REVERSE LOGISTICS FROM THE PAST TO PRESENT

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Keywords: reverse supply chain, reverse logistics, returns management, recycling

REVERSE LOGISTICS: FROM THE PAST TO PRESENT

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Abstract

Organizations have been working to improve efficiencies in their supply chains as a result of technological advances, global competition and consumer demands. Reverse logistics is one method that has been utilized to improve efficiencies. Delivering product to the customer does not necessarily end the business cycle. Products are often returned or must be reclaimed from downstream trading partners, according to Blanchard (2005), with over $100 billion in goods being returned every year. The volume and monetary value of product flowing in the reverse direction within the supply chain has been and continues to be increasing, particularly as environmental, legal, and customer service requirements increase throughout the marketplace (Daniel, Souza, Van Wassenhove & Blackburn, 2006). Reverse logistics has become an important part of supply chain management for a number of reasons. The proposed research effort focuses on the use of the reverse logistics from the 1980's to the present day and establishes framework for future investigation.

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Introduction

Organizations have been working to improve efficiencies in their supply chains as a result of technological advances, global competition and consumer demands. Reverse logistics is one method that has been utilized to improve efficiencies. Delivering product to the customer does not necessarily end the business cycle. Products are often returned or must be reclaimed from downstream trading partners, according to Blanchard (2005), with over $100 billion in goods being returned every year. The volume and monetary value of product flowing in the reverse direction within the supply chain has been and continues to be increasing, particularly as environmental, legal, and customer service requirements increase throughout the marketplace (Daniel, Souza, Van Wassenhove & Blackburn, 2006).

Reverse logistics is that part of the supply chain process that plans, implements, and controls the efficient, effective reverse flow and storage of returned goods (Sarder, Rahman, Yenduri & Ijumba, 2009). It deals with the returned goods for the purpose of capturing value efficiently and/or proper disposal to reduce the environmental impact (Ferguson and Browne, 2001). As defined by the Council of Supply Chain Management Professionals (CSCMP, 2013) reverse logistics is "a specialized segment of logistics focusing on the movement and management of products and resources after the sale and after delivery to the customer. Includes product returns for repair and/or credit". In the past, the product lifecycle ended when the consumer purchased a product. Return of a product, however, was nothing more than a cost to an organization or a necessary burden versus a benefit. The scope of reverse logistics throughout the 1980s was limited to the movement of material against the primary flow (Bernon, Rossi & Cullen, 2011). There was little information on how reverse logistics could benefit a company's bottom line, how it could benefit the environment or why a reverse logistics strategy could improve customer service and increase sales. Today, however, a wealth of knowledge is

beginning to develop around the reverse logistics field as product returns have become an important part of the product lifecycle. It is evident that reverse logistics as a field of study gaining momentum as an important part of the supply chain management process.

Reverse logistics involves a number of different operational processes. Rogers, Lambert, Keely & Sebastian (2002) identified six reverse logistics processes: return initiation, determining routing, receiving returns, selecting disposition, crediting customers, and measuring performance. Because of the complexity of returns management, a process approach is necessary in order to fully understand and manage the activities and interactions involved (Cooper and Stephan, 1994). As Dowlatshahi (2000) states, reverse logistics has gained increasing acceptance as a profitable and sustainable business strategy. Reverse logistics is a growing and important area of strategic advantage for many companies (Tibben-Lembke, 2002). The following research provides a brief history of reverse logistics as well as some examples of how companies are using reverse logistics to meet their strategic objectives. To understand reverse logistics, however, it's important to understand logistics, logistics management and the relation of logistics to reverse logistics. At the most basic level, logistics management is concerned with the effective movement and storage of product, approximating the traditional economic utilities associated with creating value through time and place transformation (Chase, Jacobs & Aquilano, 2006).

Logistics Defined

Logistics involves planning, implementing and controlling efficient, effective flow and storage of goods and services from the beginning point of external origin to the company and from the company to the point of consumption for the purpose of conforming to customer requirements (Lummus, Krumwiede & Vokurka, 2001). In this definition, even though it's from

2001, it is important to note that there is no mention of a return of goods in the logistics process. Langley and Holcomb (1992) described how the logistics process creates customer value by enhancing a companies' efficiency, effectiveness and differentiation. Similarly, Hagon (1994) stated that value is what ought to be added by the logistics function in the supply of wanted goods from producer to customer. According to Mentzer, Stank & Esper (2008) it is critical for an organization to exploit logistics for effective customer service, total cost efficiency, competitive advantage, and, ultimately, enhanced organizational performance. Logistics can involve many people, supplies and facilities. A more recent definition of logistics as defined by the Council of Supply Chain Management Professionals (CSCMP, 2013) states that logistics management,

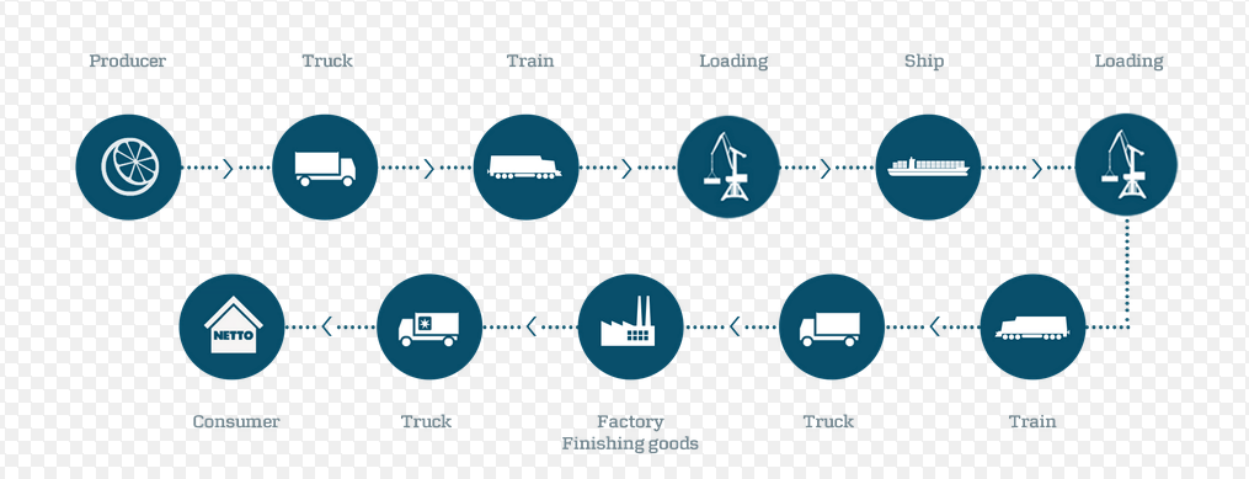
> "is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers' requirements. Logistics management activities typically include inbound and outbound transportation management, fleet management, warehousing, materials handling, order fulfillment, logistics network design, inventory management, supply/demand planning, and management of third party logistics services providers. To varying degrees, the logistics function also includes sourcing and procurement, production planning and scheduling, packaging and assembly, and customer service. It is involved in all levels of planning and execution-strategic, operational, and tactical. Logistics management is an integrating function which coordinates and optimizes all logistics activities, as well as integrates logistics activities with other functions, including marketing, sales, manufacturing, finance, and information technology."

According to Keebler & Plank (2009) there are three basic reasons why a company would want to measure logistics performance. First, companies can reduce operating costs. This is accomplished by using logistics to identify when to make operational changes to control expenses while improving asset management. Second, companies can use logistics measurements to drive revenue growth. This is accomplished by not only attracting new customers but also keeping them through more competitive pricing, cost reductions and service

improvements offered through logistics. Finally, returns to shareholders and the market value of a company can be significantly impacted by logistics performance improvements.

Logistics, from a consumer's point of view, plays an important part of everyday life and can be traced to almost everything people depend on such as food, shelter, water and electricity. One example could be the common trip to a grocery store. The grocery items come in from all over the country, or world in some cases, to a store shelf for consumer consumption. The logistics involved can be quite intensive. One item like tomatoes could be picked in Mexico, trucked to a warehouse in Arizona then sent by train to be loaded on a ship going to Hawaii then unloaded at another warehouse closer to end customers and ultimately to a grocery store for human consumption (see Figure 1).

Figure 1



http://www.maersk.com/~/media/upload/ld_maersk_supply-chain.png

In another example, logistics plays a critical part in consumer electronics. Electronics, such as the cell phone, start out as raw materials that could be located all over the world. Through logistics, these raw materials are gathered, transported, processed (i.e. forming plastic into the cell phone's outer shell or melting metal into component parts), assembled then ultimately shipped to the consumer. Without logistics in healthcare, patients would have no way to get

medicine, vaccines and other life saving products on time, in the desired quantities and in proper condition. Without logistics in professional sports, teams would not get to the games on time with all their equipment, fans would not be able to purchase food and beverage at the games and television crews would not be able to show games at every angle while still capturing the best plays. Logistics bridges the gap for consumer mail orders by finding a purchase in the warehouse, to getting it packaged and shipped, and ultimately delivered to a customers desired location (i.e. home, office or retail store). Even the entertainment industry (i.e. television shows) relies on the logistics of transportation, supply and delivery of their end product their customers' desire.

Logistics in the Military

Logistics, as one of the factors of war (the others are strategy and tactics) has been crucial to warfare throughout history (Eccles, 1959). In addition, many of the early references to logistics came from the military. In the United States military literature, logistics emerged as a term by the time of the American Civil War (McGinnis, 1992). It had to do with procurement, maintenance, and transportation of military facilities, material, and personnel (Ballou, 2007). Logistics also determined the military forces that could be delivered to the theatre of operations, what forces could be supported once there and what the tempo of operations would be for a particular engagement. Modern logistics came of age during Second World War with ability of the military to establish stand-alone facilities near the front lines, easily reachable by truck from larger sources of supply (Rutner, Aviles & Cox, 2012). This demonstrated the need for superior logistics since this war was global in size and scale. Not only did the U.S. and their allies have to supply forces at ever greater distances from their homelands, but these forces had to be fast moving while being supported for large consumptions of food,

water, fuel and ammunition. Other support services such as medical staff, supplies, shelter and transport for the critical needs had to be well coordinated. Railways were important as well as the use of sea and air transport. The large-scale use of military transporters for tactical re-supply helped sustain the momentum of tactical offensive operations. In more recent wars, such as the Gulf Iraq War, logistics as it relates to the movement of troops and supplies played a critical role in strategy. "The highest number of American casualties in the first stage of a war against Iraq would likely be suffered not by the front-line riflemen but by those just ahead and behind them struggling to keep the fighters supplied with food, fuel, water, and ammunition", according to Army Lieutenant General William G. Pagonis, who directed supply efforts in Gulf War. Over the past 20 years, according to Rutner, Aviles & Cox (2012), military logisticians have faced shifts from Cold War strategies, a different type of adversary, sustained combat operations in Third-World environments and a changing military work force. As General Dennis J. Reimer, Chief of Staff of the Army from 1995-1999 noted "there can be no revolution in military affairs without having a revolution in military logistics."

Logistic considerations are built in to battle plans at an early stages well before the start of war since without logistics the tanks, aircraft carriers, artillery, food, shelter and support personnel would not be effectively or efficiently in place to support the troops. A Dictionary of Modern War (Luttwak, 1971) described logistics as all the activities and methods connected with the supply of armed force organizations, including storage requirements, transport and distribution. The goal was to supply the ideal quantity of each supply item by not overstocking or running into shortages of essential equipment. Military professionals may have begun the discourses of logistics, but it clearly migrated into the business environment (Rutner, Aviles & Cox, 2012). In both military and business logistics, resources are almost always limited and

must be balanced to help ensure success. According to McGinnis (1992), military logistics provides insights that enhance the understanding of business logistics integration within the firm, among firms, over time, and in response to changing environments.

Logistics in Business

Logistics for many years centered on what is known as forward logistics. In the general business environment, the flow of forward logistics is the sending of the semi-final or final products from the point of origin to the point of consumption, with the participation of several key sectors, namely the manufacturer, wholesaler, supplier, and distributor or forwarder (Zelbst et al, 2009). In retail, for example, forward logistics was dependent on sales forecasts for future requirements of the supply chain network. As product was needed, it was sent first to a distribution center and then to the retail stores. At each level in the network, forecasts would be used to help predict what will be needed, and shipments are sent in response to need at the distribution center or retail level (Tibben-Lembke & Rogers, 2002). Not much thought was put into what happens after these steps for products that do not find their way to a planned final destination with a customer. Reverse logistics flow is very different from the forward flow logistics. By contrast, a reverse logistics flow is much more reactive, with much less visibility. With returned product, a wide range of disposition options is available, all with different revenue streams (Theirry et al. 1995). Companies generally, however, will not initiate reverse logistics activity as a result of planning and decision-making on the part of the firm but in response to actions by consumers or downstream channel members. Hammaduddin (2012) provides a comprehensive summary on how forward logistics differs from reverse logistics (see Table 1). Forecasting reverse logistics flow initiated from customers, for example, can be very uncertain especially when compared to planning available for the forward logistics of the same product. In

some cases, however, a trend can be observed where reverse logistics flow would naturally follow trends in forward flows. For example, sales and special promotions can correlate with an increase of returned products, which would help a company plan for reverse logistics needs. This means that the information about the demand, based on sales or special promotions should be shared and analyzed with the forward and the reverse logistics planning in order to prepare in advance the resources needed at any time. Additionally, different products could have very different returns rates, depending on the quality and on a series of factors which makes forecasting the return more complicated than forecasting the demand (Tibben-Lembke & Rogers, 2002).

Table 1

Forward Logistics	Reverse Logistics
Forecasting relatively straightforward	Forecasting is difficult
One to many distribution points	Many to one distribution points
Product quality uniform	Product quality not uniform
Product packaging uniform	Product packaging damaged
Destination/routing clear	Destination/routing not clear
Disposition options clear	Disposition not clear
Pricing relatively uniform	Pricing dependent on many factors
Importance of speed recognized	Speed often not considered a priority
Forward distribution costs easily visible	Reverse costs not directly visible
Inventory management consistent	Inventory management not consistent
Product life cycle manageable	Product life cycle issues more complex
Negotiation between parties straightforward	Negotiation complicated by additional considerations
Marketing methods well known	Marketing complicated by several factors
Visibility of process more transparent	Visibility of process less transparent

Hammaduddin (2012)

Retail reverse logistics describes the activity of returning goods back through the supply chain with a focus on retailers (Bernon, Rossi, & Cullen, 2011). Although retail reverse logistics is not a new concept, the growth of the Internet and home shopping has seen a marked rise in the volumes of products being returned (Richey, Tokman, Wright, & Harvey, 2005). This does not need to be a burden on a company but should be seen as a potential benefit. High quality reverse logistics can promote longer-term relationships according to Daugherty, Myers & Richey (2002),

as customers are more likely to repurchase from companies who do a good job at handling returns. Customers, for the most part, are no longer concerned with the product once it is returned, but for organizations, this is a critical component of the returns policy as it is a major expense (Skinner, Bryant & Richey, 2008). The following is an example of reverse logistics within a bricks and mortar retail business. As noted by Tibben-Lembke & Rogers (2002), differences in reverse logistics will exist based on the destination to which the returned items will be sent: return to vendor; resell via outlet, or to a broker, either as is, or reconditioned; donation to charity; or disposal via recycling or landfill. The disposition strategy that the organization adopts is going to be correlated with its returns policy and is ultimately part of its customer service offering. The position within the supply chain often drives the size and scope of the reverse logistics problems that the firm faces. Generally, the closer the firm is to the end consumer, the greater the size and scope of the reverse logistics issues. Because retailers deal with customers directly, the retailer typically has a larger volume of returned merchandise to deal with than its suppliers (Tibben-Lembke & Rogers, 2002). The retailer if the first line in the process of returns and from an efficiency perspective the retailer's last preference would be to return to the supplier. If possible, a retailer's first preference would be to sell the item as new at the original price. This option maximizes profit potential and should have a minimal impact on resources as the item should be able to be processed all within the same store. If this cannot be done, a full refund from the vendor is the next most profitable depending on the agreement in place with the vendor. Also, depending on the volume this could lead to a strained relationship with a vendor. If a return to the vendor is not possible, the retailer may be able to sell the product again at a markdown in its store, or through an outlet at a reduced profit. In this case, an organization might have more stringent requirements for the condition of the product upon

customer return (Skinner, Bryant & Richey, 2008). Short of recycling or landfilling the product, one of any company's last resorts is to sell the product to a broker (Tibben-Lembke & Rogers, 2002). Brokers operate in a secondary market, buying and selling product that for one reason or another cannot be sold in the primary retail channel. Brokers can be found who are willing to buy almost any product in any condition. As a result, the prices, which brokers will pay, are typically very low. Retailers also have to be careful that the sale of products through these brokers does not hurt the value of their operations as customers seek the new discounted prices found with the broker's channel (i.e. the Dollar Store or TJ Maxx).

Retailers need to enhance returns processing to allow consumers to return their purchases to the channel of their choice, thereby enabling a seamless experience. In order to keep retail prices low, reverse logistics must focus on taking advantage of every possible opportunity for reducing costs or increasing revenues. Any way to process returns more quickly, or to find new brokers to whom to sell, must be taken advantage of, to reduce the cost of the returns (Tibben-Lembke, 2002).

Logistics and the Environment

Although economic performance has traditionally been, and continues to be, the first priority for manufacturers, environmental performance has become increasingly important (Huang & Yang, 2014). Reverse logistics has been found to be positively correlated to both environmental and economic performance (Huang & Yang, 2014). An organizations strategy to reuse, refurbish, and recycle products can benefit the environment, increase profits and save money. If a company, for example, can reduce inefficiencies in their return process, which in turn reduces transportation, they can effectively reduce carbon emissions while improving air quality and potentially reduce costs.

An example of reverse logistics benefiting the environment can be found in the electronics industry. This industry has been growing rapidly, and with rapid changes in technology products such as cell phones, digital cameras, video gaming systems, computers, televisions, tablet computers and other electronic devices can become obsolete in a few years. This results in unwanted products that could, without a recycling strategy, end up in filling up landfills with potentially toxic waste. Samsung, a multinational conglomerate company, began a program called Recycling Direct in 2007. Its goal was to partner with recycling companies that do not incinerate materials, use landfills or export waste to developing countries. Samsung has established drop off locations across all 50 states with more than 200 locations where consumers can take unwanted electronic products, whether or not the product was theirs. In addition, the company created the Samsung Take-back And Recycling (S.T.A.R.) toner-recycling program, which recycles used printer cartridges. Using a pre-paid Smart Label, customers can return old printer cartridges to Samsung for recycling and reuse.

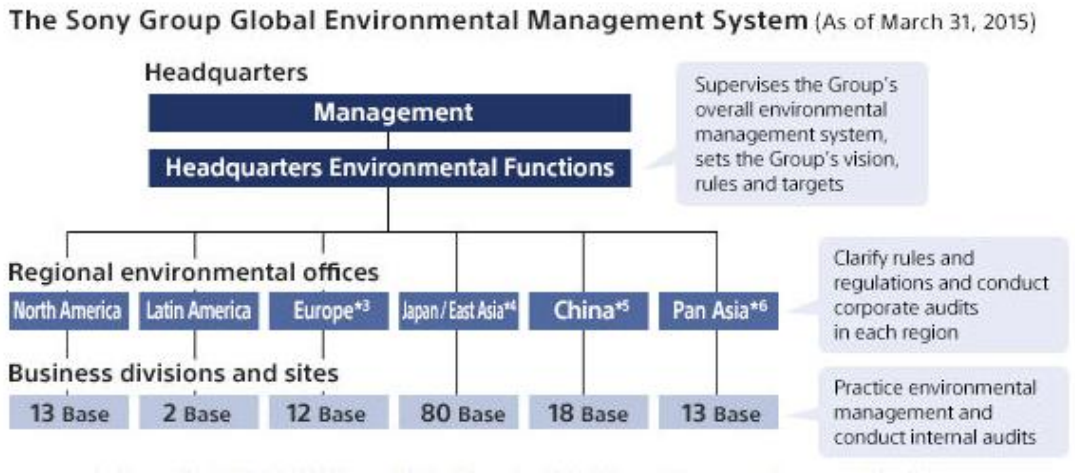
Increasingly, stringent environmental and packaging regulations are forcing companies to become more accountable for residual and final products, long after they sell the products (Dowlatshahi, 2000). Fewer products will be disposed of as firms investigate their reusability, remanufacturability, and recyclability (Dowlatshahi, 2000). Because reverse logistics by definition includes processes like reusing, refurbishing, recycling, and remanufacturing engaging in reverse logistics activities helps organizations achieve a certain level of green. Environmental protection is becoming a key issue in our society, and the reverse logistics management plays a significant role in creating green supply chain and environmental protection (Li & Luo, 2012). For a variety of economic, environmental, or legislative reasons, product disposal may no longer

be the consumer's responsibility as products come to be recycled or remanufactured by the original manufacturers (Dowlatshahi, 2000).

The success of a reverse logistics program will be positively related to the existence of an incentive system that rewards employees and managers for their involvement with reverse logistics activities (Carter & Ellram, (1998). This can be seen with a company that sought to reduce the amount of energy consumed, the volume of greenhouse gases created and packaging (i.e. cardboard or pallets) used in the transportation of parts and finished goods is significant to reduction of the environmental waste as it relates to manufacturing logistics. Sony Corporation is a great example of how a company can address environmental waste in the logistics process. Sony Corporation is a Japanese multinational corporation headquartered in Japan. The company is one of the leading worldwide manufacturers of electronic products for the consumer and professional markets. Sony Corporation, the parent company of the Sony Group, is made up of the following four operating units: electronics (Sony Group), motion pictures (Sony Pictures Entertainment), financial services (Sony Financial) and music (Sony Music Entertainment). Sony produces a lot of waste in their operations process as one of the largest manufacturers in the world. To address this waste, while at the same time making environmentally conscious products, Sony uses its logistics expertise in an environmental plan referred to as the Road to Zero. The long-term vision of the Road to Zero it to achieve a zero environmental footprint, or basically leaving the environment the same way it was before they used it for any operations. First, Sony created management accountability in what is referred to as its environmental headquarters which is located at the parent company. According to Sony's website, the headquarters is responsible for environmental management related to energy consumed at sites and by products; resource conservation, including recycling; chemical substance management;

biodiversity conservation; procurement; logistics; technological development; and communications, which the Corporate Executive Officer is in charge of overseeing. Working with regional offices and departments, goals have been established and progress towards those goals are measured and reported. In addition, regional environmental offices facilitate region-wide environmental management activities, such as a better understanding of local, legal and regulatory trends, effective communication of standards and instructions set forth by headquarters to the regional divisions and sites, and effective performance of audits at all regional business divisions and sites (see Figure 2).

Figure 2



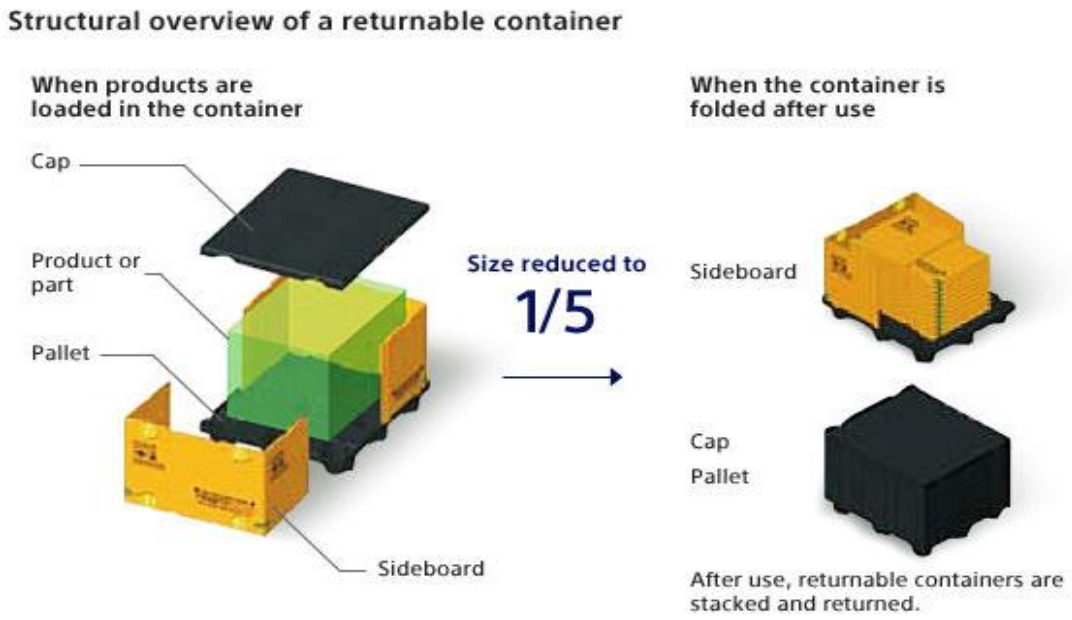
http://www.sony.net/SonyInfo/csr_report/environment/management/structure/index2.html

The following is an example how Sony is reducing environmental impact through improvements in packaging in the logistics process. Packaging produces CO2 emissions and packaging materials that can adversely affect the environment. To improve on the impact created by the packaging manufacturing process requires many departments working together including logistics, procurement, product design and manufacturing.

One area with high potential returns is found with containers used in the transportation of goods. Sony reuses packaging materials and reduces waste by using returnable containers which

can be reused repeatedly for products and parts transport (see Figure 3). Sony has been using returnable containers since 2005 in Japan and expanded outside of Japan to include production to sites around the world.

Figure 3

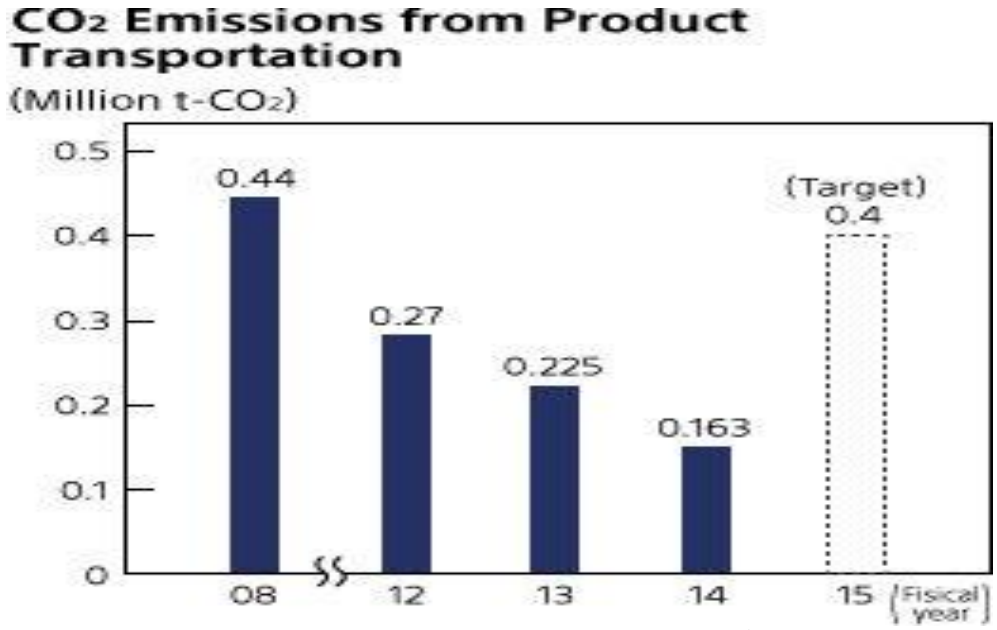


http://www.sony.net/SonyInfo/csr_report/environment/index.html

These standardized modular containers are designed to enable the efficient loading goods going out to customers on transportation carriers (i.e. sea freighters). These same containers which are built to be broken down to 1/5th the original size are returned to the manufacturing facility to be reused again. As mentioned earlier, Sony reports the progress toward achieving the results of the Road to Zero initiatives to the public. One of the measurements is called the Green Management Environmental Targets for Logistics. According the website, the goal is to reduce CO2 emissions generated from transport and packaging materials by means of optimization of transport efficiency (i.e., downsizing of product packages, improving loading efficiency and optimizing parts packages) and switching to alternative transport modes which can reduce

environmental impact (i.e. modal shift and joint shipping), as well as by reduction of gross transport weight through weight reduction of each product. For 2015, the goals are to reduce CO2 emissions from logistics by 14% and reduce waste from packaging for incoming parts by 16% from the fiscal year 2008 levels. In fiscal year 2014, CO_2 emissions from logistics totaled approximately 163,000 tons, 62% lower than in fiscal year 2008 (see Figure 4).

Figure 4



http://www.sony.net/SonyInfo/csr_report/environment/logistics/index2.html

Sony continues to target further reductions of CO_2 emissions through downsizing and weight reduction of products and packages and also modal shifting of transport (i.e. by rail, sea and/or road).

Logistics and Supply Chain Management

The supply chain is the network of companies involved in providing products and services to the end-customer (Lambert, García-Dastugue & Croxton, 2008). Supply chain management describes the business practice that combines logistics, production and inventory control and operations management. According to Ballou (2007) logistics is now being viewed

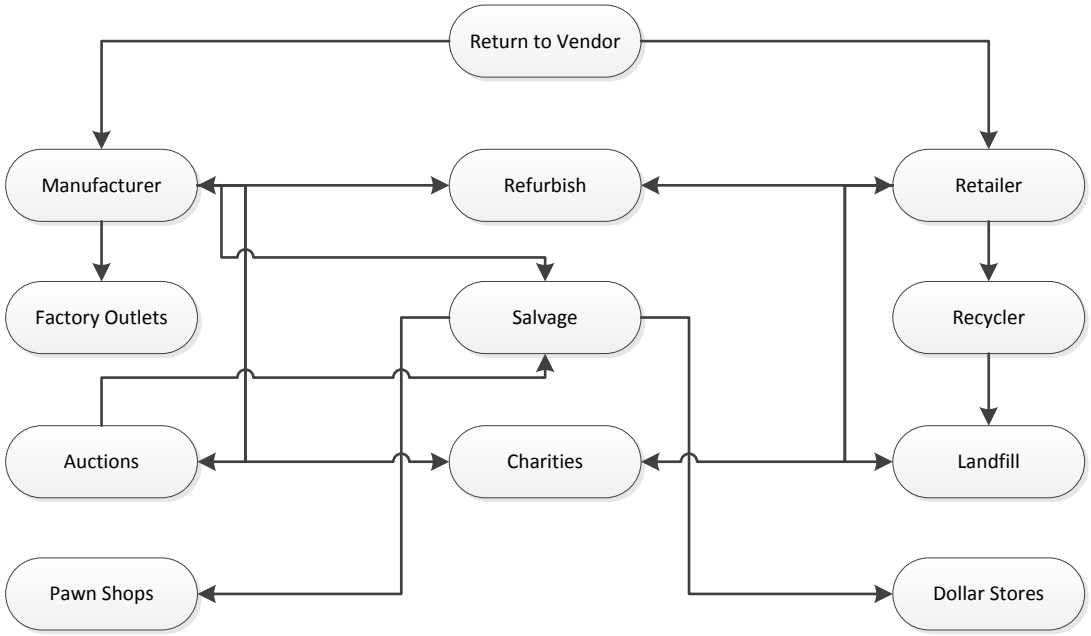
as a subset of supply chain management. Logistics and supply chain process integration is much more than sharing information and the development of proper communication channels; it requires significant investments in inter-organizational process development, joint decision-making, and inter-firm relationship management (Mellat-Parast & Spillan, 2014).

Firms such as Toyota have developed unique logistics and supply chain systems enabling them to achieve superior performance and competitive edge in the marketplace (Barney, 2012). Supply-chain management at Toyota is based on the Toyota Production System (TPS) which was developed in the 1940's by Taiichi Ohno and Shigeo Shingo. TPS is often referred to as lean manufacturing. Liker (2005) lists following components of Toyota Supplier Partnering Hierarchy: mutual understanding and trust, interlocking structures, control systems, compatible capabilities, information sharing, joint improvement activities, and Kaizen and learning. For example, Toyota's way to capacity planning is to eliminate inventory. By keeping inventory lean Toyota helps save on expenses such as an excess inventory of parts not being used or parts that become obsolete because they were not used in time. In achieving this objective Toyota relies heavily what is referred to as the pull system. A pull system reduces waste in the production process as only make enough products to meet customer demand. Companies like Amazon and Wal-Mart, two of the world's largest retailers, continue to grow due to the way they use their logistics and supply chain management to reduce costs and in turn to provide products and services at a lower cost to customers (Bonney, 2012). Amazon has come a long way since its founder and chief executive officer, Jeff Bezos started the company in 1994 as a virtual bookstore. It has evolved into an online retail giant that sells every type of product imaginable and generates over $88 billion in revenues. Much of this revenue comes from the over two million companies that use Amazon to sell their products online and distribute them to

customers. From a supply chain and logistics perspective, Amazon provides its customers with a means to store their products in its fulfillment centers; pick, pack, and ship them; and provide customer service including handling returns. These centers include 84 in the United States and a total of 145 warehouses around the world in Canada, Europe, China, Japan India). This amounts to more than 40 million square feet of space. Amazon has also has made substantial investments in material handling systems, including the acquisition of Kiva in 2012. Kiva designs robots, software, workstations, and other hardware that has been used in the distribution facilities of companies such as Staples, Office Depot, and The Gap. Walmart's excellence in supply chain management and logistics was create over many decades and serves over 4,5000 stores in the U.S alone. In 2014, the retailer moved from No.14 to No.13 on research and analyst company Gartner's annual ranking, according to Aronow (2014), placing among Gartner's top 20 supply chains for half a decade. Wal-Mart can leverage its tremendous purchasing power to force suppliers' to drive down costs and increase speed to market while maintaining adequate supply to meet their needs. The retailer started dealing directly with manufacturers in the 1980s, giving suppliers the job of managing inventory in its warehouses (Gilmore, 2012). This was called vendor managed inventory, or VMI. The goal was to smooth out irregularities of inventory flow which helped ensure that products were always available on store shelves. The process involved cooperation and collaboration with suppliers that produced a more efficient supply chain. Wal-Mart also uses information from stores such as point-of-sale data, warehouse inventory and real time sales to help suppliers who know when to ship more products. These methods produce lower costs for products and inventory, better control over selection in its stores and the ultimately lower prices that can be passed to customers.

Although there are differences in definitions between logistics and supply chain management, there are similarities across all regarding what is taking place, which is the coordination and communication of interactions for the efficient and effective delivery of goods.

Figure 5



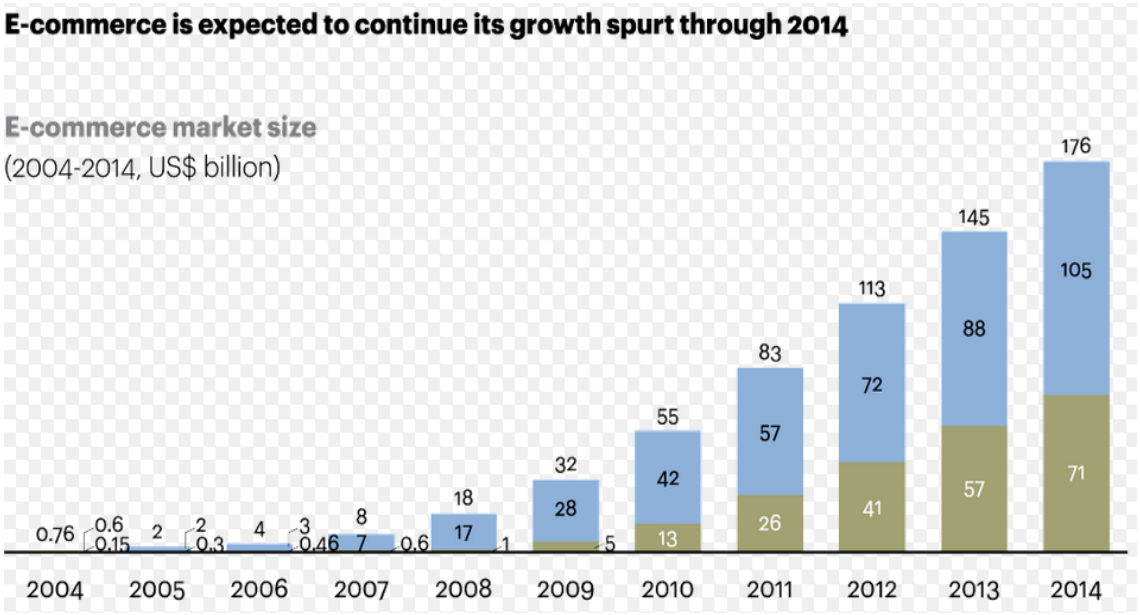
As shown in Figure 5, the transfer of goods from one business entity to the next requires the coordination of demand and supply between many different institutions, from the original vendor to many possible destinations. Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities (Ballou, 2007). Logistics and supply chain management, the process of managing material and information flows from the source, through the firm and to the customer, has been recognized as an important part of organizational strategy (Heskett, 1977).

Logistics and E-Commerce

The rapid development and adoption of the Internet or the web as a marketing tool have introduced the concept of "electronic commerce" or "electronic business" to market transactions

(Cho, Ozment & Sink, 2008). Electronic commerce is simply a vehicle for obtaining goods and services via the Internet in the form of real time access of data, ordering goods/services on line, B2B transactions, and so forth (Kumar & Petersen, 2006). Murillo (2001) found that success in e-commerce requires the use of many complementary assets most notably computers, the Internet, satellite technology, logistics assets and services. E-commerce offers online retailers a world of opportunity. According to A.T.Kearney (2015), E-Commerce is expected to grow to over $176 Billion in 2014 which is over double the figures from 2011 (See Figure 6).

Figure 6



Source A.T. Kearney (2015)

Logistics helps retailers become successful with this opportunity by defining how well they service and retain their customers through their ability to handle orders, inventory, shipping and returns. According to Cho, Ozment & Sink (2008), e-Commerce requires a new logistics approach as small order size, increased daily order volumes, small parcel shipments, and same-day shipments are common. One of the biggest advantages for companies to be present on the Internet is the fact that the interactions with potential customers, both current and potential, can

easily be monitored and logged (Dignum, 2002). With the applications of e-commerce, logistics service is supported by information systems including major business transactions amongst the buyer and supplier, for example, access to shipment status or delivery service databases, and access to secure transaction service (Yang, Humphreys & McIvor, 2006). A critical factor that differentiates e-commerce from traditional commerce is the ability to connect trading networks to the entire supply chain to achieve competitive advantage (Golicic, Davis, McCarthy & Mentzer, 2001).

Some of the largest e-Commerce retailers (i.e. Amazon) have implemented same-day delivery to lure customers who can't or won't wait for even next-day service. To compete, leading brick-and-mortar retailers (i.e. Best Buy or Wal-Mart) have turned stores into distribution hubs to combine online and in-store experiences. This allows customers to order items online and pick them up at the store, or order online and have the product shipped to their home. The proximity of stores to customers may even allow same-day deliveries.

E-commerce has revolutionized and fundamentally reshaped business relationships and has caused dramatic shifts in channel power as information and communication imbalances disappear (Jantan, Nelson & Ong, 2003). Today, e-commerce is treated not as a competitive advantage, but as a necessity, which helps to avoid the lagging behind competitors (Barsauskas, Sarapovas & Cvilikas (2008).

Literature Review

Literature review has turned up a few good definitions for reverse logistics. Stock (1998) defines reverse logistics "from a business logistics perspective, the term refers to the role of logistics in product returns, source reduction, recycling, materials substitution, reuse of materials, waste disposal, and refurbishing, repair, and remanufacturing; from an engineering logistics

perspective, it is referred to as reverse logistics management (RLM) and is a systematic business model that applies best logistics engineering and management methodologies across the enterprise in order to profitably close the loop on the supply chain". According to the Council of Logistic Research, the definition of reverse logistics is "the process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in process inventory, finished goods and related information from the point of consumption to the point of origin for purpose of recapturing the value or proper disposal." Reverse logistics has seen tremendous growth over the last 30 years as it offers an opportunity for companies to differentiate or distinguish themselves with customers (Daugherty, Myers & Richey, 2002). Development continues as the foundation of reverse logistics expands and becomes even more critical to a company's strategy and overall profitability. Several themes were brought out through literature review and are summarized below (see Table 2).

Table 2

Reverse Logistics Themes
• Remanufacturing
• Refurbishment
• Recycling
• Waste/Scrap Management
• Environmental Resources
• Sustainability
• Warranty Management
• Asset Management
• Fulfillment Services

There is a distinct evolution of reverse logistics starting in the 1980's through the present with a general theme of organizations across all industries developing reverse logistics strategies as a process of managing assets. Ideally, before reverse logistics, organizations were focused on the forward logistics process of getting products into a customer's hand. In a way, product returns were thought to be of little importance. Giving the growth of online shopping as well as direct-

to-store shipments for customer pick up, reverse logistics is becoming more important in helping manage the bottom line.

Reverse Logistics Themes 1980 - 1989

Literature review on logistics starting in the 1980's show no references to reverse logistics as part of a supply chain process. Instead, there are other references to a return product flow to what would ultimately become known as reverse logistics. Chandran & Lancioni (1981) note that logistics managers have done little to develop a systematic recall process, or reverse distribution system from consumer to producer. In addition, tracking goods and locating goods in the regular flow of goods out to the customer were still challenging as technology was just starting to come into the workplace that could handle high volumes of information. Referring to the inbound collection of goods as the reverse distribution problem, Schuldenfrei & Shapiro (1980) state that the pressures of inflation, tight energy supplies, and the trend of higher cost logistics will force management to strive for success by looking at both sides of the logistical equation. In the 1980's with the normal day-to-day manufacturing process, consumer products follow well-defined marketing channels designed to move them swiftly and efficiently down the distribution chain, Damary & Hurst (1982), but should this process have to be put into reverse and distribution becomes recuperation severe problems arise. At this time in history there is little in the way of literature on how to address this problem but there is, however, a start in the realization that this is a problem that would need to be addressed in order for companies to be effective and efficient.

Reverse Logistics themes 1990 - 1999

Literature review on logistics starting in the 1990's starts to show more references to reverse logistics with deeper research and insights into the importance of this process to the

supply chain as a whole. Pohlen & Farris (1992) state that (1) most logistics systems are ill-equipped to handle product movement in a reverse channel, (2) reverse distribution costs may be up to nine times higher than moving the same product from producer to consumer and (3) returned goods often cannot be transported, stored and/or handled in the same manner as in the forward channel. Leading firms are now expected to develop operating systems that are capable of accommodating reverse logistics in an efficient and economical manner (Bowersox & Daugherty, 1992).

Reverse logistics including product recalls, returns and mistakenly shipped goods are finally getting recognized for the unique burden they place on logistics systems. An unintentional benefit for companies with reverse logistics programs include increased control in the distribution function, reduced long-term packaging costs, and corporate image enhancement (Byrne & Deeb, 1993). In addition, the perceived influence of the regulatory sector on reverse logistics activities is starting to show up in literature. As noted by Carter Ellram (1998), the regulatory sector has received the greatest attention and is generally credited as having the greatest influence on a firm's reverse logistics. Up until this point in time, most references to logistics still dealt with a one-way flow of goods out to a customer.

Reverse Logistics themes 2000 - 2015

Literature review on logistics starting in the 2000's starts to show more complex explanations, analysis, statistics and adoption of reverse logistics as a basic need for companies to operate in a competitive market. Responsibility for product disposal, for example, forces manufacturing firms to incorporate disposal costs in product prices according to Klausner & Hendrickson (2000) as this gives manufacturers incentives to design their products for lower costs at end of life, often through reuse or recycling. Firms are starting to see the need to

develop reverse logistics systems that rival outbound logistics in the terms of efficiency, cost effectiveness and competitiveness (Daugherty, Myers & Richey, 2002).

High quality reverse logistics can promote longer-term relationships, according to Daugherty, Myers & Richey (2002), as buyers are more likely to repurchase from vendors who do a good job at handling returns. With the increase of online purchases, many customers are concerned with how an online purchase will translate into a store return (Jack, Powers & Skinner, 2010). According to Daugherty, Myers & Richey (2002) information support is particularly critical to achieving efficient reverse logistics operations. With reverse logistics, companies are dealing with the non-routine events of product returns, recalls, refusals, reworks and rejects. Technology provides a critical link to a successful system, which is the need for rapid timing and processing of goods. Information coordination, however, is complicated because of multiple parties involved (Daugherty, Myers & Richey, 2002).

Growing concern for the environment, coupled with economic incentives and legislative compulsions, has enhanced producer's responsibilities to take back end of life and used products from the consumers (Patel, Li, Bose, Timmer, & Gonzalez (2006). In the past, companies have not had much incentive to refurbish returned products. Returns, in essence, were a liability to be disposed of as cheaply as possible which often meant sending them to a local landfill. Increasing restrictions on what can be placed in a landfill and the cost of land filling have made disposal a less attractive option (Rogers & Tibben-Lembke, 2001).

The operational factors of reverse logistics consist of cost-benefit analysis, transportation, warehousing, supply management, remanufacturing and recycling and packaging (Dowlatshahi, 2000). Reverse logistics can be broken into two general areas, depending on whether the reverse flow consists primarily of product or packaging (Rogers & Tibben-Lembke, 2001).

Product could be in the reverse flow for remanufacture, refurbishment or simply because a customer returned it. Packaging, however, flows back because it is reusable (i.e. pallets) or because regulations restrict its disposal (i.e. corrugated). Operational factors of reverse-logistics systems include: cost-benefit analysis, transportation, warehousing, supply management, remanufacturing and recycling, and packaging (Dowlatshahi, 2000). The importance of these operational factors can be different depending on the organization so they should be weighed according to their importance. The customers of today expect and demand the ability to return defective or unwanted products and efficiently as possible. In addition, monitoring the performance of any logistics system should include measures both internal and external to the firm (Stank, Crum and Arango, 1999).

The e-commerce business and online transactions have brought a new dimension to the buying and selling of goods and services during this period. Today the e-commerce industry is on the ramp up, thanks to the phenomenal success of amazon.com and other similar online enterprises (Jayaraman, Srivastava, Balgi, & Prasad, 2013). Reverse logistics of e-commerce refers to the return, counter-flow or reverse-flow of products which are ordered on the Internet from customers to suppliers (XiaoYan, Han, Qinli & Stokes, 2012). These products can be returned for a number of reasons including poor quality, incorrect product or size, product was not needed or wanted, product did not match the description on the Website or in the catalog, product did not fit the customer's expectations or the company shipped the incorrect product or size. Compared with traditional bricks and mortar facility, e-commerce is becoming more acceptable and popular among consumers because of its high efficiency, convenience and low cost. In addition, the explosive growth in this area can be linked to the development of technology such as smart phones, computer tablets and the Internet. An example of reverse

logistics with e-commerce can be found in the retail fashion industry. According to Nitse, Parker, Krumwiede & Ottaway (2004), as the number of Internet purchases of fashion items increases, the problem of inaccurate color representation on the Web becomes more significant. Something such as color inaccuracy can end up having many negative consequences for retailers including loss of sales, increased returns and complaints, and customer defections. This can also lead to higher costs, as customer service representatives try to resolve complaints and the reverse logistics system is used to handle a returned product and possibly send out a new one at the company's expense. In a survey by Nitse, Parker, Krumwiede & Ottaway (2004) a majority of the respondents indicated that they would not make additional purchases from an e-commerce retailer if they received items in colors different than they expected.

Reverse logistics models based on e-business environment have received a degree of attention (Ni & Liao, 2009). Generally, there are three typical forms and these include manufacturing collecting, online retailer collecting and the third-party logistics providers (3PL) collecting suppliers (XiaoYan, Han, Qinli & Stokes, 2012). In the early stages of e-business, the most adopted models were the first two. That has changed, however, as companies struggled to satisfy customers since the reverse logistics process was more complex and more costly than anticipated. Furthermore, as more retail stores are setting up or refining their Internet presence, pressure to run an effective and efficient reverse logistics process has intensified. Therefore, owing to concerns to reduce logistics costs and improve efficiency, it is hardly surprising that enterprises tend to prefer outsourcing it to the third-party reverse logistics service providers (XiaoYan, Han, Qinli & Stokes, 2012). Companies can then focus on their core business. The outsourcing of logistics to 3PLs has become an increasingly powerful trend in modern companies. 3PLs are used to perform traditional logistics functions, such as inbound transport,

outbound transport, warehousing and for other services, such as reverse logistics (Qureshi, Kumar & Kumar (2008). Companies can leverage 3PLs to set themselves apart from the competition. Such differentiation may allow firms to maintain or gain market share, increase revenue, and possibly reduce transportation and inventory costs through efficiencies gained within their reverse logistics processes (Daugherty et al., 2002).

Current Examples of Reverse Logistics – United Parcel Service

According to Tibben-Lembke & Rogers (2002) reverse logistics networks may be classified into several categories, depending on the source of the reverse flow: catalog/e-commerce customer returns; retail customer returns; retailer returns; and manufacturer returns to a supplier. There are many examples of reverse logistics at use in today's markets. United Parcel Service (UPS) is a leading provider of logistics. Founded in 1907, UPS is the world's largest package delivery company and a leading global provider of specialized transportation and logistics services. According to their website, UPS had revenues of $55.4 billion in 2013 with 395,000 employees worldwide (318,000 U.S.; 77,000 International) while delivering 4.3 billion packages and documents. One specific solution offering from UPS is Reverse Logistics, which can provide a customer with many benefits (see Table 3). According to Moore (2005), a reverse logistics partner with UPS, the importance of reverse logistics to organizations includes: returning goods into the supply chain which is equally important as moving goods to market, managing and improving the asset-recovery program which is fundamental to achieving profitable results, revenue generating opportunities exist in reverse logistics programs, and regulatory controls which area becoming more stringent on proper disposal of products. An example of UPS's reverse logistics system can be found with their partnership with HP. HP's LaserJet Toner Cartridge Recycling Program, called HP Plant Partners, has recycling programs

throughout the world and claims that since 1990 HP has been able to divert over 18 million pounds of material from landfills by recycling every toner cartridge received by providing consumers with pre-paid UPS label to send the used toner cartridge back to HP (Yen-Chun & Wei-Ping, 2006). In addition to environmental and cost benefits, a reverse logistics program such as the HP example can proactively minimize the threat of government regulation. UPS, as well as a variety of other transportation and distribution firms (such as FedEx, Yellow Freight, etc.), are being driven by the market need for rapid, integrated return shipment and repair, and concerns over environmental impact (Blumberg, 1999).

Table 3

Key incentives for Reverse Logistics
Customer retention/satisfaction
Container reuse
Recycling programs (Transport packaging)
Damaged material returns
Asset recovery/restock
Downstream excess inventory (Seasonality)
Hazardous material programs
Obsolete equipment disposition
Recalls

Source: UPS (2014)

Current Examples of Reverse Logistics – Wal-Mart

Wal-Mart is a company that relies heavily on reverse logistics. Raul Castilla, director of reverse logistics at Wal-Mart, said each year the retailer processes 45 million cases of returned merchandise through its regional return centers with 40% of that volume coming through in January and February following the hectic holiday buying season (Souza, 2013). Wal-Mart sorts the returned products into four tiers: back to vendor for credit, donation to charitable organization, recycle or send to landfill. Most of the time, for example, up to 70% of electronic returns are related to buyer remorse, not defective products, which makes the refurbish centers a valuable addition to the retailer's reverse logistics plan (Souza, 2013). Another example of how

Wal-Mart uses reverse logistics can be found through their Internet business site Walmart.com. This site blends online purchasing with returns either online or in person at any of its stores throughout the country. According to the web site, all merchandise sold and shipped by Walmart.com may be returned either to a store or by mail within 90 days of receiving it. This returns policy evidences an adequate management of reverse logistics and synergies from integrating clicks and bricks (Kumar, Eidem & Diana, 2012). This return policy is evidence of a positive process of reverse logistics, which is fundamental for online retailers since customers are not able to check a product before making a purchase decision. Furthermore, this return policy and the brick-and-mortar stores of Wal-Mart represent an important element of trust for consumers.

Current Examples of Reverse Logistics – Ryder

Ryder is a publically traded company in the transportation industry. Founded in 1933 it had revenue of $6.63 billion, net income of $218.57 billion and total assets of $6.6 billion in 2014. Ryder specializes in fleet management, supply chain management and dedicated contracted carriage. Ryder operates in North America, the United Kingdom and Asia with its headquarters located in Miami, Florida. According to Ryder, what happens to products after the point of sale is as critical to the customer experience and profitability as the activities that bring them to market. In 2009, for example, retail returns in the United States amounted to $185 billion, equal to about 8 percent of the estimated $2.3 trillion in retail products sold by the members of the National Retail Federation.

With respect to reverse logistics, Ryder integrates product returns into the overall supply chain strategy for companies by providing services that get product returns into the forward supply chain, secondary market or other streams fast and with efficiency (see Table 4).

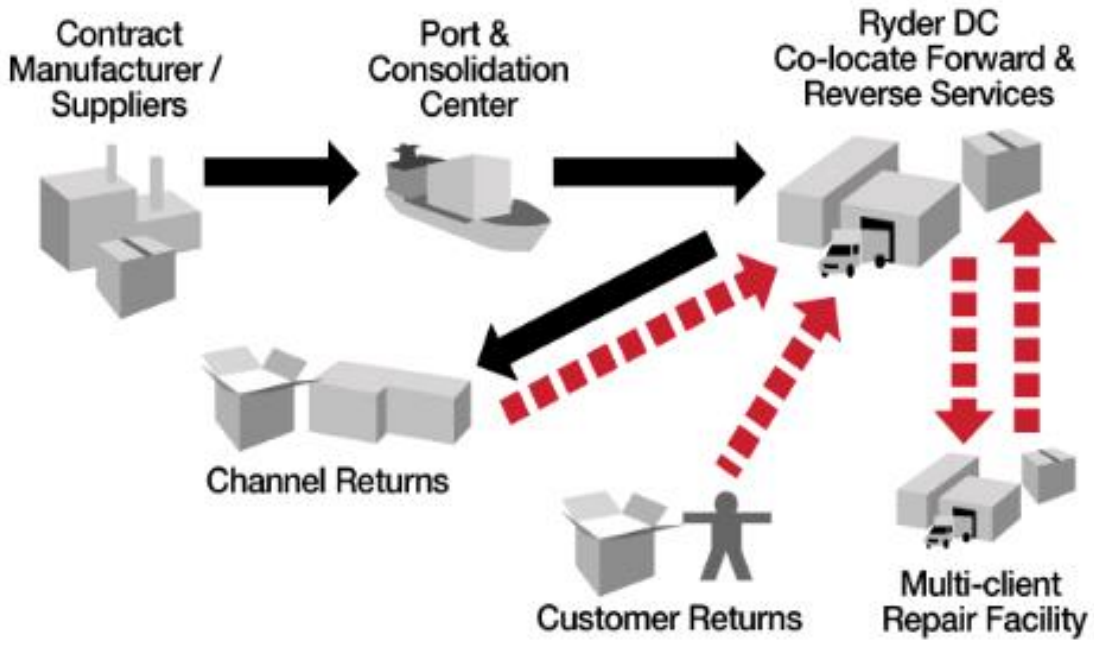
Table 4

Reverse Logistics Services
• Product inspection, including Return Material Authorization (RMA) verification and tracking
• Product sorting
• Credit reconciliation
• Triage and testing, including disposition
• Repackaging/restocking for future order fulfillment or resale
• Repair/refurbishment, including cosmetic, board and component-level repair and parts reclamation
• Recycle/disposal/scrap, including harvesting parts for re-use

Source: Ryder Logistics (2015)

This is done by co-locating repair and refurbishment with forward distribution into a single facility where companies can realize significant benefits. Basically, Ryder takes care of every function associated with product returns management by consolidating all the functions needed for returns into a single entity. The goal is for fewer hand-offs, warehouses and touches which adds up to increased asset recovery value, an improved customer experience and lower infrastructure, transportation and labor costs (see Figure 7).

Figure 7



Ryder (2015)

The ultimate goal of reverse logistics is to maximize asset recovery rates and supply chain efficiency to ensure the lowest possible costs. In a recent survey by the Aberdeen Group (2010) of over 160 companies in the computer, consumer electronics, telecom, aerospace and manufacturing industries, those that used best-in-class reverse logistics processes report an:

- Average customer satisfaction rate of 93 percent (vs. 86 percent industry average)
- 4.4 average days parts return times (vs. 14.5 days industry average)
- 21 percent decrease in cost per return materials authorization over a 12-month period (vs. 6 percent industry average)

According to the Consumer Electronics Association (2010) return rates for all consumer electronics products are averaged about 8 percent overall and 13 percent for video products, driven by the fast-growing popularity of HDTVs. That adds up to a lot of returned products considering the 325 million televisions, 233 million cell phones, 222 million DVD players, 164 million digital cameras and 128 million desktop computers in U.S. households. Ryder hopes to capitalize on these trends in reverse logistics to help companies achieve their goals.

Current Examples of Reverse Logistics – Dell Incorporated

Dell Incorporated is a privately owned multinational computer technology company with annual sales over $59 billion and 106,000 employees. Dell ships products to 180 countries worldwide, at a rate of one system per second. Customers range from single orders for an individual to orders in the thousands for large corporations. In either case, Dell's goal is to ship products in a way that gets each order to its correct destination on time, with all contents intact while minimizing returns. Dell handles reverse logistics proactively to help increase their placement of computers. Technical customer service representatives are they gatekeepers for the reverse logistics process where no computer can be returned unless a phone call from the

customer goes through them first. According to Cojocariu (2013) Dell technical customer service representatives often walk consumers through set-up and early usage issues and, in effect, talk them out of returning the machines. In addition, this gate keeping approach can provide an opportunity to up-sell and cross-sell. According to Dell, efforts to decrease product returns resulted in making 94 percent of returned assets available for resale through their Dell Outlet. These items can be resold for potential profit while the remaining six percent of returned assets are recycled responsibly.

Conclusion

The rapid growth of reverse logistics is likely to continue. Managing reverse logistics is becoming an important element of supply chain management and, in some cases, a profit generating function (Rogers & Tibben-Lembke, 2001). For years companies thought that once the products would leave their warehouses that the products were no longer their responsibility. At that point the product belonged to their customers. There was little with regards to regulations, environmental concerns or public expectations. Logistics for years was focused on the company's ability to get products to the buyer as effectively and efficiently as possible. With increased competition, advancements in technology and demanding customer expectations companies had to make efforts to improve their effectiveness and efficiency in the their supply chain. Reverse logistics was one way in which companies could increase their competitiveness in the marketplace as well as address the issues just mentioned. This paper has provided a general framework for the basic understanding of reverse logistics and its importance to companies today as many firms have begun to realize that reverse logistics is an important and often strategic part of their business mission.

The author's findings show that reverse logistics can reduce costs (Klausner & Hendrickson, 2000), increase profitability (Rogers & Tibben-Lembke, 2001), improve customer satisfaction (Daugherty, Myers & Richey, 2002), create customer value (Dowlatshahi, 2000) and enhance environmental performance (Li & Luo, 2012). The value of an effective, measurable, and efficient reverse logistics system will prove invaluable to an organization. Sarder et al (2009) warn that by ignoring this important field of reverse logistics, many enterprises may be missing a prospect to turn burdens into valuable property. In addition, environmental and legal requirements support efforts to execute a sound reverse logistics strategy. While many companies have begun to recognize the need to address reverse logistics, it appears that few have strategically examined the opportunity or established explicit contribution objectives and formal processes/metrics for asset refurbishment, resale or disposal. Reverse logistics has become a sustainable development issue for several reasons, including economics, corporate citizenship and legislation (Huang & Yang, 2014). A firm that can develop and properly monitor reverse logistics processes in product returns and reverse logistics can be a mutually beneficial situation for both the firm and the customers (Stock & Mulki, 2009). Logistics and supply chain managers can also develop incentive and reward systems that recognize employee involvement in reverse logistics activities and success. Otherwise, reverse logistics will simply become a "burden" that employees will be unwilling to fit into their already full schedules (Carter & Ellram, 1998).

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Key Reference List Summary

Note: this section includes summaries of the literature review as well as finding common themes and possible gaps that could be addressed.

Author(s)	Topic	Summary	Gap
Daugherty, Myers & Richey	Reverse Logistics influence	Looks at information systems support and reverse logistics program performance. Move from environmental approach (1990's) to returns, recalls, refusals, reworks, rejects and return1ables. Focus on buyer's perspective.	Limited view of how technology can help with reverse logistics analytics and predictive modeling.
Patel, Li, Bose, Timmer, & Gonzalez	Reverse Logistics problems, framework, models, and applications.	A basic overview of the problems involved in reverse logistics through system analysis, including analyzing characteristics, key elements, task flow charts and decision frameworks.	The complexities associated with other areas of reverse logistics like production planning, warehousing, and transportation are not addressed in detail.
Rogers & Tibben-Lembke	An examination of reverse logistics processes.	Managing reverse logistics activities and the barriers to successful implementation.	How can companies reduce return rates (i.e. limit the number of items into the reverse flow) without damaging customer service.
Richey, Genchev, & Daugherty	The role of resource commitment and innovation in reverse logistics performance.	Aims to provide empirical evidence of the relationships between and among reverse logistics, resource commitment, and innovation.	The focus is somewhat narrow. New research should extend beyond the one industry examined (members of the Automobile Aftermarket Industry Association).