handling errors and wrong entries. In order to avoid these sorts of challenges various tracking techniques are being implemented from strategic level. Moreover the barcode system implementation along with its integration with ERP system is in final phase which will certainly eliminate most of tracking and tracing problems associated with inventory (Spradi has been using warehouse management system for the record keeping and information sharing purpose within and out of the organization). In order to make old product stock out and promoting sales of products STTPL also arrange different offers and discounts to its customers. As accurate order forecasting and effective ordering is key to reduce larger inventory holding and maintaining greater profitability, inventory and product ordering decision passes through purchasing unit which make detail overview of the order. They make analysis of the product stock at different location or regional warehouses and if the order is required to be purchased, they finally make purchase order to the supplier.

3.6 Information System

Overview

Information system is key driver to optimize and improve logistics management in the supply chain. Information systems basically automates several process of organization i.e. documentation and ease the flow of them to the concern party when required promptly and efficiently. Therefore information systems strengthen the management scope and allow managers to acquire operational decision as well as operational status of several previously information lacking areas smoothly and on time.

The characteristics of logistics information are enlisted as follows (Skott-Larsen et al. Managing the Global Supply Chain):

Logistics master data	Logistics transaction data
Article and order-based data • Addresses • Articles numbers • Measures of units • Price	Article- and order- based data • Delivery quantities • Delivery times requirements • Number of delivery units • Number of shipping units
Location-based supplier logistics data • Shipping dock information (numbers of doors, areas, buffer capacities, shipment control) • Delivery channels Location-based operation logistics data • Receiving dock information (number of doors, areas, buffer capacities, incoming	Location-based supplier logistics data • Delivery addresses • Delivery times, shipment times, operating times Location-based operation logistics data • Picking information (types, capacities, marginal performances) • Number of used logistics units

control) • Shipping dock information (number of doors, areas, buffer capacities, shipment control) • Inventory areas (storage types, capacities and marginal performance of given storage systems)	• Operating times, collection times, standard delivery times
Logistics unit data • Identification number • Technical –functional name • Measures • Sizes • Weights • Restrictions coding	Logistics unit data • Number of logistics units and packaging units • Number of loading equipment and transport means

Figure 9 Characteristics of logistics information[22]

Sipradi

At the moment, Sipradi is using Workshop Management System (WMS) powered by Oracle for the automation of documents, stock level updating, and efficient demand, internal order & supply visibility. WMS further facilitate appropriate information flow regarding activities i.e. inventory level, inventories, periodical reports, product location etc. Customers order the goods to Sipradi via emails or by physical visit to the regional offices.

For inquiries, general document sharing and information sharing within the organization in different region email services are used such as Microsoft Outlook. Within Sipradi for the

[22] Fig: Tage Skjott-Larsen, Juliana H. Mikkola, Philip B. Schary, 2007 B001JODE40 : Managing the global supply chain, 17 and Christopher, 2005

required regular communication and inquiries between various departments and regional offices personalized enterprise collaboration systems (ECS) is used. For placing the orders to Supplier, Sipradi, in general, uses suppliers information systems i.e. it uses TATA's ERP system to place the order of goods for vehicles and auto parts.

For demand forecasting, Sipradi is not using any forecasting software or tools. Marketing department is responsible for forecasting demands. They use best available existing data and sales history to speculate the demand.

Sipradi does not have ERP system yet but it is at customization phase of ERP System implementation which powered by Microsoft. Furthermore the tracking and tracing tools i.e. bar code, RFID etc have not been used in Sipradi yet but the feasibility of barcode system and its applicability in Sipradi's business context is being analyzed.

3.7 Transportation

As Sipradi has well structured distribution network with five different regional offices and various local dealers all-round Nepal, it uses various transport mode in order to distribute products to those sales site. The most frequent transport mode Sipradi uses is roadways.

Medium sized trucks are used for sphere parts and other goods transportation. These types of transportation services are purchased from the local service provider from the required regions with proper periodical contracts. Amount to be paid to these transport service provider depends upon the transport unit and its volume (according to the agreement made in contract). For the local transportation of auto parts and other goods to its dealers, Sipradi uses its own vehicles i.e. vans and small sized trucks. Moreover if the amounts of goods are not enough to be transported by service provider, Sipradi uses its own vehicles to transport those goods.

Sipradi transport its vehicles individually by driving them to the required site i.e. regional offices, dealers and its final customers. There are no uses of bigger trucks, containers, trailers and so on for the vehicles transportation, yet. In this process, several vehicles drivers are hired for driving the vehicles to the required site in wages basis when needed.

The major region behind not using bigger trucks and trailers for transportation of vehicles is due to the less favourable roads (bad road condition, smaller roads, and many turnings, many up hills and down hills) and lesser quantity of goods to be transported. In various circumstances even airways is used for the auto parts and other goods transportation. If the delivery is to be made promptly as per the customer requirement and company policies, Sipradi purchases transport services from the curer company such as DHL.

3.8 Payment Process

As financial decision and payment process is most impotent expense-revenue function in a business organization; the way of handling it affects most for profit maximization. Every company needs to systematize payment process in such manure that errors level gets minimized, cash in hand ups optimized and safe amount is available for business transaction. For the assurance of proper fund availability for business transaction, future investments and optimizing amount to be received during business process, company needs to develop effective payment process and make transaction right in favour of the company and its business motive.

Taking in all these factors in consideration Sipradi has developed efficient and quality payment process to its supplier for purchased items and from its customers for the sold goods both during purchasing and selling of the goods. Here, Sipradi's account department play life blood role for transaction decision in its business process.

As shown in figure 10, when customer sends their purchase order of goods to Company head office or branches, at first customer make payment for the goods to be purchased as per invoice delivered. Assigned account personnel for concerned transaction from account department make confirmation of those payments. After the payment confirmation from account department the goods are arranged for delivery and the process of loading and transporting them to the customer begins.

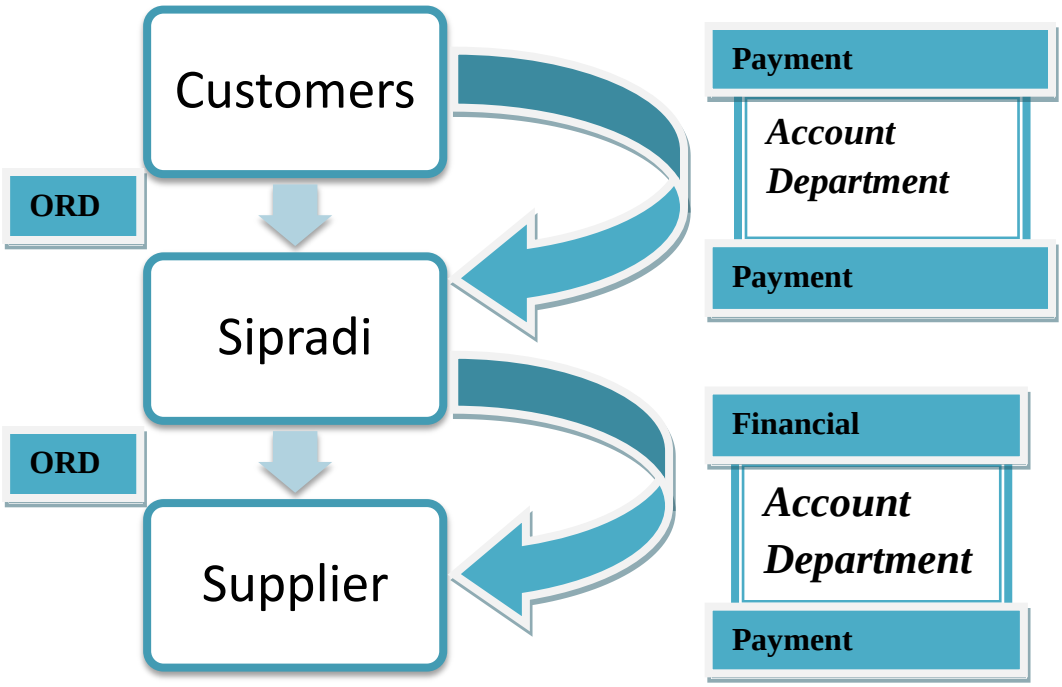

Figure 10 Payment Process Flow Diagram

When Sipradi purchases goods from its supplier, account department plays vital function there as well. During purchase process Sipradi at first sends purchase order of the goods required. In response of this purchase order suppliers reserve the goods and sends invoice for goods to be purchased to the company. When payment is made by company's concerned account department then the products are delivered to the organization with proper payment verification documents (i.e. bills).

Apart from purchase and sells of goods, account department plays key role at the time of other major investment function as well i.e. at the time of custom clearance. Since there huge taxation for the import of goods such as vehicles and its sphere parts, account department serves important payment and business decision, as it make confirmation of availability of enough fund for the clearance process and further makes arrangement of those required fund.

3.9 After Sales Service

Sipradi as brand has excellent reputation for its top class after sales services among its competitors. With appropriate servicing centres and maintenance facilities all round Nepal; Sipradi has been handling maintenance operation and warranty process in efficient manner by using Tata Genuine sphere parts and components for its vehicles.

Every Sipradi regional has fully equipped maintenance facilities along with well trained and well experienced personnel who are mainly responsible for the activities i.e. quality and status check of new vehicle arrived for sale, maintenance of Tata vehicles from its customer and servicing of the in the required time frame as manufacturer specification. Apart from regional maintenance facilities Sipradi trading has authorized many dealers all across country for the repair and maintenance of Tata vehicles with Tata genuine sphere parts.

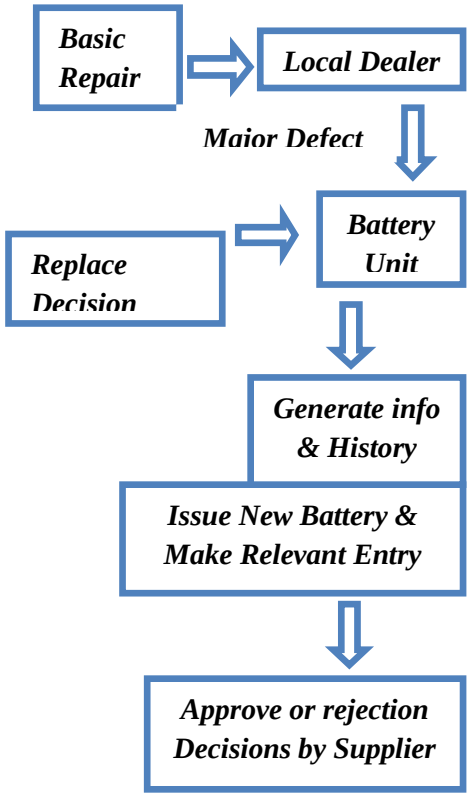

Figure 11 Battery Warranty Process

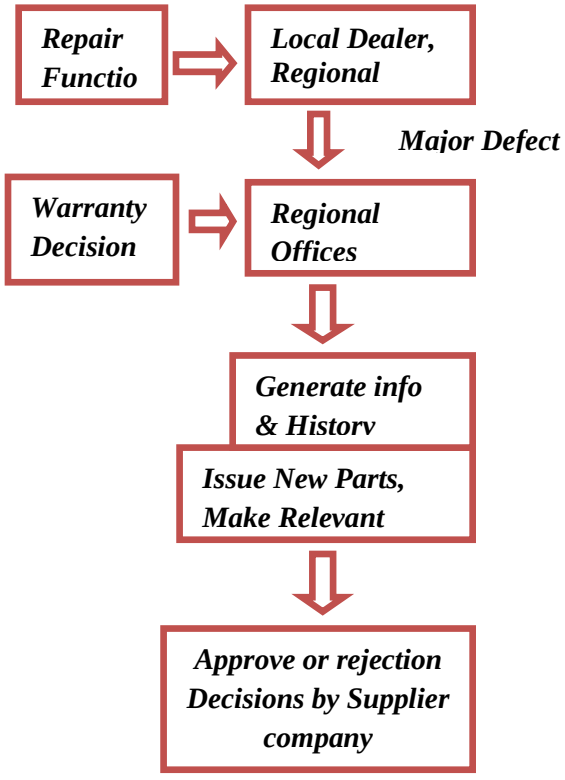

Figure 12 Auto parts warranty process

Battery warranty Process

As shown in figure 11, in the battery warranty process, when the defect or problem occurs in the battery at first it is reviewed by local dealer subjected by customer. Local dealer does basic repair activities if they are able to solve the problem. In case of major defect where local dealer cannot solve the problem, they forward it nearest Sipradi battery unit in belonging region. They go through the nature of damage and problem in battery and go through the info and history of battery as available in sales and maintenance data.

Upon the appropriate study of the battery history and nature of damage, inspection personnel from battery unit make decision whether to replace the battery or not. With warranty claim approval, company issue new battery to the customer and keeps the damaged one with proper documentation. The warranty decision are further evaluated by supplier company representative in fixed time interval and makes sure that replace decision is valid according to their warranty rule and finally approve or reject the warranty decision.

Auto Parts Warranty Process

As presented in figure 12 (p38), when vehicles are subjected for maintenance to Sipradi's local dealer or regional offices, the concern repair centre go through the nature of failures and make general evaluation if it is covered by warranty. For the maintainable failure, these repair centres repairs the parts where as in case of major defects goods are introduced to regional office which makes warranty decision of replacement of parts. Before issuing the new parts as replacement, the parts history is generated along with all its associates' detail. After the conferment of the parts to be eligible for warranty claim, (if required) new parts are issued and relevant entries are made. The final approve or rejection decision on warranty claim is made by supplier representative in scheduled duration of time.

4 SWOT Analysis

There is always certain weakness and threats along with strength and opportunities of every business organization. Despite of specializing in distributing automotive and allied in Nepal over the ages and developing distinct identity in the market, there are some weakness and threats to the Sipradi. Adequate understanding and realization of them helps business organization in optimizing its business and figuring effective strategy to overcome upcoming challenges. Brief overview of strength, weakness, opportunity and threats of the organization, extracted from current situation and system analysis of Sipradi Organization are discussed as follows:

4.1 Strength

Long term partnership with its supplier

Sipradi has long term partnership with its suppliers, mainly with TATA, one of the most sellable brand names in automobile sector all over Nepal. These partnerships add on certain degree of goodwill and reputation that the suppliers have, as they are market leaders their field of expertise. Via these long term relationship and trust factor between suppliers and Sipradi, suppliers open heartily shares, inspires and implements their strategies and operating techniques through Sipradi for maximizing supply chain profitability. These long terms relationship between Sipradi and its suppliers is win-win situation for Sipradi and its suppliers both as each party subject their years of experience and expertise to enrich products and goods to their final costumers.

Systematize working process (ISO certified) and customer trust

Over the ages Sipradi, in accordance with its business need have been rectifying the holes in its business process, if any. It has been continuously updating its working process with timely trends, technology and facilities. Via systematization of its working process Sipradi has been able to deliver goods and services to its customer on appropriate time frame with optimized service level. Through systematize and standard working process, Sipradi has been providing quality goods and services to its customer over the ages. So, it has gained customer trust and good will factor via its quality goods and services, which for sure one of the greatest strength and asset of the company.

Enthusiastic and skilled workforce, working in their field of expertise

Sipradi is full of its workforce who is contributing their skill and knowledge for mutual well being. Because of comparatively attractive wages, salary and company's brand value within Nepal, majority of skilled personnel are always willing to work in Sipradi. As Nepal is country with many skilled and educated work forces and very less job opportunity, large company like Sipradi are centre of attraction for them and these companies get to select best personnel in country. The personnel who are already working here get more motivated to excel their work because of the reward and incentives given strategically. Thus being able to get best workers, in their field of expertise, working for the well being of company is for sure most vital asset Sipradi have.

Establishment of strong and reliable brand name

Sipradi has established strong and reliable brand name in automobile sector over the ages in Nepal with adequate service level and effective after sales services. This for sure boosts the sales of goods and services of the supplier associated with Sipradi. That increases

intensity of the suppliers' willingness to be associated with Sipradi and customers desire to purchase its products and services.

Diverse product and service range

Sipradi deliver products and services of various ranges as per customer requirements and their affordability with optimized service level. This get customer attracted to buy its products as they get services of their requirement when required. Moreover, via various techniques, facilities and strategic partnership with its dealers, Sipradi has been able to provide products to its customers along with effective and reliable after sales services which are for sure one of the major strength factor of the organization.

Sound distribution network

Sipradi is profound with sound distribution network all over Nepal, diverse in various regions as per their business requirements. Via various dealers for goods and services all over the country, Sipradi has been able to reach comparatively larger range of customer. Thus, when final customer buys products form Sipradi they can be assured for effective after sales services at the time of requirement nearby to their site of operation. Moreover, this wide spread distribution network serves in marketing of the products to company's own benefits because of their local enrich and gives Sipradi competitive advantages. This sort of strong relationship with its dealers and business partners and strategy of working for mutual benefits works in favour of company for maximizing supply chain profitability is important asset of the Sipradi.

Adequate technology, facility and strategies update

Over the ages Sipradi has been maintaining positive attitude toward new trend technology, facility and strategies pitched by its personnel. It motivates its workforces to get new techniques and strategies for minimizing operational costs and optimizing profitability. Regular scheduled meeting are arranged for the purpose of brainstorming, information sharing and status updating activities throughout the organization. Through these meetings when management sees possibility of operating process optimization via implementation of certain technologies, strategies or facility update, concerned personnel are assigned for proper feasibility analysis of the purposed techniques. If feasible within its operational business environment to improve the efficiency and/ profitability of company, then those techniques are implemented effectively and proper reward is granted to concerned personnel.

This sort of openness to effective strategies and technology sharing within organization inspire its staffs to work on the innovative and effective ideas. Through these sorts of collective effort and ideas, Sipradi has been updating its technologies, facilities and business strategies time and again. These strategies, facility and technology act crucial role in systematizing its business process and maximizing its profitability in optimized operational cost.

4.2 Weakness

Dependences on single supplier

If a company has single supplier and the supplier is as big as TATA then for sure the company's business experience will be quite intimidating. In these circumstances in one hand, company benefits massively from the high value brand name of supplier on sales of product and on the other hand it have to struggle a lot to create its unique business

existence on the market. The company will turn out to be more of the subsidies then an individual company.

The major question here is “what’s so wrong about acting as subsidies?” and the answer is “none” if organizational business strategy is to be satisfied with what it is now. In contradiction, in any real profit motive business, satisfaction is never an option for its sustainment; it’s rather surrender to the circumstances.

Having single supplier makes business strategies and decision influenced or induced by its supplier which is more or less, not in favour of company. But if each party in supply chain strategically works for maximizing the supply chain profitability then to maximize individual profitability then every party get benefited in greater proportion by enriching higher range of customer through price and sales optimization; which is for sure not the exact case in this organization.

High demand fluctuation, forecast inaccuracy and supply-demand mismatch

In Sipradi’s supply chain, the demand and supply of the product fluctuate drastically all-round the year. Because of unstable political circumstances, strikes, product shortage, natural calamities i.e. land slide, human errors in product handling etc. both in India and Nepal the supply of product get disrupted. Due to new trends, marketing strategies, seasonal effect, national events, government taxation and policies etc demand and order of the product in Sipradi changes randomly. Generally forecasting of demand is done for larger time frame basically on the basis of previous sales record. The association of various direct and indirect factors on the demand and supply mismatch makes it difficult to predict accurately. Eventually this will lead company to hold larger inventory, creates bullwhip effect, increases overall cost and decreases the profitability of the company. Thus forecast inaccuracy and supply demand mismatch is one of the major problems Sipradi have which need to be adjusted with better tools, techniques and process.

Product tracking and tracing system not available

Currently, Sipradi is not using any sort of product tracking and tracing system because of which there occur various problems in day to day business activities. Though Sipradi is trying to adjust the tracking and tracing problem via efficient product monitoring and information sharing but the errors and efficiency issues in this system is impeccable; that makes this system inefficient.

Due to lack of product traceability Sipradi has issue of losing the product when required, if misallocated. This further makes difficulty in finding product status, and condition of product (i.e. where and when product get damaged, which product are not appropriate) that makes difficulty in material handling and tracking faults and process errors. Moreover, this increases the inventory holding cost and makes loss of the product when misplaced which ultimately effect adversely on company's profitability.

Poor transportation systems and strategy

Transportation is one of the major issues that are hindering Sipradi on its product availability, stock level and overall business profitability by increasing associated costs. For the auto parts and other goods transportation, the most common issues are delays in transportation, lost and damaged goods, wrong delivery of the products and unavailability of the transport vehicles when required. These transportation issues rises in greater proportion and magnifies because of the presence unreliable and small scale transport service providers on markets, working just on their regional levels and their un-optimized working processes.

Drivers negligence, strikes, road conditions, natural calamities i.e. flood and landslide, festivals and holidays and traffics jams are most common causes of transport delays during transportation. Products get damaged because of mishandling of goods, random loading and unloading, unplanned loading and bad road conditions, inappropriate/ineffective

packaging and rough driving. Theft, wrong product loading and ineffective sealing of loaded vehicles leads to product getting lost. Goods and auto parts are wrongly delivered due to human errors i.e. wrong delivery specification, confusing specification and negligence etc.

Generally, for lost and damages on goods if not insurance company, Transportation Company pays for compensation. But when product get lost or damaged, company have to make new order for the product, and this process takes times leading various consequences i.e. product shortage, customer diversion to other products, lost in future sales and so on. Moreover, occurrence of all of these transportation issues including lost and damages on goods effects directly in maintaining appropriate stock level or even in many case leads to stock out. This decreases the service level of company creating unsatisfied customer and lost revenue due to stock out.

For transportation of vehicles there are presences of even bigger issues. Sipradi have not been able to introduce bigger trucks for carrying automobiles. Thus it has to drive them via roads using drivers to throughout its distribution network. This increases the transportation cost of vehicles as they have to transportation individually and consume more fuel and more charge for drivers. Moreover the major issues here are; on-road uses of individual vehicle for transportation deteriorate the condition of vehicles because of bad road condition, scratches, rash driving and so on. This leads Sipradi to check the condition of vehicles thoroughly before selling it and needs to maintain it if there is any damages, scratches, rust or strain due to transporting via on-road driving. It increases the cost as it needs extra maintenance activities on these automobiles and detract portion of customers buying items i.e. cars.

High increment in cost in products value chain

One of leading weakness Sipradi supply chain posses is the enormous increment in prices of vehicles and sphere parts during different phases of value chain. The major cost increment occurs during the process of importing goods to Nepal from India, as heavy taxation is imposed on the imported items. This leads in causing large difference in product

selling prices of Sipradi with suppliers' selling price. Apart of this major cost increment in import, other costs are occurred because of less implementation of business process optimization tactics in various value chain phases. Because of this Sipradi and its competitor's faces huge challenges in reaching wider range of potential customers and exploring lower price range market.

Long Lead Time

Various environmental, political and social impact as well as infrastructural and efficiency issues held during product down streaming from supplier to the demand origin in Sipradi elongates the products lead time. The happening of climatic catastrophes i.e. flood, land slide, heavy rainfall etc makes difficulty in getting the product on time as common mode of transport is via road. Political issues i.e. strikes, protest, political rally etc as well increases the lead time for product delivery. Moreover festivals, religious rally, traffic jams (especially in Nepal-India border), infrastructural shutdown or damages etc effects in the lead time of the product and they cannot be delivered on time. Apart from these random issues hindering on lead time, there are some regular factors i.e. various legislations and there unsystematic manual documentation, un-optimized transportation and material handlings and indolent business culture that impact on the lead time and forbid it to get minimized.

Large Inventory of products

In order to tackle with supply-demand mismatch and fluctuating lead time, Sipradi need to maintain certain stock level of the products in its warehouse with reasonable consideration on service level. Here, Sipradi needs to shift its focus from maximizing to optimizing availability in order to maximize business profit. One of the weaknesses of Sipradi in this context is that it has been unable to reduce inventory of goods as its major focus is to maintain maximum availability of products. Un-optimized stocking of inventory at various

regional warehouses increases inventory holding cost and various support cost associated with them right since it's down streaming from supplier to the concern warehouses. This phenomenon elongates the return of investment and decreases the profitability of business.

4.3 Opportunity

Sells and revenue increment

The market of private vehicles is yet to be discovered in Nepal. Here in this country with about thirty million populations, the average vehicle distribution is approximately one per hundred people. So if Sipradi can deliver vehicles and its sphere parts in affordable range to masses, it has huge potential to raise its sells, revenue and profits on larger extent.

Product range extension

Since Sipradi has created reputed and reliable brand name in Nepal, it has opportunity to extend its business in other product range. If Sipradi extends its business in other sectors as well, it posses huge potential to be successful because of its good will in the market and effective working processes.

Vehicle manufacturing plant establishment

Manufacturing the automobiles plants here in Nepal with mutual partnership with its business partners is another huge opportunity Sipradi have. Via this Sipradi has potential to

produce automobiles in reduced cost and it can reach to wider range of customer with in and out of country.

Establishing Sphere parts and components manufacturing plant

Establishing larger range of automobile components and sphere parts manufacturing plant and supplying them for automobile manufacturer is another huge potential Sipradi have. By its establishment Sipradi can even get special discount in finished good from its supplier. So it can be opportunity for mutual benefits and way to explore affordable automobile markets in Nepal.

Globalization opportunity

With the experience from its long term business ideas, Sipradi can march forward to global automobile distribution and retail business. As Nepal is located in south Asian region, there are several developing countries located near this, where automobile business has not been explored or established yet. Beginning its business extension from unexplored south Asian market, and then entering in fast growing Indian and Chinese market, it has potential to extend its distribution business globally and have opportunity to stand as leading distribution brand in global platform.. In those circumstances it has scope of exploring the global market via distribution of different supplier then single supplier as well as per the regional (country) requirement and product demand.

4.4 Threat

Global competition

Since the automobile market in Nepal is at its growing phase, many automobile brands are in process of establishing and introducing their products in Nepal. Sipradi being one of the most experienced companies in this field in Nepal it has largest market share. So there it always has threat of losing market share and its customers.

National competition

Some companies have started manufacturing ranges of vehicles in Nepal. By this they are getting competitive advantages because of low manufacturing cost and lesser custom duty. As automobiles have high custom charges and taxes while importing, the companies with their manufacturing plants are getting advantage of cost and trying to explore lower cost market which is in fact yet to be discovered.

Competitive market and customer affordability

In the sphere parts section there is always scope for the sphere part manufacturer to provide parts cheaper to the genuine one. So in the cost competitive market there is always threat of customer preferring other options for their vehicles maintenance to the genuine parts because of price and availability factors.

5 Problem Identification

Through overall analysis of Sipradi's supply chain and operational circumstances, following problems hindering its profitability and service level are identified:

1) ***Supply demand mismatch and bullwhip effect***
2) ***Inefficient internal and external information flow***
3) ***High cost of product***
4) ***Products lost due to misallocation***
5) ***Forecast inaccuracy***
6) ***Poor transportation system***

6 Solutions and Recommendations

With proper consideration of issues figured from current situation analysis and problems identified in Sipradi supply chain; effective tackling techniques, strategies and technologies are proposed as follows:

6.1 Matching Supply and Demand

Sipradi can match, maintain and smooth supply of goods and their demand by reducing the buffer inventory. One way of reducing its buffer stock is efficient management of safety stock and re-orders point, cycle inventory and seasonal inventory. Safety stock and re-order point can be efficiently managed through continuous evaluation and maintenance of safety stock according to seasonal requirements, timely re-order point calculation with

demand constraints fluctuations and more accurate forecasting methodologies and tools. [23] This further helps Sipradi in maintaining proper service level, reduces the number of manual orders and decreases runtimes. Moreover implementation of postponement and modularity helps Sipradi to maintain minimal and productive inventory level. It remarkably saves cost due to over stocking or under stocking of the goods

Detail analysis and trade off between ordering enough of goods in order to satisfy demand and ordering too much is most for Sipradi along with their conjoint consequences. Sipradi primarily needs to make effort on figuring optimum level of order quantity and need to update it when business environments and demand spectrum changes.

Average profits generate incomplete set of information in real life business environment when considering two quantities of a product e.g. 100 and 900 units have the same average profit. Thus, the preference and priority on goods and their transaction should rather to be work out with proper consideration of probabilities of profit and loss rather than their average profit. The factors that are needed to be considered while setting the quantity of goods to be ordered are as follows:

- It is not so necessary that optimal order quantity is equal to the average forecasted demand.
- Optimal order quantity depends on the marginal profit and marginal cost and their relationship.
- The increment on quantity of purchased items and stored items increases the risk factors i.e. increment in probability of larger profit and large losses.
- The increment in order quantity does not always increases the average profits, at first it increases and then decreases. [24]

The application of economies of scale during purchasing of goods from suppliers helps Sipradi in optimizing cycle inventory. Economies of scale reduces the total cost by

[23] Reference: Chopra and Meindl ,2006–3rd edition; Supply chain management
[24] Reference: Chopra and Meindl ,2006–3rd edition; Supply chain management

reducing material cost by volume discounts, fixed cost i.e. fixed ordering cost and holding costs by aggregating it across the products. [25]

Optimized safety stock on the other hand balances supply-demand variability. The optimized level of inventory can be maintained by avoiding or minimizing neither over stocking as it hampers business by even causing liquidation, obsolesces and holding nor under stocking as it causes loss in margin and future sells.

Appropriate safety inventory can be maintained by quick response measures i.e. reducing info uncertainty, lead time and supply uncertainty and accurate response measures i.e. postponement and modularity, component commonality and aggregation.

6.2 Bullwhip effect and mitigating techniques

Bullwhip effect

The phenomenon where demand order variabilities in supply chain get amplified when they moved forward in the supply chain is commonly known as bullwhip effect. As unmanaged or poorly managed supply chain is inherently unstable and there the network oscillate in larger swings when each organization in supply chain seeks to solve the changes in consumer demand via own prospective. This circumstances result in large fluctuation in order placed upstream. The incomplete or distorted information flow from one end of supply chain to other leads various inefficiencies i.e. larger investment in inventory, poorer services, missed production schedules, inefficient capacity plans and transportation, cost increment and revenue loss to an organization. Thus, in order to cope with bullwhip effect companies needs to understand underlying causes thoroughly.
Generally demand order variability can occur due to strikes, facility fires, quality issues etc. The transmissions of this variability information get delays while passing up through

[25] Chopra and Meindl ,2006–3rd edition; Supply chain management

each party in supply chain which cause in responsive time delays in manufacturing and shipment of goods while down streaming in supply chain and create bullwhip effect. [26]

At first, in order to mitigate with bullwhip effects company management need to understand its causes thoroughly. The major causes of Bullwhip effect are enlisted as follows:

- While, in an attempt to reduce inventories, goods are neglected to order.
- When backlogs are overreacted.
- When there is inefficient communication throughout the supply chain.
- If there is lack of coordination between each party in supply chain.
- When there are time delays in information and material flow.
- Order batching; Larger order are placed in order to get advantage of economies of scale causing more variance.
- Shortage gaming: During the time of short supply, customers order more then they need expecting to get sufficient supply even via partial shipments.
- There is high forecast inaccuracies
- Presence of free return policies. [27]

[26] Reference: The Bullwhip Effect; QuickMBA's website.

[27] Reference: The Bullwhip Effect; QuickMBA's website.

Mitigating Measures

In order to compute with bullwhip effects, company need to address its four major causes i.e. order batching, price fluctuation, forecast inaccuracies and shortage gaming. The countermeasures that are needed to implement in Sipradi for controlling bullwhip effect are enlisted as follows:

- **Break order batching:** As order batching impact on bullwhip effect, Sipradi need to explore strategies that lead to smaller batches and/ more frequent resupply of the goods. One of major region behind the larger orders or lower order frequencies is the higher cost of placing and replenishing the order. The implementation of Electronic Data Exchange (EDI) and computer aided ordering (CAO) assists in reducing the cost placing and replenishing order by eliminating the cost of paperwork in order generation.

  As Sipradi has been already using transport service provider and assorted truck loads, effective use of this will counter for full truck load economics. Random ordering can be tackled through more frequent ordering which helps in keeping smaller ordering and smaller quantity variance. This reduction in variance can be more clearly observed by upstream entities then by Sipradi.

- **Shortage gaming elimination:** In those circumstances where Sipradi faces shortage of goods, it can allocate the units in proportion of its past sales record instead of allocating it on the basis of orders. This will avoid customer's incentive to exaggerate their orders during the shortage.
  Basically gaming during shortage raises when the customers have limited or very less knowledge on company inventory and supply situation. Sharing appropriate information on capacity, supply and inventory situation of the company helps in balancing the situation. But in genuine shortage situation sharing supply, capacity and inventory with customers is insufficient. In these circumstances company needs to work mutually with customers to place the order in advance for sales season so

that it can work on arrange the sufficient demand quantity with efficient use of company resources and strategies.

- **Stabilizing prices:** The high and low pricing by organization in various circumstances and sales strategies should be replaced with every day low price (EDPL) strategies. Sipradi need to implement special purchase contract with its customers with proper order specification at regular time interval in order to make proper synchronization of delivery and purchase.

- **Avoiding multiple demands forecast updates in supply chain:** Generally every supply chain member conducts some sort of forecasting on their individual level with reference to their own planning i.e. manufacturer do production planning, wholesaler do logistics planning. Bullwhip effect often created when any member in certain supply chain process demand input from their immediate downstream member to generate their own forecast. [28]

One of the ways for solving this situation is to access upstream site in a supply chain, demand data of downstream site i.e. Sipradi or even its supplier getting access to the sales data from its dealers dealing with final customers, to forecast the demand for the region. For the efficient sharing of data between each party in supplier electronic data exchange (EDI) can be used. [29]

In spite of uses of same source demand data by multiple organizations in a supply chain to do forecast updates because of different ways and tools in forecasting and purchasing, there is always undesired fluctuation in order placed when it reaches to upstream site. Thus in order to solve this problem radically, Sipradi can implement the methodology of controlling resupply of goods up to its dealers. It get wide access to the demand and inventory information of its dealers and update the necessary forecast and resupply of product for them. In return its dealer's would be passive partner in its supply chain. The common examples of this approach are vendor- managed inventory (VMI) or continuous

[28] Referance: Hau L Lee, V Padmanabhan, and Seungjin Whang; The Bullwhip Effect In Supply Chains, Sloan Management Review, Spring 1997, Volume 38, Issue 3, pp. 93-102
[29] Referance: Hau L Lee, V Padmanabhan, and Seungjin Whang; The Bullwhip Effect In Supply Chains, Sloan Management Review, Spring 1997, Volume 38, Issue 3, pp. 93-102

replenishment program (CRP). Furthermore, since long lead times accelerate bullwhip effect and improvements in operational efficiency reduces the variability in demand generated due to multiple forecast updates, just-in-time replenishment is effective measure to mitigate bullwhip effect in Sipradi supply chain.[30]

6.3 Accurate forecasting tools and techniques

Sipradi can make its sales forecast more accurate by implementing various methodologies. The most effective ways by which Sipradi can bring about more accuracy in its forecasting are briefly discussed below:

6.3.1 Sales influencing factors consideration

In order to practice more accurate forecasting, Sipradi need to figure out all the needed information in depth and response effectively to the factors impacting on it. Generally forecasting in Sipradi is performed through speculation based on past sales and personnel field experience from marketing department which finally undergo filtration process to purchasing personnel assigned to do purchase order. In this forecasting process the major weak links is less consideration on various internal and external factors that influence on sales. Thus Sipradi at first need to figure out the factors that impact on sales in detail and shoot its demand forecast with proper consideration of them.

The major internal factors that need to be taken in consideration before forecasting are:

- Sales motivation plans
- Inventory scarcity and shortages
- Price changes
- Labour and personnel issues
- Credit policy changes

[30] Referance: Hau L Lee, V Padmanabhan, and Seungjin Whang; The Bullwhip Effect In Supply Chains, Sloan Management Review, Spring 1997, Volume 38, Issue 3, pp. 93-102

- Distribution method and network changes
- Working capital shortages
- Production capability and resources shortages and
- New product and parts [31]

The external factors that impact on the sales and demand of goods that need to be properly considered before forecasting are:

- Market competition (both direct and indirect),
- Business seasonality
- Relative state of economy
- Political events
- Strikes and similar circumstances
- Trends and fashion
- Population changes
- Climate and weather conditions
- Consumer affordability and earnings
- Social and cultural events
- Change in import and export policies[32]

Sipradi need to forecast separately for different products, parts and goods with proper consideration of these sales and demand influencing factors. If more priority is given to forecasting, forecast will be more accurate.

[31] Reference: Sales forecasting article; www.globotron.com/htm/saleforce.htm
[32] Reference: Sales forecasting article; www.globotron.com/htm/saleforce.htm

6.3.2 More often forecasting

The best way to make optimize demand forecast is to maintain proper length and frequency of it. For activities decision about planning, inventory and staffing, scheduling, procurement and logistics activities short-range forecasting should be done in time interval less than three month. Intermediate range forecasting of three month to two years should be done for the purpose of marketing new products, budgetary planning cost control, facility and resource planning, sales force compensation planning, distribution planning, capacity planning and process selection. Long range should be done in time period of more than two years in order to develop and sale new services and products, make decision about whether to enter new markets, establish new facilities and resources and making long term procurement contracts.

Sipridi can enhance forecasting accuracy by making it more often. There are various advantages associated with the practice of often forecasting. By practicing this methodology Sipradi can cope with various uncertainties associated with demand. When forecasting is done in lesser time interval, company posses potential to identify sales and demand trend and patterns to make it more accurate. It further helps in identifying future variation in sales pattern and helps in extracting more realistic speculation of business performance. The possible risk due to potent extreme year-to-year sales variations get minimized if forecasting is does more often.

6.3.3 Using efficient tools and personnel

Company should always realize that forecasting is not just the responsibility of marketing personnel or any other. It must be the collaborative effort of various personnel involved with sales, marketing, inventory and procurement. Hence, the process of forecasting needs to be executed with collaborative effort of sales, procurement, inventory and marketing staffs and managers.

Using business and product appropriate software for forecasting helps in boosting accuracy of forecasting by minimizing human errors and eases the forecasting process. Once when

they are set up it takes away the complexity out of forecasting process. They are simple enough to handle and add-on to the decision making process. The use of forecasting software further saves the time on calculation and speed up the forecasting process.

Some commonly used forecasting software are Bcluk(www.bcluk.com), Bluetidemanagement(www.bluetidemanagement.com),Budgeting4business(www.budgeting4business.com),Cabc(www.cabc.co.uk),Connectwise(www.connectwise.com), Cubesoftware(www.cubesoftware.co.uk) etc.

6.4 Optimizing material sourcing

There add-on huge amount of associated cost while Sipradi source the vehicles and goods from its supplier. By minimizing these associated cost organization can acquire higher business profit and deliver the product to its customers in optimized prices. The way and techniques by which Sipradi can optimize its material sourcing in various stage of value chain are enlisted as follows:

6.4.1 Postponement and modularity concept implementation

Concept

Postponement is the concept of delaying the product differentiation until the phase where demand is known or can be identified. Under this concept instead of keeping finished goods at different sales point, customer order are known first and the product are either assembled at those point from modular components or/and they are delivered to sales point from centralize warehouse.[33]

Generally there are three different types of postponement concept i.e. manufacturing postponement, logistics postponement and full postponement. In manufacturing postponement concept, the modular components are kept at sales point in generic form and when costumer orders are received, the final products are assembled as per customer

[33] Reference: Chopra and Meindl ,2006–3rd edition; Supply chain management

specification or requirement. According to logistics postponement concept, manufacturing of product are done according to speculation and forecasting and they are stored at central location which is favourable distribution for multiple sales point. When customer orders are received at sales point the finished product stored at central warehouse is supplied to different demand centre. The full postponement is combined concept of logistics and manufacturing postponement. In full postponement modular component in generic form are kept a t centralize location i.e. central warehouse and when customer order are received then the complete assembly of modular component begins. After the assembly of component into complete product, they are sent to sales point where it is delivered to customer.[34]

Merits

The major advantages of the postponement concept is that since product are kept in generic form, Sipradi will be able to deliver larger variation of products to customer as per there requirement and specification by maintaining desired service level with lesser inventory. This on the other hand eliminates risk and cost evolved in stocking finished goods of certain nature (as too many prediction and speculation are involved in it). Moreover markets/sales point get free of risk of product and logistics input wastage which occurs due to less demand of the stocked product. Being specific, manufacturing postponement helps in providing variety of product as per the customer requirements and eliminates the risk of stocking one product and getting demand of product with different specification. On the other hand logistic postponement helps in avoiding product stocking at sales points. It enables company to offer different range of product without storing in safe amount at each sales points. They can just get and sell the product what customer ordered.[35]

[34] Reference: Chopra and Meindl ,2006–3rd edition; Supply chain management
[35] Reference: Chopra and Meindl ,2006–3rd edition; Supply chain management

Applicability and pre-caution

Postponements concept is mainly applicable to those products for which overstocking of finished product at sales point make large impact in supply chain profitability and if set of product in certain product family makes most of sales to the firm. Thus before implementing postponement concept in any supply chain whether the concept really justify supply chain requirement should be properly evaluated.[36]

For the fruitful outcome of postponement concept the following factors are required to be properly considered:

- Final product must looks reasonably different to the customers.
- Products of same product family where majority of parts and components are reasonably similar or same function wise are required in order to apply postponement concept .
- Implementation of the concept should likely to yield optimized performance and save cost reasonably.[37]

6.4.2 Lean Service adaptation

In order to minimize the product cost Sipradi is in greater need to adapt lean service strategy. It needs to work on continuously improving and maintaining quality of working process, products and services through implementation effective management strategies and efficient monitoring of quality. Sipradi should inspire its personnel and managers to come up with tactics and strategies to eliminate wastes and unnecessary efforts that are complicating the process with either minimal positive outcome or adverse one. Via implementation of strategies such as just in time (JIT), it need to work on maximizing the responsiveness to circumstances fluctuation and work on optimizing the time for every

[36] Reference: Chopra and Meindl ,2006–3rd edition; Supply chain management
[37] Reference: Chopra and Meindl ,2006–3rd edition; Supply chain management

task to be perform. The major goal of lean strategy is to eliminating waste, improving quality, reducing time and reducing total costs. [38]

Service waste

In order to optimize the working process and perform it effectively in reduced cost various wastes that occurs during service operation must be decreased or eliminated.

According definition of wastes for service operations by Bicheno and Holweg(2009), the seven wastes in service operation are:

- **Delay:** When the portions of customers are made to wait for service, delivery, response, in queues and so on, customers' time seems free to the service provider. But indeed it cost a lot to company if it lost customers, when they moves elsewhere.

- **Duplication:** While performing organizational activities, if there need to re-enter data, copy information across, repeat many details on forms and answering queries from various sources within same organization, these are wastage that just increases the operational cost in business organization with null yield.

- **Unnecessary movement:** In activity execution in any business organization the process are wastes which demand unnecessary movements i.e. have to be queued several times, the activity process is defragmented into many stops with unnecessary prolongation and if there is poor ergonomics in service encounter.

- **Unclear Communication:** If the information is unclear then various wastes get initiated in the process of getting them clearly. The confusion over the use of service or product and time waste in finding wrongly informed constraints and products is ultimate extravagant that happens due to unclear information.

[38] Reference: Lean Strategy Article on www.scribd.com/doc/53364813/4

- **Incorrect Inventory:** Another most common service waste while performing service operation is incorrect inventory holding. The out-of-stock of inventory make company unable to deliver what is required which need to be compensated via extra effort for substituting products or services and their prompt arrangement.

- **Opportunity lost to retain or win customers:** The way of establishing rapport, dealing with them friendly, politely and effectively in right opportunity is best, simple and straight way of winning customers. If company losses this chance by ignoring them, with unfriendly and rude behaviour then there require various other extra effort in gaining them.

- **Service transaction errors:** The defects in product/service and lost or damages of goods lead company to add-on the activities i.e. reverse logistics of product right from defects centre to supplier, inspection and maintenance extra efforts and so on.

Techniques to implement Lean strategy

In order to implement lean strategy successfully, Sipradi at first needs to engineer its working process highly and accurately specified as to the content, sequence, timing and outcome. Further it should try to keep the relation with customer direct and unambiguous response and request exchange system. Any improvement or circumstance modification in the systems must be done under the proper guidance of experts in the field. Sipradi should work on designing simple working process and strategies so that personnel can easily execute them. As result is always driven toward the efficiency of ground root personnel who are executing the activities rather than complex input imposed by management level, the strategies, tactics and working process should be presented to executing personnel in simplified form. In real life business environment strategies is not always how well you

can understand it, it's how well you can make them understand it and extract maximum out of theoretical strategies in process execution. [39]

Furthermore management need to be recognize that there is always room for improvements and try on exploring new age strategies, techniques and resources to maximize the business profitability , service level and customer satisfaction. Sipradi need to work on optimizing the distribution channel via effective analysis of distribution network, inventory location and sales epicentre and, make effort in making regular update on it. Further, organization should emphasize on reducing cycle time and try to maintain optimized inventory by balancing the availability, cost and profitability.As Sipradi has input large investment on resources, facilities and workforce, company need to develop techniques and tactics to utilize them in best way and make consideration of these investment during or before any deal and strategies so that they are utilized optimally.

6.4.3 Sphere parts and components production

Sipradi strategically need to establish more sphere parts or components manufacturing plants for its supplier. It need to manufacture feasible component that require high import duty and logistic cost (i.e. high cost for transportation, distribution, handling etc) which impact major portion on vehicles' overall cost. For this, it can implement several techniques i.e. supplying the manufactured product to TATA and getting special discount on final product (also duty discount as per custom regulation) in return and or final assembly of vehicle using the components on its arrival. This helps in optimizing cost of product.

With mutual partnership or authority of its Supplier, when Sipradi produce the sphere parts and components manufacturing plant, the final vehicle and concern sphere parts can be launched in reduce cost giving Sipradi and TATA competitive advantages over their competitors in Nepali market. Furthermore it will strengthen Sipradi's relation status with its supplier and helps in generation of extra revenue by product sells to its supplier.

[39] Reference: Lean Strategy Article on www.scribd.com/doc/53364813/4

Challenges

There might be various challenges Sipradi might face in establishing this on practice. Foremost challenge is, establishment of sphere parts and components production plant is not so possible without either mutual partnership or authority its supplier TATA. There might be probability that, they might not find the strategy attractive enough for them to be associated. Thus Sipradi need to purpose the strategy to TATA in larger proportion implying sale increment potential in yet to be explored automobile market in Nepal and amplitude of Sipradi to be long term and reliable Supplier of those components for TATA. Furthermore, since major proportion of price increment of product is due to the high import duty during import process of goods, Sipradi need to be always prepared for possible change in custom duty policy between Nepal and India.

6.4.4 Establishing assembly plant

Sipradi can minimize the cost of product by establishing the vehicle manufacturing plant in Nepal. Through mutual partnership with TATA motors Sipradi poses economic potential to establish final assembly plant of automobiles with parts and components from TATA. This will generate cost competiveness to Sipradi because of lesser custom duty and associated cost.

For efficient manufacturing of product Sipradi needs to produce some of heavy duty and economically feasible product locally and rest of components need to be subcontracted from TATA. The best and most practical way of doing this is via sound partnership with TATA (establishing Subsidy Company to TATA for vehicle production sector). In this way organization will be able to keep long term relationship with TATA intact and will be able to deliver customer its product in optimize price.

Challenges and Mitigating Measures

For the establishment of manufacturing plant the normal strategy of purchasing every part from TATA, importing them and assembling them is not sufficient. If done in that manure Sipradi might not generate maximum benefit out of this strategy and might even suffer loss. The most feasible and wise way of doing this is establishing assembly/manufacturing plant and continuously smoothing the working process, reducing the cost of production via effective strategies i.e. lean manufacturing strategies and optimizing the working process so that the cost of manufacturing locally does not exceed the cost of importing the final product.

In order to yield best result from establishing assembly plant in Nepal is via using manufacturing postpone concept. In this process the modular components are kept at sales point in generic form and when costumer orders are received, the final products are assembled as per customer specification or requirement.

For generating the maximum merit from this Sipradi need to optimize its supply chain with effective, efficient and long term management strategies, adequate technologies and sufficient resources. If well executed and managed, this strategy will certainly take Sipradi to new height as never before with larger increment in sales, revenue and profitability. On the other hand TATA will as well benefit in larger proportion via these strategies due to its market extension to larger customer range and increment in sales.

The major challenges on its implementation Sipradi will face are high financial and tactical investment company need to input. But optimization of business process and strategies will help in faster return of investment and larger increment in sales as output. Thus establishing assembly plant in Nepal for local market is one of the major strategies that both TATA and Sipradi have to start working right on without any delay.

6.5 Introducing effective Information system

Current information sharing techniques and tools that Sipradi is using have some efficiency issues and they are not the best possible information systems that company has access to. Thus within and out of Sipradi organization there is lack of proper information flow and effective information sharing techniques. Here are some tools and techniques that help Sipradi to bring about effectiveness in information flow:

6.5.1 ERP system implementation

Enterprise resource planning (ERP) is business management software that enables business organization to use a system of integrated application in order to manage its business. All the facets of an operation are integrated by ERP software including sales, marketing, manufacturing and development.[40]

Sipradi can maintain efficient and effective information flow within its supply chain by the implementation of ERP system. Implementation of ERP system helps Sipradi in preventing information delay and automates the documentation process. It provides concern department and supply chain partners their defined set of information through internet according to their requirements. Apart from its direct business merit to the organization, ERP implementation helps it on various supply chain solutions.

ERP system in collaboration with barcode or Radio Active Identification Device (RFID) helps in product tracking and tracing within and out of warehouses. It further helps Sipradi in tracing the problem/fault origin in supply chain upon their occurrences. By tracing the problems' epicentre root causes of it can be explored which helps in identifying measures to prevent occurrence of similar faults in future. The effective storage and flow of information in Supply chain on the other hand eases the forecasting process of Sipradi to make more accurate forecasting.

[40] Reference: Article on ERP system ; www.webopedia.com/TERM/E/ERP.html

Sipradi has already realized the wide advantages it can extract from the implementation of ERP system. Sipradi is now in the final phase of ERP system implementation and in near future it is going to perform its task via ERP system enabled by Microsoft. Here are some factors and precaution it needs to consider thoroughly before and during its ERP implementation phase:

- Whether the personnel are effectively trained or qualified for performing the business transaction via ERP systems?
- Whether the ERP system makes justice to the transaction volume and nature?
- If the return of investment (ROI) justifies the company financial condition?
- Is the system secured enough from cyber pirates and hackers?
- How well company is prepared for the possible challenges and risk which might evolve with system implementation?
- Whether the company is prepared for initial adversity of implementation because of users' inefficiency leading to prolonged ROI period?
- How well the existing personnel are trained and introduced with the system? How well they will be able to compute their strategies and ideas in newly implemented technologies?

6.5.2 Middleware

In general, middleware are the enabling engines allowing external engines to ERP i.e. middle software interferences, ERP systems or any software components to external applications. In traditional database, users get access to system through restricted network or intranet as they are deployed in closed environment. But the use of middleware software enable Sipradi to establish system where users can get specific access to the data from anywhere in the world. Middleware system link required information between different supply chain parties with needed specificity. It boosts the company's responsiveness to the changing market situation by eliminating or minimizing information delay between

Sipradi's supply chain members. Middleware application facilitates required flow information related to procurement planning, inventory level, inventories, scheduling and so on to the organization and provides proper visibility of demand, order and supply.[41]

A2A Integration

Application-to-application (A2A) integration, sometimes referred as Enterprise Application Integration (EAI) is a form of middleware that transport and synchronize data between two intra-enterprise applications or systems. EAI software links cross functional systems to provide access to system interferences, communication between systems and data conversion within the enterprises. Thus, EAI system boost up product visibility streamlines business process and provide real time information access between different systems within Sipradi. EAI further facilitates optimum organizational efficiency by finding business patters from existing data from operators, managing efficient internal communication, health care, inventory, shipping, customer relation and human resource data. A2A integration generally is intra-enterprise point-to-point data integrating framework for extracting or loading, translating and transporting data. Typically it moves one set of data between two different application and systems and the data synchronization transactions are conducted once a day or in any other scheduled time interval.[42]

[41] Reference: Middleware article ; www.answers.com/topic/middleware

[42] Reference: Gable, Julie (March/April 2002). "Enterprise application integration"*Information Management Journal and* Supply Chain & Logistics on EAI TECHNOLOGIES's website; www.eaiti.com/#!/supply-chain-logistics.html

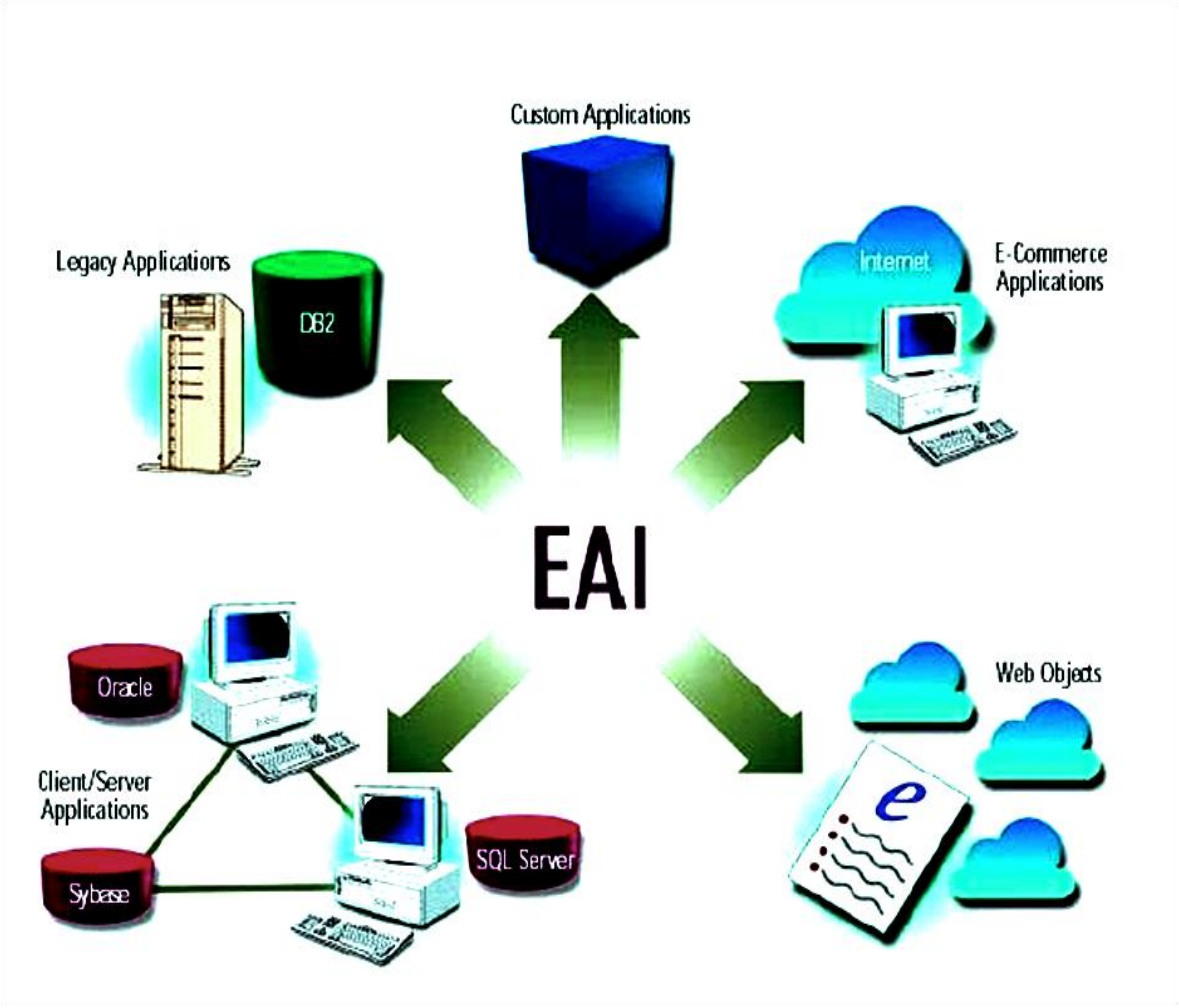

Figure 13 EAI framework

Picture: www.campusoxide.com

Major demerits of using this framework for Sipradi is its high initial development cost. On the other hand this system, mostly, is limited to data integration between different applications within enterprise as it basically does not connect its business partners as it work in application or system integration level with in enterprises. The most common EAI software are **Taco**, Biztalk**,** Websphere-Integration**,** Seebeyond**,** Vitria Webmethods**,** SAP-PI**,** Oracle-Fusion**,** etc

B2B Integration

Business-to-business (B2B) integration is multi-enterprise integration application that enables company to extend its business process and data from its application or systems beyond the "firewall" to its suppliers, external customers, distributer, partners, or corporate divisions. B2B integration facilitate company to exchange information electronically from company's internal systems and applications to the systems and application of each members in its supply chain i.e. business partners and customers. It is basically in form of Data Interchange (EDI) & XML. It helps every parties in supply chain to manage information exchange between the companies as part of complete business process i.e. logistics optimization, ecommerce, procurement, order management etc, far beyond data synchronization.[43]

There are various advantages that Sipradi can extract via effective implementation of B2B integration solutions. It can automate various transactions that need be done on every day basis. Important data and documents required to be exchanged during business transactions between companies such as product catalos, design specification, inventory status and location, delivery status, purchase orders, invoices and payment, shipment specification and instruction, delivery proof, inspection certificates, and advanced shipment notices can smoothly automated by B2b integration implementation. B2B integration enables these data between supply chain parties via automated messaging and routing, application integration within/out of enterprise and workflow processing. The most popular B2B integration solutions are provided by vender like BEA-Weblogic Integration, Oraccle - Oracle SOA suite,Webmethds Network, Hub Span etc.[44]

[43] References: B2B integration article on toolbox's website; it.toolbox.com/wiki/index.php/B2B_Integration & EDI Outsourcing article on CALTECH COMMERCE'S website;www.caltechcommerce.com/EDI-Outsoucing.htm

[44] References: B2B integration article on toolbox's website; it.toolbox.com/wiki/index.php/B2B_Integration & EDI Outsourcing article on CALTECH COMMERCE'S website;www.caltechcommerce.com/EDI-Outsoucing.htm

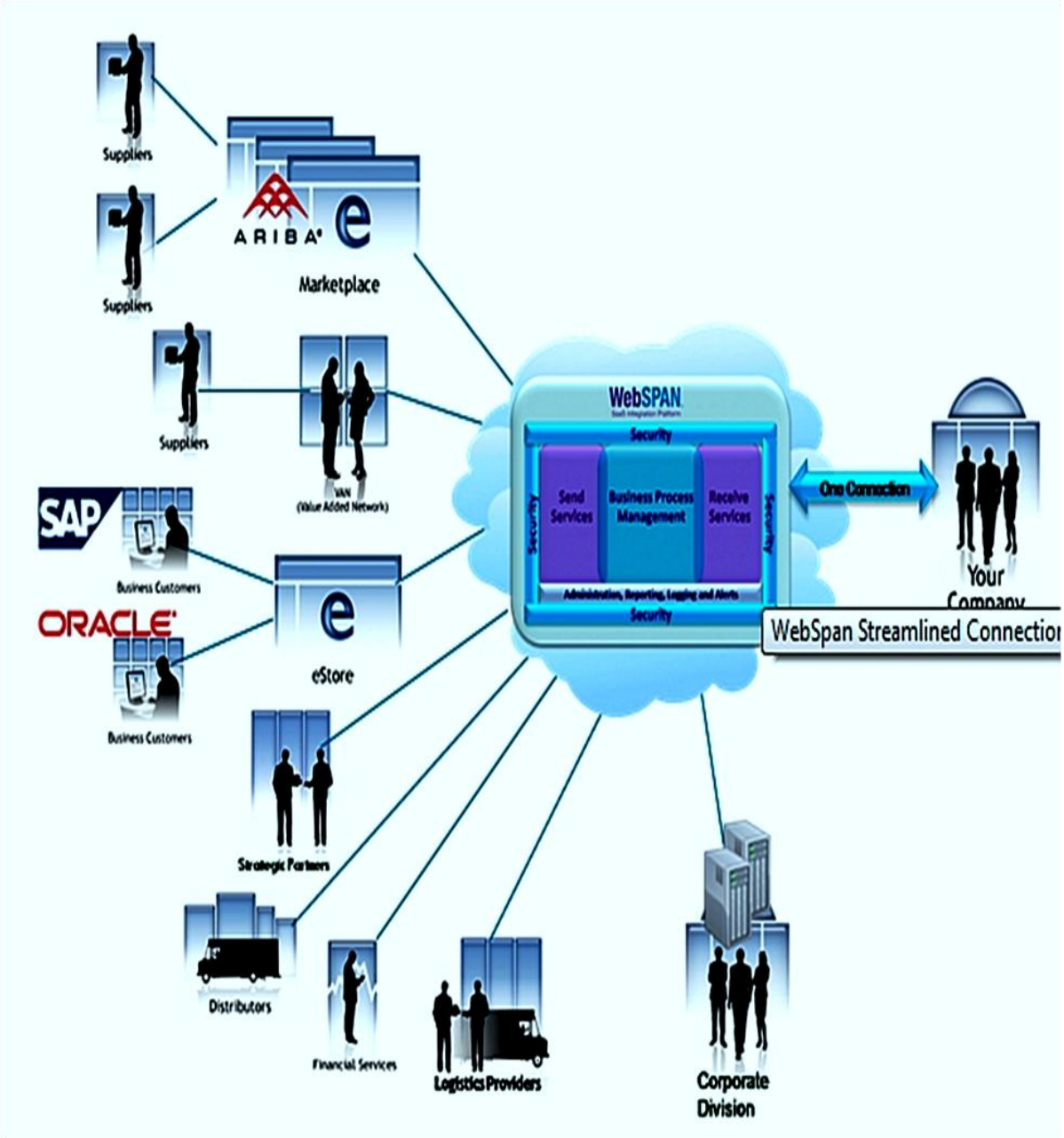

Figure 14 HubSpan — Simplified B2B Integrations

Picture: www.cmswire.com/images/Hubspan-B2B%20Integration_simplified.jpg

B2B integration solutions major merits are a) it works on multi-enterprise level b) it handles numerous information and data exchange between systems and application of one

companies to partners and customers on one to many as well as many to many basis d) transaction are conducted continuously or multiple time a day and e) it is advance integration technologies for business process, related information and document synchronization. More over the implementation of B2B integration helps company to strengthen information visibility between supply chain members promptly and efficiently which helps in eliminating or minimizing bullwhip effect and act life blood tool for supply chain optimization. Thus B2B Integration in Sipradi supply chain will be more fruitful in comparison with EAI implementation.[45]

6.6 Effective tracking tools and strategies

Sipradi has not been using any product tracking and tracing systems and tools, so it faces various challenges and difficulty in its day to day business activities. The major drawbacks company faces due to lack of product tracking and tracing system are; difficulty in fingering product status (where the product are?) and damage and fault epicentre (where the product get damaged? Which products are not suitable and inappropriate?). As a result company suffers lost revenue due to misplacement of product and larger inventory holdings. Thus, in order to minimize or reduce above mentioned issues here are some useful tools and technologies described as follows.

Barcode

Barcode is optical representation of data about certain object to which it is attached, that can be read by machine designed to decode it. Initially barcode was designed to represent data through parallel lines with variation in their width and space between them. Later on they started to come with dots, rectangles and various other geometrical forms as well.

[45]Reference: A2A versus B2B. Article on HUBSPAN's website; www.hubspan.com/business-integration/saas-integration/a2a-versus-b2b/

Despite of using various structure, shape and symbols they generally are continued to be referred as barcode. The optical devices capable of decoding the barcode are known as barcode reader. Now a day's barcode readers come in form of software which can be widely seen in various optically potent devices i.e. Smartphone, printers and so on.[46]

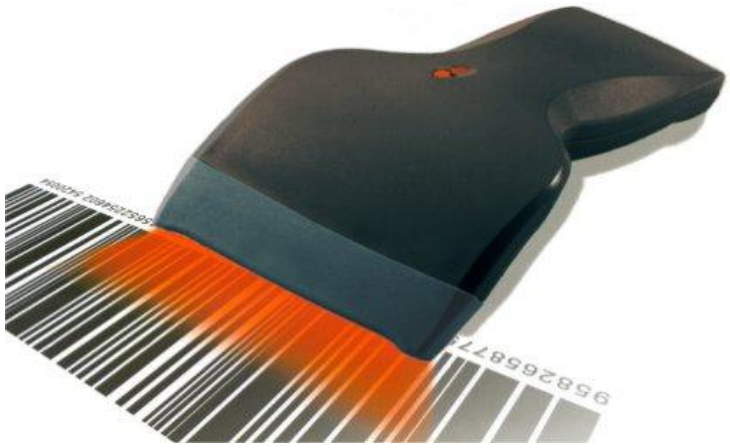

Figure 15 Example of Simple Barcode Scanner

Picture taken from www.barcodeman.com/altek/simple/

Sipradi has already realized the advantages it can get through the implementation of barcode solution in its material handling and data keeping process. Thus it is now in evaluation, trial and pre-implementing phase of barcode solution in its day to day business activities. By effectively planning, implementing and executing the barcode solution and integrating it with soon to be implemented ERP system, Sipradi can bring various positive waves to its business.

Here are some of pros that the companies will benefits via effective implementation of barcode solution in its business operation:

[46] Reference: searchmanufacturingerp.techtarget.com/definition/bar-code

- Foremost advantages it will observe after successful implementation of barcode solution are empowerment of product visibility, product positioning (SKU tracing) and accurate record keeping capability.
- Barcode solution will boost speed and efficiency of company during the activities i.e. material handling, inventory keeping, entry and dispatch of SKU.
- It is easy to implement as the users can promptly learn to effectively use the system (it can be learned in less than 15 minutes), cost effective as its ROI is faster (normal range of six to eighteen month) and it minimize the human errors.[47]

The major demerits of barcode solution Sipradi need to take in consideration are as follows:

- If printed section of barcode is not in right condition i.e. torn, wrinkled, smudged or dirty then barcode reader cannot decode the code which lead in elongation of entry and dispatch process of goods and disease the process.

  Furthermore, at sales point if the code could not be scanned properly then personnel need to read and enter the corresponding numeric code manually. When personnel get used to with automated barcode solution and lack of practice of manual entry, it makes the process slow, less accurate and delay the dispatch and checkout process.
- If the warehouse employees forget to code discount during discount period, this might lead to the problems such as delays and confusion on check out process.
- As Sipradi has not been practicing barcode system before, there require certain investment on equipments i.e. barcode readers and barcode printer and personnel training. Furthermore there require financial and strategic investment also maintain effective material handling and transportation so that the barcode on the goods reach in readable form via barcode readers.[48]

[47] Reference: RFID VS Barcode comparison article on inLogic's webpage. www.inlogic.com/rfid/rfid_vs_barcode.aspx.
[48] Reference: RFID VS Barcode comparison article on inLogic's webpage. www.inlogic.com/rfid/rfid_vs_barcode.aspx.

RFID

Radio-frequency identification device (RFID) is a system of remotely transferring data using radio-frequency and or electromagnetic field from tag containing information about the object it is attached to, with the help of its decoding device. RFID generally automates identification and tracking process and further capture/identifies information about the identity, location and time movement of the object. The basic elements of RFID system which are essential to implement RFID solution in practice are Tags, Reader, Reader antenna, Application, Data management systems and Network structure.[49]

Basically RFID tag, containing the information about the object it is attached to, is activated when it passes through radio frequency field generated by its decoding device i.e. RFID reader and antenna. Then tag impulses programmed response which is detected by antenna. The reader/transceiver transfers that data to the computer application which further forwards it to the data management systems. Through the data management system the information received, is updated and circulated to the entire influencing areas in the network.[50]

There are various RFID tags available widely used in their property appropriate field and site. On basis of the physical property of tag, they are categorized into active and passive tag. Whereas according to their functional property RFID tag are categorized as ID-only and encrypted. Active tags are the RFID tag with their own power source. They are small low-power radio transmitters with medium distance coverage (several meters) which react in response of reader's signal. Passive tags are parasitically powered tags through the reader device which uses inductive coupling rather than radio frequency in order to transmit the data. They are very small tags with short range coverage (few inches). [51]

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[49] References: RFID article on websites; www.palowireless.com/rfid/whatisrfid.asp and www.pcmag.com/encyclopedia_term/0,2542,t=RFID&i=50512,00.asp

[50, 42] Reference: 'RFID' Article on www.palowireless.com/rfid/whatisrfid.asp

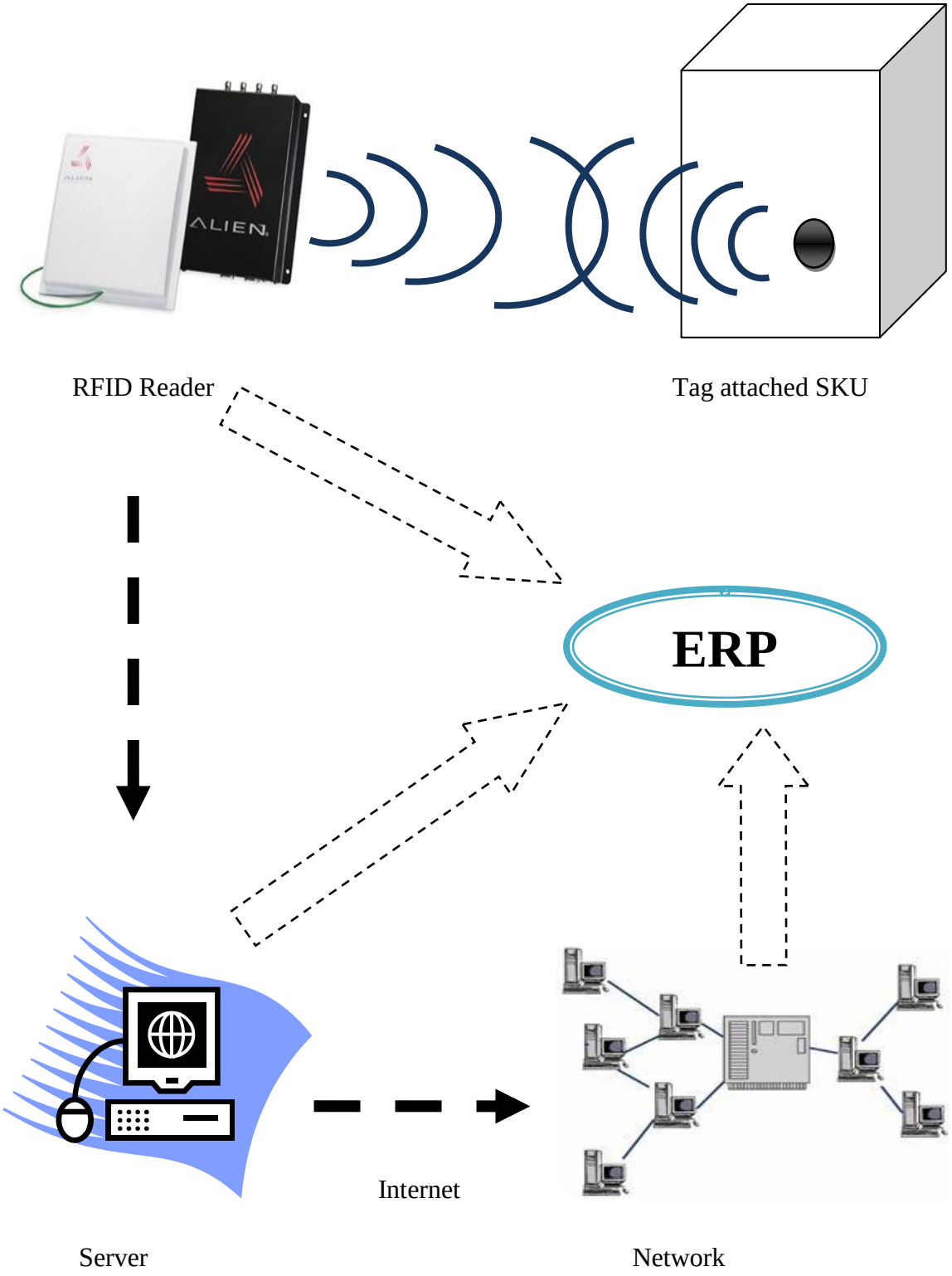

Figure 16 RFID working Process[52]

[52] Mikko Keskinen, Jyväskylä University of Applied Sciences. Slide on Change of the Information Society Roadmap till 2020 Influence on Logistics Services And Customers Behavior

ID-only tags are the simple tags that send same code every time and easy to clone. Encrypted tags are more secured tags which send different code as it is programmed. Thus, encrypted tags are more difficult to clone and are safer for its users. Both of ID-only and encrypted method can be used for both active and passive tags.[53]

Since line of site is not needed for RFID solutions, inventory activities can be executed with greater efficiency and promptly. For instant the multiple products in the warehouse can be read without the line of sight even inside the palate. Furthermore even though it requires high initial investment, it gives good ROI, decreases the cost of ownership, improve the business process and lead to positive vibe on company profitability.[54]

Barcode vs. RFID

Even though both RFID and barcode carry information about the products and goods they are attached with, they are different technologies with their own pros, cons and implementation requirements. Here are comparisons between barcode and RFID solutions that Sipradi should take in account while choosing between these tracking systems in order to yield optimum benefits through successful strategic implementation of appropriate one in its business operation:

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[53] ,[44] Mikko Keskinen, Jyväskylä University of Applied Sciences. Slide on Change of the Information Society Roadmap till 2020 Influence on Logistics Services And Customers Behavior

Constraints	RFID	Barcode
Automation	Do not require more of manual input as most of readers are automated	Most of barcode scanner are manual and require human involvement
Coverage, Range	Larger range coverage i.e. active RFID can read up to 100s feet or more and passive UHF RFID can read up to 40 feet if it is fixed readers and up to 20 feet if handheld readers	Short distance coverage i.e. from several inches to several feet
Identification	Able to identify each items tagged uniquely	Mostly able to identify the type of items(can't identify items uniquely)
Efficiency	More efficient i.e. faster read rate	Less efficient i.e. one item at a time
Interference	Some of RFID cannot operate properly under the metal and liquid interferences, some time while reading multiple tags nonexistent tag (ghost tag) could be read, so better to implementation some type of read verification system e.g. CRC	Mostly incapable of reading obstacles i.e. torn, smudged or dirt covering barcode
Read/write	Many RFID are both readable and writable	Barcode can readable but not writable
Line of sight	In most cases does not require line of sight	Require the optical contact and line of site
Investment	Requires more implementation cost than Barcode	Requires lesser implementation cost then RFID
Orientation issues and dead areas	As wireless network and cell phone there are certain weaker signal region, further more there might be some issue regarding poor read rates due to rotation of tag in the orientation which does not appropriately align with reader. This	Only reader read one barcode at a time which need to be optically aligned in its line of site

	can be avoided or minimized through use of tags in multiple axis and implementation of multiple readers.	
Security	As RFID is not a line of site technology like barcode there is always possibilities of raising various security issues e.g. by making set up of high gain tag detecting directional antenna competitor might get the flow rate information of various products	Since it is line of site technology no such issues

Figure 17 Comparison between RFID and Bar code[55]

Sipradi handles numerous products every day right from small items such as bearings to cranes and road making equipments. It is not so logically and strategically sound idea to implement either of barcode or RFID technology to all the product ranges. Introduction of technologically and strategically sound RFID solution all over it product ranges might cost undesirable initial investment to Sipradi and using barcode solution for entire products is not efficient enough. Basically, Sipradi deals with products and parts that are made from metals, so specially designed metal tags are to be used for those items in order to avoid metal interference on RFID reading. However, it can implement both of RFID and Barcode solution as complementary technologies according to its business requirement.

In the first phase of tracking system implementation Sipradi should implement the RFID solution in the vehicle and battery unit. These are high value products generating maximum revenue to the company and require lesser Stock Keeping Unit transaction/handling. The value and volume transaction of vehicles and batteries justifies

[55] Reference: RFID vs. Barcode, Article on website; www.inlogic.com/rfid/rfid_vs_barcode.aspx

the initial expense on the RFID technology. They further require lesser RFID tags because of lesser quantity of product SKU. In these product ranges Sipradi can yield faster ROI and get prompt benefit from RFID implementation. In the next phase of RFID implementation, auto parts need to be effectively categorized into different categories according to their value and their contribution on revenue. Thus, accordingly the maximum revenue generating product categories (i.e. A and B category as per ABC analysis) should be introduced to the RFID solution. The C category of item with maximum SKU and minimum revenue contribution should only be introduced to RFID solution when there price justifies the investment cost on the Tag or Tag price. Instead about to be implemented Barcode solution could be used for these product ranges.

6.7 Vehicles Tracking System

Vechicle tracking system basically consist of eletronic device (e.g.fig18) installed in the vehicle, GPS tracking server and computer softwares/web application (e.g.fig19) for positining the location of vehicles to which device is installed. This system enables the owner or authorized personnel to acess data refering the track or positioning of the veechicles. Basically , GPS technology is used in modern day vehicle tracking solutions. Apart from GPS positioning, vehicle tracking devices have capability of storing indepth data i.e.vehicle speed, oeriantation and sometimes even event like key on-off, door open-close, tire pressure,battery status and many more information.[56]

Tipically the vechicle tracking device are catagorized into active and passive device. The major diffrence between active and passive devices is; active system transmit the real time data to the web application of computer through cellular ofr sattelite networks where as passive system store the tracking record and data are downloded afterward through wireless technology. Now a days vehicle tracking devices come with the combination of both technology i.e. in the celler or sattalite network coverage area transfer the data to server and when there is the network is not available device store the data and send it when

[56] Reference: GPS tracking article on www.findnsecure.com/vehicle_tracking.html

the network is reinsteated. GPS tracking server on th e other hand receives the data from devices, securly stores them and serves the information to user. Computer softwares/web application are the user interface through which users get acess to the vehicle data and other important in information that the user has acess to. [57]

Figure 18 GPS Device[58]

Figure 19 Vehicles Tracking Software[59]

Sipradi currentaly is in greater need of implementing the vehicle tracking system for the transportation of its goods(i.e. auto parts and battery) and vehicle. By using the vehicle tracking system for tracking its goods and vehicle, Sipradi can bring about positive vibe in business profitability via increasing transportation accuracy and effecincy. This lead company to maintain more accurate delivery and dispatch of product and systamatize the business process. Furthermore this will boost the rate of service and dalivery made and

[57] Reference: www.findnsecure.com/vehicle_tracking.html
[58] Picture take from www.asntech.in/Products.aspx

[59] Picture taken from www.nicholls-uk.co.uk/page.php?id=21

increases the customer satisfaction due to accurate delivery. Various waste time available in the delivery process due to lack of tracking system get eliminited and management will be able to cut down overtime of its personnel by using GPS tracking technology.

As Sipradi sub contract transportation service for autoparts and batrries via regional transport companies and does urjent or unqulified quantity by themselves, it should give pressere to those companies to either implement tracking system in there vechicle or allow to do so. For the companys transportation vechicle Sipradi need to implement the GPS tracking system as soon as possible. Since, Sipradi distribute vehicle through driving them to the site or region of its requirement, it must implement GPS tracking system in vehicle transportation in order to lower the insurance premiums, improve route efficiency and saving fuel and maintainance cost. Furthermore this system solution has faster ROI and company can yeild greater merits throuh its implementaion. The GPS device installed in vehicles are reuseable and company can be easily instal it to new vehicle when they are sold to customers.

6.8 Customize vehicle carrier

In global business environment, a new car being loaded on truck, trains and trailers to be transported from factory to dealers is taken as obvious factor. In Nepal it is still a new concept. In common practice cars and other vehicles are derived hundreds of kilometres through tough and rough roadways to the dealers. Despite of various cons regarding the traditional practice and customers oddness in buying such cars, Sipradi as well as its competitors have not been able to implement more effective, scientific and systematize transport techniques over the ages.

In present day competitive market, company cannot blame the factors such as bad road condition, lesser unfavourable supply-demand frequencies and other infrastructural challenges when the effective implementation of truck solution is remarkably cost efficient and systematic despite of these odds. In order to acquire competitive advantage due to cost, good will and process efficiency factors Sipradi is in greater need of introducing

circumstance favourable trucks for the distribution of its vehicles all over the country. It is not so possible to use larger semi-trailers, trailers and trucks to transport vehicles in the existing road infrastructure, railway is almost non-existent and inland water ways is out of frame(There has not even been any study or research ever done regarding the feasibility of inland transportation even though it looks most location appropriate mode of transportation because of wide network of many big rivers and there wide range connection to India i.e. trade epicentre for Nepal and hardship roadways and railways faces because of high hills, mountain, land slide, harsh climate and so on). This makes big vehicle i.e. mini trucks, trucks, bus and so on very difficult and inappropriate to transport via vehicle carrier.

Figure 20 Examples of space management practice for transporting car[60]

[60] Picture taken from www.comiskeyvehicleservices.com/services.asp & www.mansells.com.au

Under these constraints, Sipradi should implement some circumstance favourably modified and customized car carriers for car and other smaller vehicle distribution (as shown in fig20). For this it can use road appropriate, medium sized trucks and customize the storing space inside it so that it can maximum number or cars safely and effectively. Further there can be used various space engineering and management techniques in order to make the car carrier most space and cost efficient. For example, car could be transported via trucks with specially designed angled compartment as shown following pictures, so that space can be effectively utilized.

7 Final supply chain and solution Outline

Via in-depth analysis on organizational current situation, working process and business constraints; problems in SIPRADI supply chain i.e. supply-demand mismatch and bullwhip effects, inefficient internal and external information flow, high cost of product, product lost due to misallocation, forecast inaccuracy and poor transportation system are outlined in problem identification chapter. Each of these problems is well analysed and appropriate tackling tactics, techniques and technologies are briefed up at solution and recommendation chapters.

The solution findings and final supply chain module of Sipradi organization after the implementation of solutions for above explored problems are summed up and outlined briefly as follows:

Problem	Solutions
Supply-demand mismatch	Reducing buffer inventory, Implementation of postponement and modularity concept, Effective application of economies of scale, Maintaining effective information flow 47
Bullwhip effects	Avoiding multiple demand forecast in supply chain, breaking order batching, eliminating shortage gaming and stabilizing prices 49
Forecasting inaccuracy	Proper consideration of sales influencing factors while forecasting, more often forecasting, Using effective forecasting software 53
High cost of product	Lean service adaptation, Implementation of postponement and modularity concept, Producing feasible auto parts and components with high custom duty locally, establishing local assembly plant 56 58
Inefficient information flow	Implementation of B2B integration solutions 64
Product lost due to misallocation	RFID for high value items generating most of revenue(i.e. A (and B) category items) and Barcode for C category items till RFID tags cost justifies those items associated cost 70
Poor transportation	Using vehicle tracking systems during transportation, Using customized vehicle carriers for cars and other small vehicles 78 80

Supply Chain

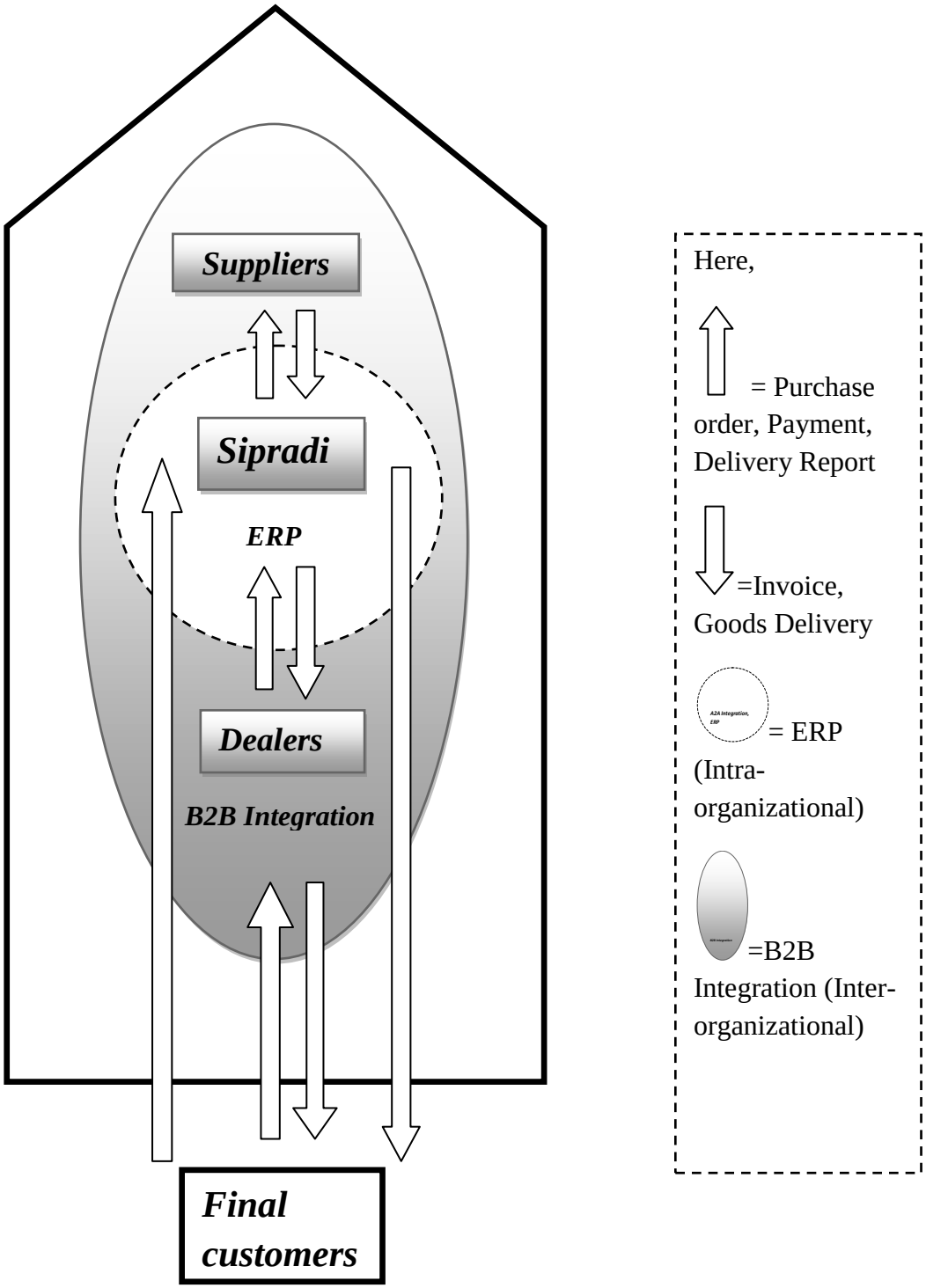

Figure 21 Final Supply chain of Sipradi organization

The supply chain solutions for Sipradi (in ERP implemented scenario) are enlisted as follows:

- Implementation of B2B integration system as it:
  - ✓ Eases information sharing process in Sipradi supply chain between different applications promptly and effectively and minimizes information delay
  - ✓ Minimize issues regarding supply-demand mismatch, forecast inaccuracy and bullwhip effect through appropriate information accessibility between supply chain parties
- Introducing product-tracking systems in organization via RFID and Barcode implementation and integrating them with ERP system. Both RFID and Barcode technologies are recommended because of nature, range and type of goods the organization is handling. Since the implementation of RFID justifies more for high value goods, at first phase RFID should be introduced to vehicles and battery units. Simultaneously, A and B category of items in auto part unit should be subjected with RFID system as well, whereas for C category items, RFID should only applied when the cost of tags and technologies justifies cost on & of items. Therefore, Barcode systems should be used to category C.
- Strategy of reducing buffer inventory by effective management of safety stock and re-order point needs to be applied in order to minimize supply-demand mismatch. Continuous evaluation, timely reorder point calculation and maintaining safety stock according to seasonal demand constraints helps in effective management of safety stocks and re-order point. Further, implementation of postponement and modularity concept, proper application of economies of scale during purchasing and maintaining optimized safety inventory level helps the organization to balance supply and demand. The quick response measures of reducing information, lead time and supply uncertainty are recommended to follow for maintaining optimized safety inventory to avoid both, under stocking and over stocking.
- For tackling with bullwhip effect one must consider of its causes first. The major causes of bullwhip effect are order batching, price fluctuation, forecast inaccuracies and shortage gaming. The strategies and techniques of breaking order batching, shortage gaming elimination, stabilizing the prices and avoiding multiple demands

forecast updates in Sipradi supply chain as described in chapter 6.2 are outline to mitigate bullwhip effect. The strategy and process of sales influencing factors consideration, more often forecasting and using effective as well as efficient tools, software and personnel are suggested to make forecasting more accurate and effective.

- In response to the problem 'high price increment' of the products in various value chain phase and custom clearance process; strategy of Lean service adaptation, implementation of postponement and modularity concept, producing feasible auto parts and components (with higher custom duty) locally and establishing local assembly plant are recommended. Using vehicle tracking device for product tracking during transportation and launching customized vehicle carrier for transporting cars and other smaller vehicles are recommended for adjusting current transportation related issues.

8 Conclusion

Sipradi is undoubtedly one of the largest and most prestigious brand names in Nepal in automotive and allied business. However big the organization is, there always exist some degree of scope for improvements which needs to be satisfied via proper engineering of process, infrastructure and circumstances. This thesis work is done in order to engineer in-depth business operation of Sipradi and its supply chain and make them more cost efficient, profitable and systematic. The major aim of this work is to purpose effective solution for the existing challenges and issues that the Sipradi Organization is facing.

Major portions of challenges and problems that companies like Sipradi are facing in Nepal are due to poor infrastructure of the country and its political instability. The ultimate solution for these national level problems is un-doughtily effective government policies and infrastructural development. But, by analysing development graph in Nepal and government actions, it is not so certain that how long it will take country to have sound infrastructure and political stability which is favourable for business organization like

Sipradi. So in these circumstances it is wiser for Sipradi to find efficient solution for the problems in its existent business environment.

Considering its operational constraints i.e. social, political and geographical factors influencing in supply and demand of products many of the tools, techniques and strategies that the organization is using are justified even though they might not be the best of their kind. In country where most of days in month are political strikes, load shedding, fuel shortage, public protest & transport strike; brands like Sipradi are big time survivor. Basically these business odds generate various problems in Sipradi supply chain i.e. overstocking and under stocking of products and inefficiency in information flow between different parties in supply chain. Further these factors add-on the cost of product and increases lead time impacting adversely in the service level as well as in customer satisfaction.

Overcoming business odds and matching, if not surplusing, customer expectation is 'most' in present day business. Basically Sipradi supply chain is hindered by issues i.e. mismatch between supply and demand of products, inefficient information flow, high increment of product cost in different value chain phases, product lost when misallocated, inaccurate forecasting, and poor transportation. If these problems are not adjusted timely with proper mitigating techniques and tools then they will for sure lead organization in losing its market share, good will and profitability.

If effectively implemented and executed, those explored supply chain solution in this work will bring about very positive vibe in organizational supply chain and helps organization in minimizing its operational costs, simplifying business process, increasing service level, optimizing market share and maximizing business profitability. It is most crucial time frame for Sipradi organization. Especially in almost 'yet to be discovered private vehicle market', Sipradi have high tendency to grasp and claim the market as never before, as in passenger vehicle sectors. It has both potential either to remain as a subsidy of big multinational in Nepal or to be national and global phenomenon itself in competitive automotive distribution business; the ball is in organization's court, it just depends how well it plays it.

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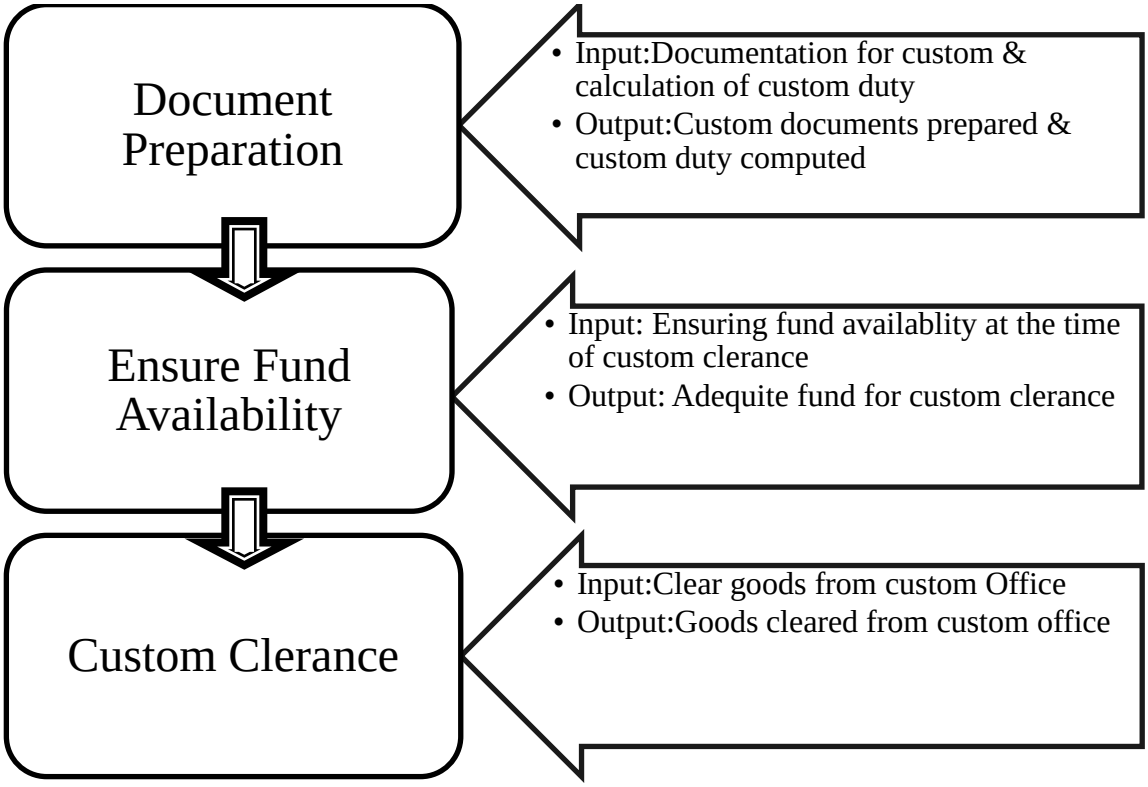
10 Appendix

Import process

Sipradi, Birgunj logistics department perform this custom clearance tasks on the basis of standardized operating procedure certified by ISO9001; 2008.The detail overview of vehicles and goods custom clearance operating process is described as follows:

Vehicle Custom Clearance Process Flow[61]

In vehicle custom clearance process there three main task head to be done under standardize operating procedure. At first all the required documents for the custom clearance is prepared. In the next step needed fund for clearance process execution are to be calculated and availability of enough fund for clearance of vehicle is to be ensured. Finally in the third stage custom clearance of vehicle is done.



[61] Reference : Sipradi's vehicle custom clearance process manual; ISO9001:2008QMS-BLD-OP .O1

Fig 9: Vehicle Custom Clearance Process

In the document preparation phase before the custom clearance; clearance MEMO from marketing division is collected through email or memo. Then Custom Declaration Form is checked and calculation of duty as per Custom Tariff rule. In the next step vehicles listed in custom clearance MEMO are verified whether they are ready for clearance. After the verification Raxual custom agent is informed for preparation of documents i.e. three copy of Proof of Export and Nepal Invoice for each of the vehicle. This entire task is performed and ensure by Logistics custom Manager within next day from the date of receiving clearance memo from marketing division.

In fund availability insurance phase, at first Logistics custom manager inform amount of fund required for custom clearance to the corporate Account Department. The finance manager(Kathmandu) arrange the required fund for the purpose of custom clearance and the issue of Manager's cheque for the amount of custom duty to be paid at the time of vehicles' custom clearance. Finally gate pass of vehicles in Raxual yard is issued by logistic custom manager.

The task and activities which are done in the Custom Clearance phase of the Vehicle Custom Clearance Process are described step by step as follows:

- Vehicles are handed over to drivers with full documents and tools i.e. gate pass and vehicle receipt sheet
- Documents are submitted to Raxual custom office
- When cleared from RXL Custom, vehicles are taken to Birjunj custom along with the proof of clearance(i.e. invoice certified by RXL Custom as red circle) from RXL Custom
- Photograph of chasis and engine numbers are taken for vehicle registration at Yatayat Office
- Documents are submitted at Birjunj custom for custom clearance

- For the required amount of Custom Dusty Manager cheque is issued by Corporate Account within same day of custom clearance
- Payment of custom duty as mentioned in CDF is made to custom office through Manager's Cheque
- When the vehicles are cleared from Nepal Custom, they are carried to Birgunj office and handed to Workshop with complete documents.
- CDF and receipt from custom are collected after payment of duty
- Proof of Export, Nepal certificate, sealed letter written to Yatayat office are collected
- CDF and photograph of chasis is handed to Birjunj office for registration to Yatayat office
- Nepal Certificate and Prof of Export is sent to concerned Company from head office, KTM
- Statement of expenses of vehicle clerance is sent for verification from Birgunj office
- Send Statement of expenses and CDF to Corporate Account after verification of statement of expenses

Other Goods Custom Clearance Process Flow[62]

For the other goods custom clearance process there are four major task heads to be executed. As a first step of the clearance process all the needed documents required for custom clearance both at Nepal and India custom is prepared and then fund availability at the time of custom clearance is ensured. At next stage custom clearance of goods is done and finally goods are received and stored in Birgunj warehouse and dispatch to its demand origin (mainly to KTM).

[62] Reference : Sipradi's other goods custom clearance process manual; ISO9001:2008QMS-BLD-OP-02

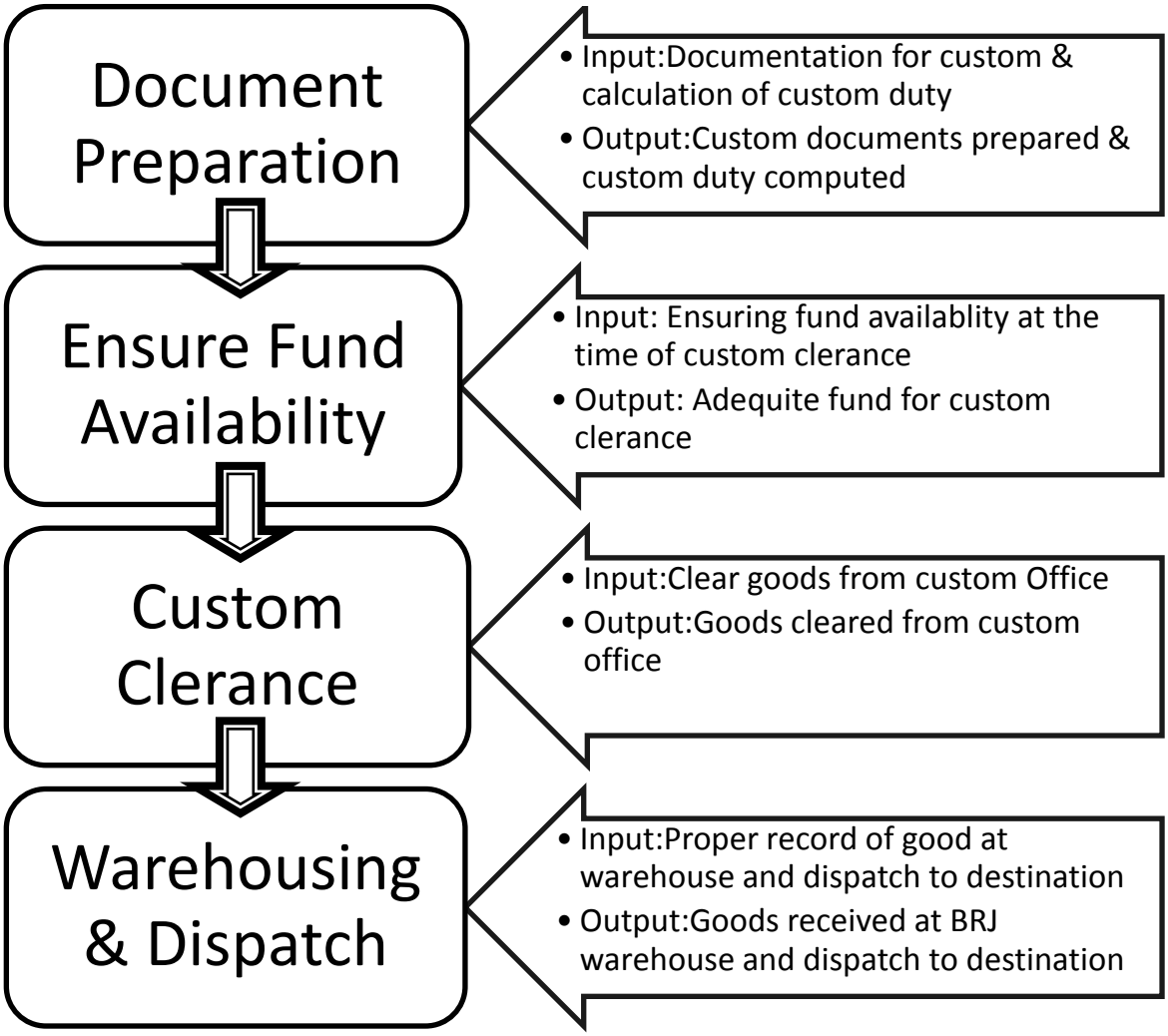


Fig10: Other Goods Custom Clearance Process

In preparation of document phase of other goods custom clearance at first information of goods arrival at RXL is acquired from drivers, transporter, courier and clearing agent. Then goods are received by Authorized Clearing Agent. After that required documents (i.e. consignment note, commercial invoice and insurance copy of concerned goods) are collected and verified for clearance. If the required documents are not received then goods

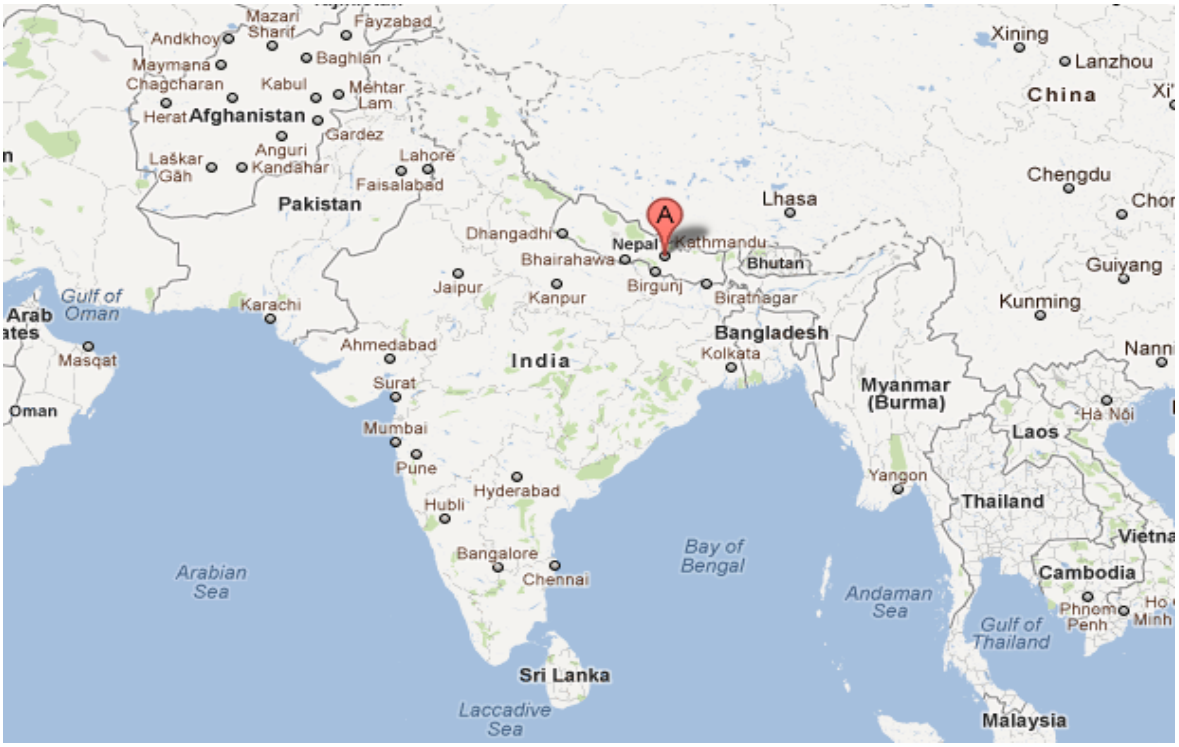
are hold and concerned in charge are informed about incompleteness of document in order to obtain complete documents. Upon the collection of complete documents CDF is filled, for duty calculation, as per Custom Tariff Rules. If there is not enough space available in Birjunj warehouse then goods are kept in RXL warehouse.

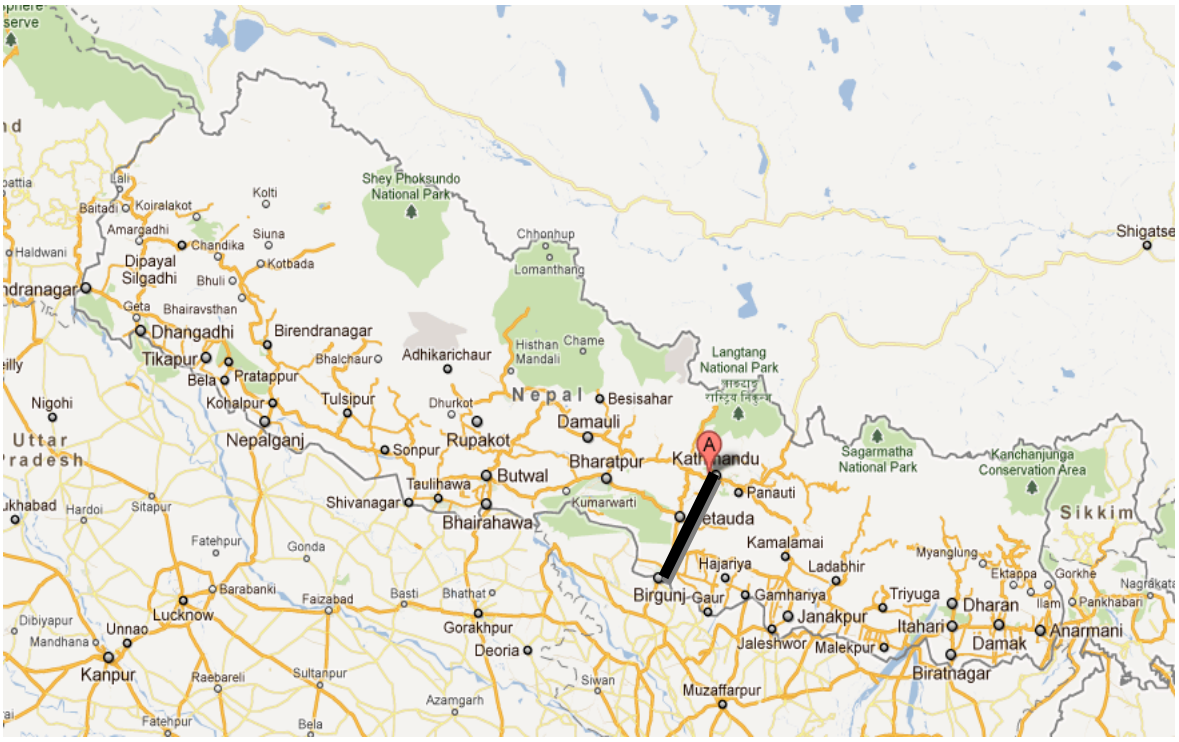
After the documentation phase of custom clearance of other goods the tasks of ensuring fund availability begins. In this phase at first according to duty calculated in documentation phase if fund is available for clearance of good is verified by concerned account in charge in head office KTM and arrangement to issue Manager's cheque for the duty calculated as per CDF is done.

In the next phase of custom clearance of goods documents are submitted in RXL custom for proof of export and Nepal invoice when goods are cleared. After clearance of goods from RXL custom they are carried to Birgunj Custom with proper proof of RXL custom clearance and required clearance documents i.e. Proof of Export, Nepal Invoice and CDF are submitted in Birgunj custom. Finally the manager's cheque is provided to Birgunj custom as deposit if duty calculated in CDF.

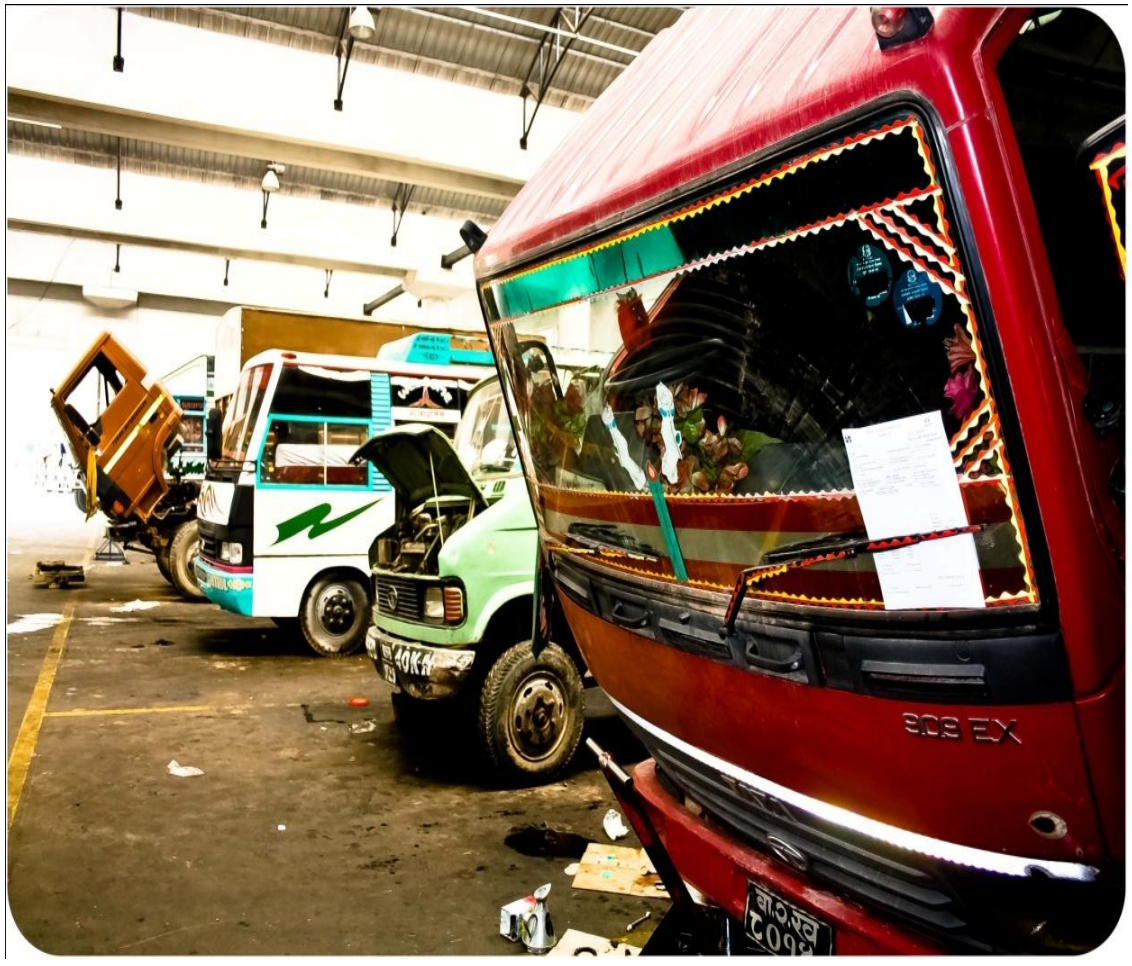
When custom clearance of goods is complete then they are sent to Birgunj warehouse on the same day of clearance with concerned CDF and invoice. Goods to be sent to KTM are sent directly to KTM from custom if it is cleared for the destination with covering transit insurance. The goods that are sent to Birgunj are unloaded with supervision of logistic officer. Then after, documents i.e. CDF and Custom Receipt is collected from Birgunj custom on same day of clearance and Proof of Export and Nepal certificate within next day of clearance. Finally statement of expenses is sent to concerned account incharge within 4 p.m. of next day of custom clearance.

Company Location (Google Map)





Distribution Route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