CLAIRE SAND

THE PACKAGING VALUE CHAIN

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To my mother,
Joan Carol (Lindren) Koelsch,
who is my inspiration

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Preface

For many years the packaging industry has focused on supply chain management and the logistics in the flow of goods from one location to another. This focus has resulted in a revolution of how and where packaged goods are delivered. Information based technologies have enabled this to occur.

Within the last 5 years, there has been an increased realization that the value of the packaged goods flowing from raw material supplier to post consumer stages can be better leveraged. This has been the birth of the value chain. The value chain works backward from the post consumer environment in the supply chain. The package value is transferred from consumers to retailers to manufacturers down to suppliers to raw materials. The higher the value transferred in entire value chain, the more competitive edge companies build.

Recent economic events have fostered innovation in value chain thinking. Relationships between suppliers and customers within the supply chain have become increasingly stressed and offer new challenges. Today's complex challenges: confidentiality, long term contracts, fostering innovation, building agility, and providing more sustainable packaging are addressed. Altering and benefiting from the future packaging value chain are explored. This text is immensely relevant for the age of innovation in the packaging value chain.

Acknowledgments

I owe a great deal to colleagues, friends and members of my family who have helped extend my involvement in packaging, and who, through their own research, comments and questions have encouraged, supported and enlightened me. I am grateful to Michigan State University and Rochester Institute of Technology packaging programs and students for providing insights into the relevance of the packaging value chain.

In this text, without a doubt there will be errors, omissions and over-simplifications, for which I take absolute responsibility. I do hope that text will be enough to stimulate insights and new trains of thought on the packaging value chain.

CHAPTER 1

History of the Packaging Supply Chain

1.1 INTRODUCTION

Over the course of history the packaging supply chain, in adjusting to the increased transfer of goods and services, has facilitated the growth of economic powers throughout the world. This chapter briefly addresses the history of the packaging supply chain and its evolution into the packaging value chain. As this history is considered, the impact of cultural, political, economic, and social influences will become evident: the ability to package goods, which has shaped the supply chain, now also shapes how our value chain operates.

McKinnon, describing supply chains in 1989, wrote: "Physical distribution is the collective term for the series of interrelated functions (principally transport, stockholding, storage, goods handling and order processing) involved in physical transfer of finished goods from producer to consumer, directly or via intermediate." Such transfers of raw materials—to converters, to manufacturers, to distributors, to retailers, to consumers and the post consumer environment—have been going on a long time. When we consider the history of supply chains we begin with the specialization of tasks by which early humans optimized their time, effort and resources. Gradually, dispersion of humans resulted in the need for longer supply chains that widened and expanded as civilizations re-discovered one another and reaped the benefits of trade.

1.2 ANCIENT SUPPLY CHAINS

From ancient times until the 1800s, packaged goods were not standardized. Instead, packaging designed for specific goods was produced

by hand in much the same way as the item it was meant to contain. As early as 5200 B.C.E. the Sumerians of southern Mesopotamia were trading pottery. The pottery artisans, who probably made the packaging materials themselves, may also have handled distribution, though that was most likely outsourced. Archaeologists have uncovered goods that were traded between 1200 B.C.E. and 600 C.E. from South America to Western Mexico. This early trade resulted from communication between nations and the development of complex supply chains that enabled the transport of food, water, people, and packaged goods (Chandler, 1995). Explorations from Sumatra to southern India that started with the Chinese Sung dynasty (c. 960–1270 C.E.), and which led to the Ming era domination of trade in the Indian Ocean in the early 15th century, offered new opportunities for sourcing packaging materials. As goods travelled from one place to another, packaging materials were often reused and the Chinese began to learn where the best packaging materials could be obtained. Europe was exposed to the Viking traders after 800 C.E. The celebrated trade routes forged by Marco Polo in the 1270s C.E. connected the East with the West. In 1200 C.E. Cahokia and other Mississippian civilizations of North America were engaged in trade along the Mississippi River. The variety of goods transferred with the aid of the river system was staggering. In terms of supply chains, the river offered linkages and varied sources for packaging materials depending on the climatic differences along the river.

As these and other civilizations advanced, the variety, the volume of goods traded, and the degree of standardization increased. Japan's self-imposed isolation due to the Closed Country Edict, which began in1635 during the Edo period and did not end until 1854, is particularly interesting, because of the vast gap that it opened between goods available in Japan versus those available in neighboring nations. Because outside materials could not be obtained in Japan during the isolation period, internal supply chains were fine tuned with a focus on relationships, quality, and the reuse of materials. Meanwhile the industrialized countries were optimizing the shapes and sizes of packaging to increase the volume of goods that could be transported. The intricacies of Japanese packaging show a tight supply chain with a close connection between manufacturer and supplier. Today industrial age packaging in Japan still shows evidence of the difference in the packaging supply chains from 1600 to the late 1800s.

1.3 SUPPLY CHAINS AND THE INDUSTRIAL REVOLUTION

In the evolution from the pre-industrial period, the primary responsi-

bility for the transport of goods and sourcing shifted from the manufacturer to the purchaser. For example, in the early 1900s Henry Ford's complex on the Rouge River in Detroit and William Durant's ideas defined the modern, vertically integrated approach to the making, transport, storage, and final manufacturing of goods and services. Ford's classic sourcing of car seat stuffing for the Model T is worth reflecting on in the light of current sustainability efforts and the multinational corporation. Ford sourced Spanish moss from Louisiana and specified that it had to be packaged and shipped in cypress crates. The cypress crate boards were later used as paneling, dashboards, and doors for cars at the Ford production facilities. Thus the the package was defined not by the transporter of Spanish moss, but by the customer, Ford. Packaging had become more specialized. Innovations in packaging hastened by the World Wars of the 20th century resulted in the ability to transport goods large distances, and advanced the role of packaging in communication, transport, and protection of products.

In the post industrial age, packages were mass produced to match customization of products. The first folding carton, which was used by Uneeda Biscuit, marked the beginning of an era that relied on a uniform product in a package of defined size. This in turn led to the creation of new companies that supplied packages or converted raw materials into metal for cans and paperboard for cartons.

1.4 THE 1950s–1980s MANUFACTURING FOCUS

In the post war era, the ability of companies to manufacture, stockpile and sell goods grew more efficient. The focus was on manufacturing, not the relationships between manufacturing entities (Stacey and Wilson, 1958). Forrester (1958), in defining industrial dynamics, began to consider the flow of materials in a more systematic way. But packaging in the 1960s was still largely handled through independent departments of manufacturing, packaging, inventory, order taking, and transport to customers. In 1962, Peter Drucker (considered to be the grandfather of modern management), began to explore the role of management and leadership and the supply chain began to be understood. In 1973, Drucker coined the term "knowledge worker," and later "knowledge work," to describe the then primitive form of sharing information for the improvement of processes (Drucker, 1973).

When oil embargoes and rising energy costs in the 1970s complicated market dynamics, there was a new focus on bulk shipments, profits versus sales, and large distribution centers and wholesale marketing, which reduced energy costs associated with distribution. This also led to the in-

creased mass production of packaging and the number of manufacturing sites decreased.

1.5 SUPPLY CHAINS OF THE 1980s

In the 1980s, packaging moved to center stage in the trade of goods. *Supply chains*, a new term, were analyzed for efficiencies and found lacking. Retailers and suppliers began to work together toward the common goal of getting products to the consumer faster. Getting products to the consumer faster meant getting packages to the manufacturer faster. Warehouses as interfaces between companies decreased, communication between companies was streamlined. Henry Ford's vertical integration concept was employed. Many organizations, instead of forging working relationships with suppliers and customers, simply purchased them—as happened extensively in the paper industry—forming vertically integrated packaging suppliers.

Henry Ford kept huge stockpiles of supplies at his Rouge River plant, but by the 1980s this approach no longer worked. The rigid philosophy of "the customer can have any color they want as long as it is black," had been replaced by the new aim of delivering, in a timely manner, exactly what the customer wanted. Stockpiles must be limited; and as warehouse stock disappeared, the focus began to shift from internal networks and internal processes to the external processes within the new supply chain.

This shift in focus drove the need to understand the business relevance of external supply chains. Oliver and Webber (1982) called for a new business model that applied to global situations, governments, and operations. Michael Porter's 1985 book, *Competitive Advantage: Creating and Sustaining Superior Performance*, explained the value of external organizational coordination. The Efficient Consumer Response (ECR) initiative brought consumers into the supply chain. Porter's model is discussed further in Chapter 2.

1.6 SUPPLY CHAINS OF THE 1990s

Since 1990, major trends have changed the supply chain into an integrated value chain. These trends are discussed in the context of their origin in the 1990s and their evolution to the value chain.

1.6.1 Global Sourcing and e-Sourcing

The 1990s brought new concepts of packaging supply chains to global

sourcing. While products had been extensively sourced globally, products were still shipped in bulk (unpackaged), back to the country which contracted for their foreign manufacture. In China, for example, the acceleration of reform by Deng Xiaoping with its concentration on specific industries such as corrugated in the 1990s and commodity PET and PE in the early 21st century increased the viability of packages being exported by China. Shipping of packaged goods instead of bulk increased from producing nations to consumer nations. In the 1990s, sourcing still lacked the advantage of immediate e-communication with global sources for package components. Since then, sourcing has evolved to the extent that countries are specializing in the manufacture of packaging materials and components. This is exemplified by the strategic investment of some billion dollars in the Chinese corrugated industry, which has resulted in China using imported (recycled) pulp to manufacture some of the best (and least expensive) corrugated. International investment in China's paper industry is increasing. Facilities have been opened in China by Indonesia-based Asia Pulp & Paper Co., UPM-Kymmene Co. (Finnish), Stora Enso (Finnish-Swedish), and International Paper Company (United States) (Zhuang *et al.*, 2008). Once e-sourcing became viable, location was no longer an issue. As long as the package component was delivered on time and within specifications, the purchase was made. Corrugated became a commodity.

1.6.2 Strategic Alliances

Strategic supplier alliances of the 1990s went beyond the package lot price. Packaging negotiations with suppliers began to involve research and development, and operations across functional teams. Discussions included research and development dollars, length of contracts, and technical and logistical operations. Weyerhauser employees, after a supplier relationship was defined, worked in house at the Kraft packaging research and development center to facilitate rapid response to the need for corrugated specifications and pallet patterns. At first, little beyond the tactical design of corrugated cartons was exchanged. When the relationship grew to encompass cost savings and source reduction, it was still nothing more than suppliers doing what was needed to retain business: the focus was on saving time, energy, and money for both companies.

In the mid-1990s, however, retailers and manufacturers began to work toward increasing sales. Plannograms—which show where in the store the product is located, including the specific shelves—were fine tuned by data analysis of consumer buying patterns based on demographics. In Chicago, Dominick's food stores excelled at adjusting plannograms based

on the numerous ethnic groups within their market. For manufacturers, the appeal of this was that their products would be displayed on shelves where consumers would be most likely to buy them. In the Dominick's chain of stores, large candy manufacturers such as Hershey, M&M, Mars, and Nestle competed for the best shelf space. Optimizing plannograms to sell the most product within the candy category, Dominick's addressed consumer preference neighborhood by neighborhood. Sharing this data with the candy manufacturers was the key to gaining buy in. We now call this type of openness "transparency." The realization that retailers could be partners in package development was increasing.

And, manufacturer and supplier relationships continue to evolve as well. Information is shared throughout the supply chain. Strategic alliances take the form of 3rd Party Logistics (3PL), Retailer-Supplier Partnerships (RSPs), Distributor Integration (DI) and its offspring, Outsourcing. 3PL, in which an outside company manages all logistics functions, allows companies to focus on their core strengths and requires sharing of more than mere information: ideas, brand image, and core value are all transferred to logistical companies. Growth in 3PLs increased almost 40% from 1999 to 2002 (Delaney R and Wilson R, 2003). RSPs are now considered the stays that hold businesses together. They operate using point of sale (POS) and predictive data to decrease out of stocks (OOS), and the now standard vendor managed inventories (VMIs). In a similar manner DI has led to reduced inventory costs and increasing customer satisfaction in the packaging industry.

Outsourcing of packaging functions arose out of partnerships of the mid-1990s and now takes the form of entire packaging purchasing, research and development, and operations being outsourced. Again, similarly to DI, it allows the company that outsources the ability to focus on the core business. As outsourcing increased, the supply chain has become longer, creating increased economies of scale, innovation (within each outsource), and decreased business risk. All of these factors optimized the supply chain using strategic alliances.

1.7 QUESTIONS ON THE PACKAGING VALUE CHAIN

1.7.1 Packaging Supply and Value Chain History in Comparative Societies

Consider and select from two of the following time periods/locations:

- Ancient Egypt, 3000–100 B.C.E.

- Golden Age of Rome, 100 B.C.E.–10 C.E.
- Kublai Khan, mid/late 1200s
- Aztec Empire, 1400–1500s

Compare and contrast suppliers in a specific vital industry. For the comparison:

1. Identify three areas of similarities in the supply chain and three areas of dissimilarities.
2. Explain how these civilizations leveraged the supply chain to derive growth and opportunity.
3. Identify three ways the supply chain could have been altered to achieve more growth and opportunities.

1.7.2 Response from P. Labejof, Senior Process Engineer, Eli Lilly

Pyramid building supply chain—a comparison between Ancient Egypt and the Aztec Empire. For most monument building, three of the main pillars of the supply chain are:

1. The raw materials—in this case the stones needed for the construction.
2. The man power—including type and quantity.
3. The customer.

There are similarities and dissimilarities in each of these areas:

1. *Raw Materials:* Although "stone" is the main raw material for each style of pyramid, a different stone is used (quarries in Egypt versus quarries in Mexico). It seems natural that due to the huge size of the stones being used, a local quarry would be used to provide the millions of stones needed. Although in modern days this would not necessarily be the case due to the available methods of transport, that didn't exist then—the raw material had to be local.
2. *Man Power:* The similarity in man power lies in the fact that building a pyramid was very labor intensive. A lot more people were needed to build the Egyptian pyramids than the Aztec. This is due to the Aztec pyramids being smaller, while between the two eras technology had at least 1500 to 2000 years of advancement. The manpower for the building of the Egyptian pyramids is thought to have been paid and somewhat voluntary, while the manpower to build the Aztec pyramids was not.

3. *The Customer:* The incentive for the manpower of Egyptian pyramids was the honor of building for the Pharaoh. The pyramid itself—the resting place for the Pharaoh—was a peaceful and sacred image. In contrast, the Aztec pyramid was a temple of the gods built in fear of the gods, and used as an altar for sacrifice.

In hindsight, the pyramid building industry in Egypt was bound to cease. Such a huge monument, built over decades by tens of thousands of laborers for one person stressed the supply chain.

There are three possible ways this industry could have flourished further:

1. Making smaller scale pyramids available to lesser mortals than the Pharaohs.
2. Building pyramids with a dedicated pool of skilled labor instead of unemployed field laborers.
3. Allowing visitation to the pyramids to encourage tourism.

Pyramid building in the Aztec world was also bound to cease. The way in which the temples were used did not inspire the Aztec laborer to work willingly.

There are three possible ways the Aztec pyramid building could have survived longer:

1. Limiting sacrifice to animals.
2. Offering positive incentives for people to build pyramids.
3. Fostering an environment of creative building instead of always duplicating structures.

The civilizations of the past had different ideas of utilitarian amenities than we do. Unless as art objects, the demand for pyramids is absent. Without demand, there is not much reason to supply.

1.8 CONCLUSION

The packaging value chain today and in the future is the topic for the remainder of this book. The value chain is intertwined with the social, economic, political, and technological state of societies throughout the globe. Special effort has been made to address the impact of these factors in various societies, industries, and cultures. Social issues, rapidly devel-

oping nations, environmental concerns, improving information transfer abilities, and manufacturing finesse, will continue to reshape the packaging value chain. New links within the chain will arise, enabling us to meet new packaging industry challenges. We continue to strive for the delivery of meaningful value to customers at every link of the value chain from raw materials to the post-consumer environment.

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CHAPTER 2

Value Chain Models

2.1 INTRODUCTION

The packaging value chain is not static. Models of the concept, still developing, have brought a major shift in thinking over the last ten years. The older idea of distinct supply and value chains has evolved into one where the two work side by side. This has created opportunities to fine tune each of them. Supply chain management is largely a logistical function. It addresses the transference of goods from the raw material state to the final consumer. In the value chain, however, the consumer determines the value; and industry strives to provide this value in a chain reaching back from the post consumer environment to raw packaging materials. With the growing impact of increasing population densities, rising energy costs, and rapidly developing economies that demand more access to goods, these chains have become circular, complementary instead of opposed.

This chapter presents the evolution of the value chain from the supply chain. It introduces the Porter model of the value chain, and offers a complementary model—a loop, instead of a linear, unidirectional chain.

2.2 THE VALUE CHAIN ORIGINATED WITH PACKAGING SUPPLY CHAIN CONCEPTS

The term supply chain management (SCM) arose out of work by Oliver (1982) (Hickman *et al.*, 2003), in which he addressed disparities between inventory and capacity. In the late 1990s (Sherer, 2005) the idea

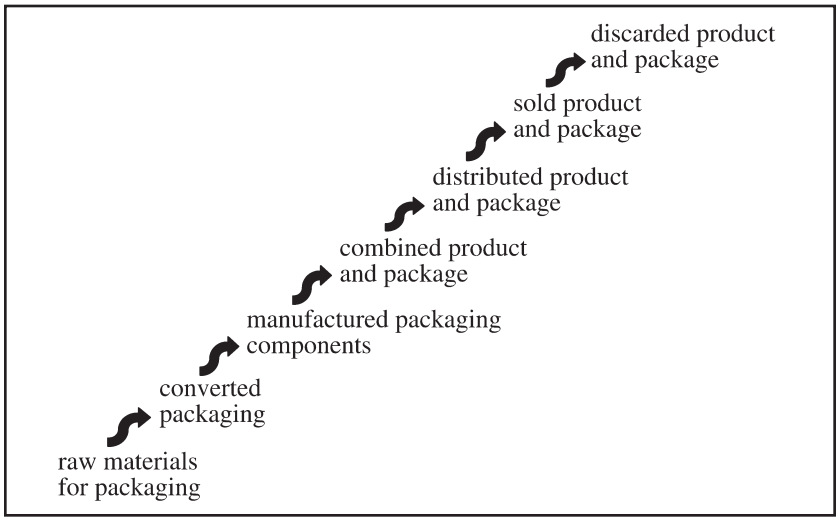

FIGURE 2.1 Packaging Supply Chain of the 1990s.

was refined by major retailers, who used point of sale information (POS) to enable continuous replenishment (Figure 2.1). The expectations of retailers then moved back up the supply chain. As the supply of packaging was linked to the demand for the final product, the packaging industry began coordinating logistics all along the way from raw materials to finished product. Raw material, such as fibers for making paperboard, were linked to consumer buying power—a powerful force. That force began to shape the way packaging materials compete against each other for consumer dollars.

Since the early 1990s, the concept of supply chain has been refined by communication technology. The business model of optimizing the transfer of goods from raw materials to final consumers still applies to SCM. But the early focus was on how to transfer goods in one state of completion to another state of completion within corporations. The next step was to optimize the processes by which businesses could connect to each other and deliver goods. The vast and deep communications network of the 21st century now allows for tracking—even by consumers—of goods in transit. SCM is "now commonly used internationally to encompass every effort involved in delivering a final product, from the supplier's supplier to the customer's customer." (Supply chain Council, 2009). As supply chains were fine tuned, the concept of what was actually being transferred arose. This was the concept of intrinsic value of goods.

Value arose from the realization that when sales of packaged products

increased, the sale of related raw packaging material did the same. And, the higher the value to consumers, the higher the sales of raw packaging materials. When a leading food manufacturer switched from a spiral wound multilayer paperboard based structure to a PET canister with a PP lid for grated Parmesan cheese, sales increased 15%. This translated to more sales for Sidel (France), the blow mold machine manufacturer that supplied machines to the plastic bottle manufacturer. The 15% increase in Parmesan cheese sales meant 15% more PET containers were needed by suppliers. So, retail sales were influenced by package value.

Suppliers of packaging to CPGs began to realize the value that their goods had to consumers. The supply chain demanded packaged products; but to deliver what was needed to meet increasing sales, the suppliers of raw packaging material needed the concept of value. The technical resources of raw material suppliers were huge. What was missing was the translation of value from the consumer down the supply chain so that raw materials could be fine tuned to meet consumer needs. For example, when the PP lid of the Parmesan cheese container did not open readily, the solution—a resin additive with more elasticity—took over 10 months to be developed. The process by which value—in this case the value of a container that opened easily—could be readily translated to the supplier's supplier did not exist.

A new model for growth helped move supply chain thinking into the realm of value and considerations of the value chain. The Greiner Model, first developed in 1972 (Greiner and Schein, 1988) and applied later, addressed the growth of organizations. It suggested that growth occurs first from within an organization and then moves on to "growth through collaboration," and "extra organizational solutions." Further, as is shown in Figure 2.2. in Phases 1 through 5, it argued that "growth through alliances" was actually vital.

In the 21st century, the role played by external organizations in enabling growth is unquestioned. New businesses are created by collaboration between multiple packaging technologies. In both economic and logistical terms, these new businesses often add value to the relationship. The successful 1998 BASF/Solvay joint venture to produce PVC and PVDC, is an example of a logistical transfer of a good—in this case excess hydrochloric acid (HCl)—to achieve economic gains (Solvay Press, 1998). Excess HCl from a BASF plant is recycled into the vinyl chloride monomer of PVC for use in the Solvay facility. This alliance enables low cost sourcing of the vinyl chloride monomer as well as addressing disposal issues associated with excess HCl. BASF/Solvay has created a number of joint ventures and mutually beneficial relationships based on logistical transfers.

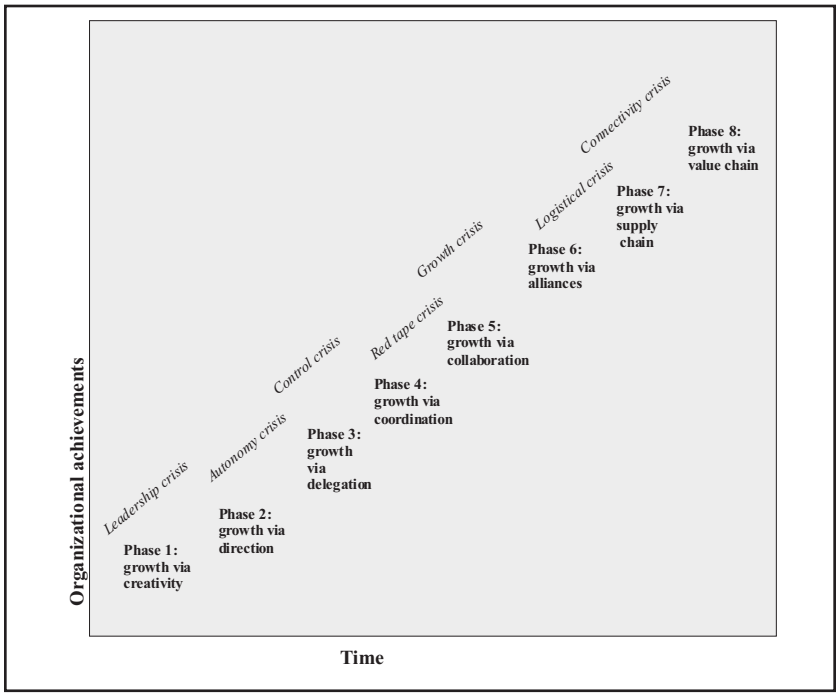

FIGURE 2.2 The Modified Greiner Curve (adapted from Greiner, L. and Schien, V., 1988, Garvin, 1998, and Cull *et al.*, 2000).

Through the BASF/Solvay joint venture and others, growth began to occur (as the Greiner model predicted), first through creativity and in the context of a supply chain. Ideas of potential joint ventures came to reality much faster as creative collaboration between companies increased. The concept of value in the relationship became relevant. In a Booz Allen assessment in 2003, the supply chain was found to be a "21 year old lacking in the ability to deliver beyond its current level unless it was broadened to include the assessment of value at every link."

This ability to assess value down the supply chain is, essentially, the value chain (Heckman *et al.*, 2003). SCM was being defined and refined as the handling of logistical issues with added value. Applied to the packaging industry, SCM enabled the transfer of materials to increase growth. In Figure 2.2, Phase 6 and Phase 7, which relate to the Crisis of Logistics and the Crisis of Connectivity, were added to Greiner's model. The concept of the value chain (Porter, 1985) was introduced to enable supply chain successes to incorporate value.

2.3 PORTER'S MODEL AND THE VALUE CHAIN

The idea of the value chain arose from Porters seminal work, *Competitive Advantage, Creating and Sustaining Superior Performance,* published in 1985. The Porter Model is shown in Figure 2.3. It is important to note that Porter's nine value-adding activities were all contained within a single company. Linkages between companies created what Porter called a "value system," which later evolved into the value chain.

The nine linkages shown in Figure 2.3 are:

Primary activities:

1. *Inbound logistics:* materials handling, warehousing, inventory control, transportation;
2. *Operations:* machine operating, assembly, packaging, testing and maintenance;
3. *Outbound logistics:* order processing, warehousing, transportation and distribution;
4. *Marketing and sales:* advertising, promotion, selling, pricing, channel management;
5. *Service:* installation, servicing, spare part management; and support activities;

Support activities:

1. *Firm infrastructure:* general management, planning, finance, legal, investor relations;

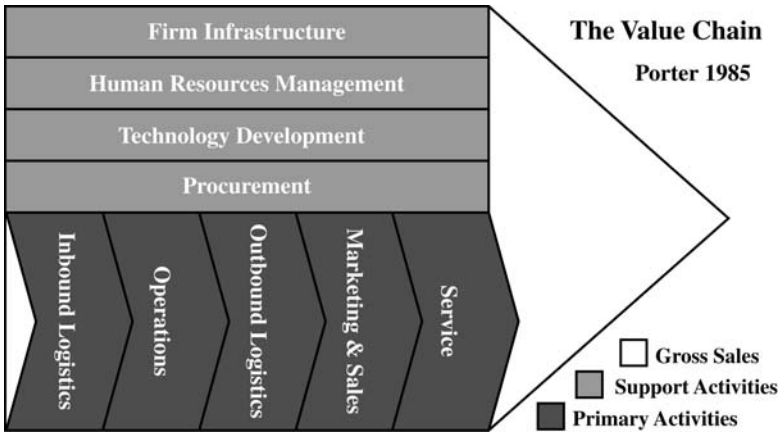

FIGURE 2.3 Packaging Value Chain (from Porter, 1985).

2. *Human resource management:* recruitment, education, promotion, reward systems;
3. *Technology development:* research & development, IT, product and process development;
4. *Procurement:* purchasing raw materials, lease properties, supplier contract negotiations.

Because Porter's Model was quantitative his analysis proved cumbersome when applied to packaging, where an extensive supply chain meant that operations within one manufacturer were connected to other operations within multiple suppliers of packaging components. Instead, a more conceptual vision, that could assess strengths and weaknesses (as Porter intended), was implemented to form the packaging value chain. As it evolved, Porter's model guided the packaging industry as it worked to ensure that the consumer value in packaging was translated down through to raw packaging materials.

2.4 BEYOND PORTER AND UNDERSTANDING THE CONCEPT OF VALUE IN PACKAGING

The focus on value chain management in packaging grew steadily. SCM concepts led to refinement and increased operational efficiencies that enabled the value chain. Today, there is a competitive advantage in delivering value, not just product, to the customer. When we consider packaging and value, value has four inherent properties:

1. Value has a context.
2. Value is experiential.
3. Value has a subjective nature.
4. Value occurs when needs are met.

2.4.1 Value Has a Context

In packaging, value has a context and the context changes for various reasons. For example, the value of more sustainable packaging materials has changed. Prior to the surge of interest in sustainability, interest in sustainable materials was quite low. In Europe in the late 1990s, the use of innovative biopolymers was fostered by extensive interest due to Green Dot and other incentive-based systems being adopted throughout the European Union. Interest lagged, however, in the United States, because in-

centives for using new polymers were not in place. Instead, regulations such as those in California in the early 1990s, encouraged source reduction. In the United States polymers had more value if they resulted in the use of fewer materials since this corresponded to source reduction strategies. This led to lighter weight containers and the merger of secondary and tertiary packaging to reduce the overall weight of packaging materials. The value of biopolymers in the United States was thus much less than in the European Union.

In the early 21st century, emerging REACH initiatives, EN standards, growing international environmental legislation, and concepts such as the Wal-Mart Scorecard (from the largest retailer in the global value chain), brought changes in value by encouraging shifts from one material to another. As this Scorecard concept expands globally, more emphasis on material switches are expected—and the context of value in packaging materials will evolve. Already in the United States of the early 21st century, innovative biopolymer based packaging materials have more value than they did in the late 1990s. In the EU, materials that generate the least GHG have the highest value.

2.4.2 Value Is Experiential

The experience of working with a packaging supplier's salespeople is enhanced when the salespeople understand the interests of the packaging professional making purchasing decisions. In this relationship, prices are discussed and agreed upon, and the essential value of the relationship is defined. The value experienced can be either negative or positive.

Small manufacturers such as Farmaesthetics (Portsmouth, Rhode Island) have taken the initiative to pursue positive relationships. As a small company, they can ill afford a poor relationship with a supplier. When Farmaesthetics was a start-up company, many suppliers lacked interest in the small volumes it produced. The forging of an alliance, as suggested by Greiner's model, was necessary to supply the packaging for Farmaesthetics to grow. Farmaesthetics strategically looked up the chain (to retailers), and down the chain (to suppliers), searching for companies with the same growth objectives and values (loyalty, in this case) as their own company. Farmaesthetics, JL Clark (Wetherfield, NJ), and Origins (New York, NY) have all grown by joining in an alliance of shared values. Farmaesthetics has remained loyal to its suppliers for packaging components including enamel tins initially developed by JL Clark (Redding, 2007). After a partnership with the retail sector natural category Origins in 2006, both companies have grown. Without the initial relationships with suppliers such as JL Clark (whom Farmaesthetics says it

"adores"), Farmaesthetics would not be in the marketplace. The value experienced in the relationship was very positive. It can also be negative.

Negative relationships within the value chain also demonstrate that value is experienced. For example, in the 1990s, large CPGs and their packaging suppliers initiated strategic alliances involving long term contracts (3–5 years) for all their manufacturing facilities. Because large volumes were at stake, the contracts were extremely competitive—large sales for the suppliers were guaranteed when a contract was signed. Indeed, it became clear that if a contract was "won," the majority of the supplier's production would be devoted to a single CPG, leaving little excess capacity to serve other clients or compete in other industries. And the business, of course, would be guaranteed for 3–5 years. But these contracts were so eagerly sought by major packaging component suppliers that battles between them drove prices steadily down. CPGs rejoiced as each competitive bid drove packaging costs lower and lower. In the end, most contracts were awarded to the lowest bidder.

As time passed, it became clear that suppliers could not remain profitable when charging such low prices. Furthermore, their relationships with other clients grew impossible due to their concentration on one customer. The suppliers found that the whole structure of their sales force, which needed to interface with customers, became superfluous for the 3–5 year term of the contract. At the same time, the low bid that won the contract made profits unattainable. Suppliers backed out of contracts. Other suppliers were needed on short notice. But these suppliers, who lost the contract initially, were logistically ill prepared to handle the larger volumes. The result was negative value being generated. The value was all in price, but the price was not fair. Such alliances cannot succeed unless both businesses make a profit.

In a specific example of this negative value, one large CPG solicited long term contracts for purchasing corrugated board, a price war ensued and the lowest price supplier was awarded the contract. Within a year, the supplier realized that it was unable to sell corrugated at the agreed price and remain in business. They requested a price increase. This request was refused and the relationship deteriorated resulting in the supplier's refusal to supply any of the large CPG's facilities with corrugated. Alternate corrugated suppliers were sought. The desire to help a CPG that had driven the price down below the level economically possible for a supplier to survive was not there. The alternate suppliers could not meet the demand for corrugated since they had closed production facilities after not having any of the CPG's business.

As a result, the CPG's production was impaired and packaged product was not delivered to retailers on time. A major out of stock situation re-

sulted in sales targets not being met and consumer dissatisfaction. Further, other suppliers who had been in the price war were leery of entering into a relationship with the CPG who clearly saw that the only value in the relationship was price. The relationship between suppliers and the CPG experienced little value. The value of price being paramount was an edict from the CPG and not agreed upon, by the suppliers

From a value chain perspective, an alternative way to reduce costs of corrugated is by the CPG working with the pulp supplier, corrugated supplier, distributor, and retailer to address what can be done to lower the costs of corrugated materials. Solutions such as distribution center rack redesigns, retail case opening features, and modified pulps communicate value in the relationship.

2.4.3 Subjective Nature of Value in Packaging

In the above example, the CPG assessed the value of corrugated solely on price. After this negative experience, a shift in thought led to a partnership approach. Timing, R&D dollars, teamwork, innovation, managerial and technical relationships, and logistics coordination, that had little value to the CPG before, now had value. All the elements of Porter's model became suddenly relevant.

The value of each relationship was assessed. Decisions were made based on the degree of comfort and confidence in the relationship. These were subjective, based on trust. For example, a young packaging professional in this CPG was more likely to forge a relationship with an established company versus an emerging company, because the rookie professional sought a high degree of comfort. Risks in relationships were to be minimized. This is similar to the cliché, "no one was ever fired for buying IBM computers," which attested to the high degree of trust that computer purchasers had in IBM. The value of a working with trusted suppliers was high.

As counterfeit packaging, driven by a lagging economy, continues to grow in the first decade of the 21st century, trusted suppliers with track records of building solid relationships are doing well. This trust can be formalized with contracts, but it is mainly an informal relationship with shared values.

2.4.4 Value Is When Needs Are Met

In the value chain, needs start with the consumer and work their way down to raw materials. For example, when a new rice product was introduced in 1998, retailers refused it, objecting that the contents of a case

did not fit on the shelf at one time. The plan was for the retailer to put four boxes on the shelf and store the other two in a crowded back room of the store. But those two boxes of rice could get lost easily, and partial cases were difficult to track and store. Worse, they often got damaged and became unsaleable.

Consumer data demonstrating that consumers wanted to buy the product was available. To the retailer, however, the package (and thus the product) had no value. All the needs in the value chain were not yet met. After the case was altered and its contents reduced, so that all its cartons of rice fit on the shelf at the same time, the retailer accepted the package and the product. Meeting the needs of the retailer created value.

Relationships throughout the supply chain are defined by these four inherent properties of value. In Kay's *Foundations of Corporate Success* (1995), the concept of "distinctive capabilities" arose. With Kay the concept of relationships as competitive advantage emerged. BASF is an excellent example of a company that has built strong relationships within the packaging value chain. At the other end of the value chain, CPGs have forged valuable retailer relationships that incorporate Point of Purchase displays, end cap displays, and bundling promotions, which all require packaging changes. CPGs have done this because of the competitive advantage enhanced placement provides. Greater value has been achieved due to logistics and effective SCM. The value chain can not meet needs if the supply chain is not in place.

2.5 THE INTERCONNECTED VALUE CHAIN MODEL

In 1998, the Global Supply Chain Forum (GSCF) defined supply chain management as:

> the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders. (Lambert, 1998)

This meant that the goods transferred by the supply chain carried a value defined by members of the value chain. The supply chain defines the flow of goods, from raw materials to the finished package in the hands of a consumer. On the other hand, since value is judged and derived from the consumer (or post consumer), the value chain begins with the consumer and flows the opposite way, down the supply chain to the raw materials from which a package is manufactured. The difference between supply chain and value chain is the direction of the flow. The sup-

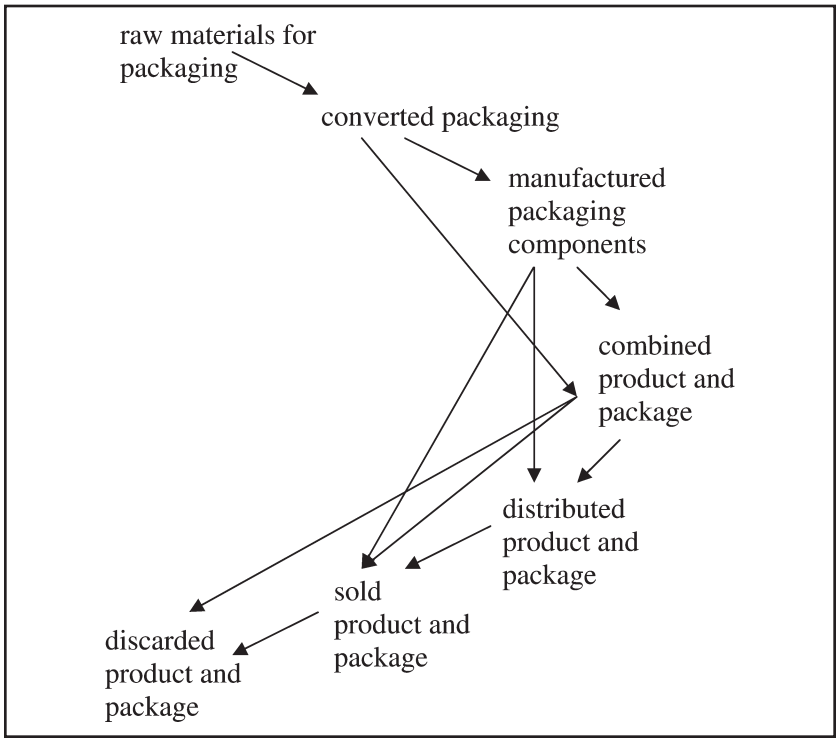

FIGURE 2.4 Interconnected Value Chain Source (adapted from Fisher, 2008).

ply chain works to improve efficiencies, while the value chain emphasizes the addition of value to the package.

Both are needed. In fact, the concept of value encompasses even the movement of goods, in the sense that raw material suppliers, converters, manufacturers, retailers, consumers, and the post consumer package environment, are all partners in creating value. Value is conveyed through the supply chain. This integrated, non-linear value chain, where logistical functions and value functions coexist is shown in Figure 2.4.

The interconnected value chain model, applied to the packaging industry, shows the connection to the consumer and the need for companies further down the chain to ensure that the package being created has value.

2.6 THE VALUE CHAIN CIRCULAR MODEL

The value chain continues to evolve in the 21st century. In the value

chain circular concept, the value of packaging materials is determined by the post consumer environment, and the value of the post consumer package is connected to its value as a raw material. Packaging materials are increasingly designed to be more readily recyclable or reusable by various converters throughout the supply chain. This is done so that the post-consumer package has more value to raw material suppliers. Supply chain processes to recognize, transport, and logistically handle post-consumer packaging have been essential in realizing the value of the post-consumer package. Thus the linear chain presented at the start of this chapter (Figure 2.1) grew first into an interconnected semicircle and then into an interconnected circle. This circular chain is shown in Figure 2.5.

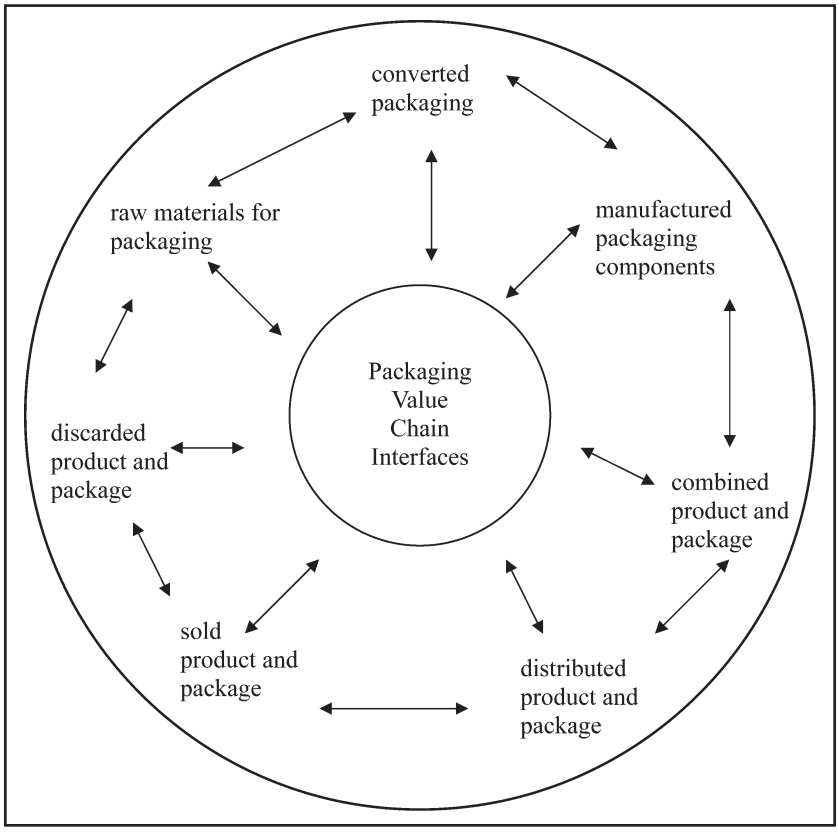

FIGURE 2.5 Circular Packaging Value Chain.

2.7 CONCLUSION

The evolution of supply chain management has enabled the packaging industry to address value. The value chain concept of Porter (1982) is still with us today. The value chain circular model of the early 21st century holds promise of delivering on initiatives relevant to both raw material suppliers and the consumer. By following this model, industry can achieve increased sustainability, decreased counterfeiting, heightened innovation, and greater agility.

The next chapters address the value chain that connects raw material suppliers to the post-consumer environment.

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CHAPTER 3

Enabling the Value Chain with Improved Relationships

3.1 INTRODUCTION

The root of the value chain is the relationship between supplier and customer. Such relationships have, of course, always been important. What is different now is that competitive pressures, economic and global, have grown so strong that a structure is needed to hold relationships together. That structure is the value chain. Decreases in volume, sales, and profit, often leading to bankruptcy, have led corporations to explore new strategies. In some cases, the threat of insolvency has been used to "justify" unsound business practices. Now, more than ever, the packaging value chain is needed to strengthen businesses by providing structures for strong relationships.

External relationships are paramount in creating a sound packaging value chain. The companies discussed in this chapter have developed packaging value chains strong enough to survive a competitive threat. This chapter addresses strategies to increase the value in relationships so that these relationships can serve as a competitive advantage.

3.2 STRATEGIES FOR ENABLING RELATIONSHIPS WITHIN PACKAGING VALUE CHAINS

When we consider the circular packaging value chain model from Chapter Two, we see that many relationships with direct, linear linkages, are possible. Other relationships, across the value chain, can also be fostered. Since value in the chain is derived from the consumer, packaging

suppliers (at the other "side" of the value chain) see benefit in a relationship with the consumer. In doing this, packaging suppliers are able to incorporate consumer value more readily into the packaging components they provide. A relationship is judged based on the value it has to the organization's competitiveness, and it must be continually enhanced. To explain these strategies aimed at increasing value in relationships we will focus on four principles and provide examples. The four principles are:

1. Inspire relationships from the top.
2. Manage knowledge.
3. Share work, and aim at joint value.
4. Keep adjusting to reward significance in relationships.

3.2.1 Inspire Relationships from the Top

While the actual function of a CEO varies from one industry to another, each CEO projects a certain company image. This image is directly related to the company's effectiveness in external relationships. Inspiration from above provides solid direction for employees. This has been addressed extensively in the context of gaining a competitive advantage (Huber *et al.*, 2001). It concretely projects what is expected from employees in their work with customers and suppliers, and with other companies in the value chain.

The former CEO of British Petroleum (BP), Sir John Browne, is an example of a leader who inspired from above. As one of Time Magazine's 2001 Top 25 Global Influentials, he led the traditional British Petroleum Company, a raw material and energy link within the packaging value chain, in many valued relationships. BP now embodies the concept of "beyond petroleum"—a transformation from oil company to energy company. Alliances with the World Resources Institute, the Nature Conservancy, and the Battelle Research Institute have inspired employees at every level of the organization to seek energy-responsible relationships with suppliers, manufacturers, and environmental groups. Brown's legacy continues: BP is now the world's largest photovoltaic manufacturer and the world's number three oil company.

Speaking at the Alternative Energy, at the World Future Energy Summit (Cox, 2009), Vivienne Cox, CEO of BP, restated BP's commitment to alternative energy and outlined new initiatives. Cox explained that BP's values extend to external relationships that include mutual advantage, social impact, human rights, transparency, and government relations and influence (BP, 2008).

This top down inspiration has encouraged members of the packaging value chain to enlist BP as a raw materials supplier and technology link. Such inspiration becomes increasingly important as companies seek partners within the value chain who share their own core values.

A case in point is the decision by BP in 2001 to consolidate research efforts at a facility that was 100% owned by one of their suppliers, Solvay. The facility in Neder-over-Heembeck is just outside Brussels. Solvay's vision (Solvay, 2008) of ethical behavior, respect for people, customer care, empowerment, and teamwork, aligned well with BP's values. The relationship continues to evolve. Solvay sold its stake in the HDPE and PP markets, and acquired BP's specialty polymers business. The Solvay–BP relationship, established at the CEO level, led their respective employees to understand what is valued.

3.2.2 Manage Knowledge

The ability to transfer and manage knowledge is becoming paramount in managing relationships. When knowledge is not transferred and managed well, the relationship suffers. When it is managed in the value chain context, knowledge has structure and purpose. While SCM has refined data and information logistics in external relationships, it does not address knowledge. Knowing the value of any information transferred is vital to understanding why it is important and how it can be used (Wu, 2008).

The recent out-of-stock situation that many companies faced as the economy sank into the 2009 recession, vividly demonstrated how important management of knowledge can be. In February 2009, P&G announced its highest number of out-of-stocks (OOS) in 2 years. P&G has long been known as a company that has a fine tuned supply chain. Various technologies such as Retail Solutions (formerly known as T3Ci) have been used with much success starting in the early 2000s. OOS were reduced from 16.3 % in 2003 to 7.6% in 2004 (Greenberg, 2006). By 2009, P&G had one of the lowest out of stock ratings and was number four in the AMR Research Consumer Products Supply Chain Top 25 in 2008.

The out-of-stock situation that occurred during the financial crisis of 2008–2009 was caused by three major disruptions the supply chain:

1. Consumer buying patterns changed. They bought less, bought at different retailers, and bought different products. This in turn meant different packages were required.
2. Packaging suppliers and retailers within the supply chain had re-

duced inventory levels toward a "just in time" (JIT) approach. So, the packaging inventory of the products now being purchased were minimal.

3. The end of the fiscal year prompted many retailers to reduce their inventories. This meant the supply chain could not accommodate a huge shift in buying patterns.

The supply chain excelled at transferring data, but not the crucial knowledge of what might happen at the retail level. Knowledge management reaches beyond the technology of data transfer (the cornerstone of the supply chain) into the realm of human interface. It relies on and builds relationships. P&Gs suppliers and customers were suitably linked in the supply chain, but a timely use of the value chain to link the knowledge of all parties could have solved the OOS problem more readily.

In De Long and Heydays work based on cultural issues in knowledge transfers, three types of classifications were defined (De Long & Fahey, 2000). All relate to the P&G situation.

1. *Human knowledge*—largely experiential, relevant to knowledge management. We have seen this in the packaging industry as seasoned packaging professionals solve problems much faster than packaging professionals with less experience.
2. *Structured knowledge*—rooted in an organization's systems, processes, rules, and routines. It is usually explicit knowledge
3. *Social knowledge*—essentially, more tacit knowledge, that arises out of relationships. It is the cornerstone of knowledge management from one organization to another. Social knowledge overlaid on supply chain data enables knowledge (not just data) to transfer. For example, Dell's high degree of customer satisfaction and transparency in making forecasts, goes beyond transfer of computer data and allows their packaging suppliers to see across the whole value chain. The key components are known and understood by all members of the value chain.

Using the value chain, P&G is fostering communication and gaining tacit knowledge on how out of stocks can be reduced now and in the long term. Of these, social (tacit) knowledge has most relevance to building relationships within the packaging value chain—a concept first developed by Polanyi (1966). He emphasized that tacit knowledge is best transferred by shared work. Translated to our packaging value chain, this means creating a structure in which experts work together from different areas of the value chain.

3.2.3 Share Work and Create Things of Joint Value

Shared work, often in the form of a task force, promotes common goals. In packaging, within organizations, we have shared work to redirect effort using a model known as the "New Deal" (Doz and Kosenen, 2007), which defines the success of the internal value chain. For example, at Cisco, the Head of Operations—in charge of all cross-functional processes, such as logistics and sourcing—engages all operations, from sourcing package components to the shipment of finished packaged goods, to foster the mutual dependence of each function within the organization. The same concept can be applied to the packaging value chain external to organizations. In that chain, a task force involving multiple companies (packaging supplier, manufacturer, and customer) would be formed. The task force initiates various strategies to create a flow of tacit knowledge, and focuses that knowledge so that information overload does not occur.

This concept of shared work has helped a small medical device company supplying burn medication increase on-time delivery of their packaging supplies. Late delivery of supplies resulted in late delivery of product. Such delays can be life threatening to burn patients in need of that product. Product needs varied in volume and frequency and product was time sensitive. The tacit knowledge of experts working together toward one goal enabled the packaging suppliers to understand the ramifications of delayed supplies and to undertake a joint mission of getting packaging supplies to the medical device company on time. This task-oriented shared work moved the relationship forward. The joint team promoted three principles for even more shared work.

- Purchase of an on site, small volume cutting table that would be run by the folding carton company at the medical suppliers facility to produce small quantities of urgently needed packages.
- A web-based blog established by both the supplier and the medical device company to promote communication early in the design process.
- Development of "priority based distribution" (PBD) in which the packaging supplies most needed would be made and shipped first from this supplier and further on down the value chain to the raw material providers.

The relationship arising from this shared task force has created strong bonds between the packaging supplier, manufacturer, and customer, and led directly to another shared work effort—how to handle all the post

consumer use packaging. The new task force is exploring efforts in this area. Communication within task forces, and a management style that embraces mutual dependency with external organizations leads to a more agile value chain and a competitive advantage.

3.2.4 Rewarding Significance in Relationships

A reward system based on interdependency can strengthen the existing bonds in a value chain and create new ones. In the hard financial marketplace of 2008–2009, the packaging industry experienced a painful awakening to the idea that organizations are interdependent in economic terms. As a result of the global recession, a folding carton supplier selling cartons for a high end P&G product lacked business, while a folding carton supplier for a low end P&G product was struggling to meet demand. The effects of interdependency became staggering.

When interdependency is assumed, structural walls between companies become transparent and both companies benefit. The system of re-

TABLE 3.1 Traditional Versus Packaging Value Chain Oriented Rewards.

Goal	Traditional Reward	Value Chain Reward Examples
Increased sales	Bonus for top seller	Maintain bonus structure for sales force. Customers get discounts on future purchases.
Reduced Out of Stocks	No reward	Task force members receive paid vacation day. Supplier's employees receive company coupons. Distributor's employees receive company coupons.
Reduced out of specification packaging components	No reward	Task force members receive family dinner at local restaurant. Family health club memberships to 10 key employees identified by the task force.
Conversion to 100% recycled content paperboard	No reward	Task force members plant trees equal to amount saved in a given period on supplier, distributor, and company grounds.

wards alters as well. In the packaging value chain rewards should be inclusive and involve all members of the successful task force, from the business perspective to the human perspective. In the task force example discussed above, task force members from the manufacturer, supplier and retailer all received rewards, as did the loading dock workers. Rewards demonstrate the importance of a function. They can be linked to pay checks in a structure similar to bonuses. Examples of rewards given to employees within the value chain are shown in Table 3.1. In companies with strong packaging value chains, rewards are agile, adjusting to different types of achievement.

3.3 QUESTIONS ON PACKAGING VALUE CHAIN

3.3.1 NutriSystem and Ford Relationships, and Their Relationships with Suppliers

Nutrisystem seeks to maintain customer value through two value chain relationships (with their dealer/agents and with their suppliers). Using insights from Chapters 1–3 and packaging value chain concepts:

1. Identify two critical relationship-building endeavors that Nutrisystem has fine tuned to reach a competitive advantage in their market.
2. Discuss two specific opportunities for Nutrisystem to add value with packaging to continue to retain their competitive edge.
3. Discuss how these can be used to forge relationships between specific internal and external packaging related customers.

3.3.2 Response from R. A. Batton, CPP, Packaging Manager, JohnsonDiversey, Inc.

In 2007 NutriSystem was named as the fastest growing company in the U.S. by Fortune magazine. In order to support such a claim, NutriSystem needed to develop a competitive value chain that optimized their extended network of suppliers, dealers and agents. One of the ways in which they did this was to build critical relationships within their value chain. This discussion looks at two examples of these relationships. Additional opportunities are identified in which NutriSystem can utilize packaging concepts to further gain competitive advantage. These opportunities are in turn linked to other internal and external customer relation-

ship opportunities that come full circle to strengthen NutriSystem's value chain.

In December of 2004, NutriSystem, acquiring Slim and Tone, became the first in their industry to incorporate physical exercise components in their weight loss program (NutriSystem, 2004). This highly strategic move added value to NutriSystem's product portfolio in several key ways. By adding the exercise component to their existing diet program, they linked two complementary products to increase the sales of each, and to create a dependency between their products. The complementary nature of Slim and Tone's exercise product additionally increased the effectiveness of NutriSystem's diet program, enhancing not only its appeal but its credibility. Slim and Tone also brought an existing distribution network to the table, creating a new product supply channel and sales touch point with customers by directly selling NutriSystem products at Slim and Tone locations. It additionally created an opportunity for NutriSystem to expand its growth rate and potential internationally (NutriSystem, 2006) .

Another partnership that benefitted NutriSystem is its relationship with QVC. The two companies signed an exclusive agreement in 2001 that gave QVC the right to promote NutriSystem's weight loss programs in the U.S. through television programs (Nutrisystem, 2001). To remain competitive, NutriSystem offers QVC customers pricing similar to the prices posted on its website for direct internet sales. This results, of course, in a lower gross margin on products sold through QVC, but in spite of this there are two key advantages gained through the partnership. The first is that QVC sales require no additional expense for sales and marketing, relying instead on QVCs existing sales and marketing model (US SEC). This is important because ordinarily NutriSystem incurs significant expense in marketing and advertising—up to one-fifth of revenue (Forbes, 2006). The second advantage this partnership delivers is the additional product recognition NutriSystem enjoys through QVC's well established company name and infomercial programs.

NutriSystem introduced a frozen food line late in 2008. This creates an opportunity for NutriSystem to develop a relationship with one or more suppliers of temperature controlled packaging materials. In order to be shipped directly to customers, frozen foods from NutriSystem will need to be maintained below temperature thresholds to prevent product spoilage and loss. There are many viable packaging solutions. Investments in relationships with distributors or the makers of products such as Ice-Brix cold packs could result in lower packaging costs and potential innovations for a vital component of NutrSystem's new frozen foods campaign. Ice-Brix are a type of state-changing gel pack that uses the energy re-

quired to effect a state change to maintain a near-constant temperature inside a package. If NutriSystem wants to continue direct mailings of its products it will need some form of temperature controlled packaging. A supply of different varieties and options of this type of packaging will be important.

Another excellent packaging opportunity is to address healthy cooking via the package. Again there are many package solutions. One is the Easysteam concept from Rockwell Solutions (Bad News, 2008). It replaces the top web of boil-in-the-bag packaging to create a package that can be either boiled or steamed. Steaming, which helps preserve food color, texture, flavor and vitamins, is preferred as a food preparation method over boiling. Packaging that allows NutriSystem's products to be steamed thus provides additional convenience, food preparation options, and a healthier, tastier, and more appealing product. This directly adds value to NutriSystem's products and is another way to achieve competitive advantage and product differentiation through packaging.

The above two packaging solution examples offer opportunity for partnership between NutriSystem and the suppliers and developers of these types of package components. As mentioned above, NutriSystem will need temperature controlled packaging for its frozen foods product line. It can pursue the selection of strategic sourcing partners in cold pack technology both domestically and internationally. This will result in more favorable negotiated pricing and a higher quality of temperature controlled packaging. This is important because NutriSystem could lose valuable customers through improper packaging of its frozen foods during shipment. Product spoilage and waste could become an expensive issue.

The boil-in-bag steamer packaging solution could offer a crucial competitive advantage for NutriSystem over its competitors. Entering with one or more suppliers into joint development of a new technology that allows steaming of foods in microwaves, could be a win-win for both by leading not only to a better product with increased sales and margin, but also to intellectual property that can be patent-protected to generate a long-term competitive advantage. Pairing the production and technology development capability of a packaging supplier with the sales potential of NutriSystem's product line adds value to both companies.

Finally, NutriSystem might want to develop a relationship with a supplier of environmentally friendly packaging, or packaging that uses post-consumer recycled materials. This could add additional product appeal to customers who are concerned about the amount of plastics and other raw material waste in NutriSystem's products, and thereby gain an advantage over competitors that use packaging made of virgin materials.

This could also create customer loyalty to NutriSystem without adding significant overhead production cost, or even while remaining cost-neutral versus virgin material supplies.

Whatever options NutriSystem chooses for packaging solutions in the long run, it will be a good business strategy to choose key sourcing partners in order to achieve the best negotiated price and to realize the highest potential for packaging quality and innovations. In a market with volatile consumer demands and tight competition, NutriSystem needs to find value and differentiation in every way that they can. Packaging, and relationships with packaging suppliers, are a significant part of the total system performance equation.

3.3.3 Response from J. R. Haas, Manager, Global Packaging & Graphic Design Bausch & Lomb

NutriSystem has had its ups and downs over the years but implementing the right business strategy and building the right relationships within the value chain have been fundamental to their resurrection in the marketplace. Lessons learned in the renewal of Nutrisystem will provide the necessary foundation to build a successful aftermarket parts business for the Ford Motor company. Two distinctly different businesses will share similar value chains.

When Michael Hagan took over Nutrisystem he made several mistakes before he focused on the two areas in the value chain that would contribute the most to its success. Those two areas were product development and the consumer. Basically, he needed a better product and he needed the consumer to not only discover his improved product, but to see a reason to buy it. He succeeded with the consumer challenge by re-energizing the whole marketing strategy.

In the past, the diet plan introduced by NutriSystem consisted of fad diet regimens that didn't taste very good and involved harmful drugs such as fen-phen (ephedra). To improve the quality of the food he rehired the original microbiologist (nutritionist), Jay Satz, to reinvent the product line with the aim of improving the taste and persuading the consumer that weight would really be lost if the regimen was followed. He developed relationships with established food companies, such as Hormel, to improve the taste of the food (Benner, 2008). To stimulate growth, NutriSystem introduced a frozen-food line that would give customers an alternative to the original pre-packaged product (Brenner, 2008).

The largest endeavor that NutriSystem undertook was to re-introduce the new product to the consumer. They began by changing the whole

marketing strategy, starting with the replacement of their ad agency. It began with focusing on the "fundamentals of direct-response marketing" (Whelen, 2006). They used visuals of NutriSystem dieters in before-and-after photos to show how well the product worked. By adding details of the meals and the meal-plan directly to the ads they were able to show a correlation to the product and the results. They used test results to strengthen their claims which in return boosted sales by 5% (Young *et al.*, 2003). To take it a step further and really grab the attention of the consumer to grow the customer base (men), they introduced dieters that other consumers could relate to—celebrities.

As Ford ventures into the aftermarket industry there are two areas that they should focus their attention on in order to insure success. Given the size of their customer base and their ability to expand nationally and globally at a fairly rapid pace, it is critical that they develop relationships within the information technology sector—more specifically, with software companies. Also, because of technology advancements in the automotive industry, it is evident that the number of "do-it-yourselfers" and independent installers will start to decrease due to the cost of associated tools, training, and skills required to perform repairs (Brenner, 2008).

The use of integrated software systems is essential, especially in terms of inventory tracking and control. The ability to view inventory levels across locations will allow Ford to better balance their inventory, reduce scrap and overages, and improve their planning and forecasting process. The visibility of inventory also creates opportunities to develop new types of relationships and partnerships with suppliers. Integrated software systems provide the ability to incorporate a vendor managed inventory (VMI) system. Either the supplier produces and maintains the inventory and the OEM (Ford) orders production of a certain part based on inventory levels at the supplier, or a supplier will automatically produce components based on a forecast established by Ford.

As mentioned earlier, building relationships with dealers will become increasingly important to the growth of the aftermarket parts business. One of the reasons Ford is venturing into this area is because automobiles have not only become less profitable, but more reliable. More reliable means fewer new car sales. Because cars are more complex they also require greater education and skill to repair. This leaves the consumer and small auto-repair garages at a disadvantage. If fewer do-it-yourselfers and independent repair shops are able to work on cars, there will be a less need for aftermarket stores—such as Pep Boys—to provide parts. It makes sense to consolidate both operations at the dealer level where they have the resources to perform the service.

From a packaging point of view, Ford will have the ability to utilize

their suppliers, especially in a situation incorporating VMI, to package and distribute the parts directly to dealers and other aftermarket suppliers. In the past, parts were manufactured for Ford and then distributed by Ford to their dealers. Buying a "dealer" part was typically more expensive than an aftermarket part and was usually avoided whenever possible. With these new relationships Ford will be able to reduce costs by eliminating steps in the supply chain (distribution via Ford).

One way that NutriSystem can build on the relationship with their food suppliers is from a marketing standpoint. They could create a product line especially for the supplier, such as Hormel Foods, or a private-label branded line that combines the success of the diet plan with the quality reputation of a well-known food manufacturer. There would be no need for new packaging designs or retooling of the production lines. New graphics and a marketing plan that builds on the established strategy set forth by NutriSystem would enable the opportunity.

Instead of using similar companies or industries as a model for launching new business ventures, it may make more sense to compare value chains and identify how each member in the value chain relates to the other. Comparing diet systems and food preparation with aftermarket parts distribution would make it very difficult to draw conclusions; but looking into the relationships within the supply chain will provide better insight into developing a strategy for success.

3.4 CONCLUSION

This chapter addressed strategies to foster relationships in our increasingly interdependent packaging arena. Even prior to the recent global financial crisis, the packaging community developed strategies to be competitive. Now we employ strategies to strengthen our value chains. Solid external relationships with packaging value chain partners are essential. The next chapters explore how these relationships within the packaging value chain can be used.

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CHAPTER 4

Economic Effectiveness of the Packaging Value Chain

4.1 INTRODUCTION

In the recent document Future Value Chain 2018 (Global Commerce Initiative *et al.*, 2009), the term VUCA—Volatile, Uncertain, Complex and Ambiguous—was used to describe the economic environment. While this concept offers little reassurance for the future, it does suggest competitive opportunities for packaging value chains that continue to be refined to avoid stagnation.

This chapter explores five trends that will impact the packaging value chain and considers questions of growing revenue, reducing costs, and increasing efficiency.

4.2 FIVE TRENDS THAT SHAPE PACKAGING VALUE CHAIN DYNAMICS

While many trends impact the packaging industry, the consensus from industry leaders is that these five trends will reshape the entire business world:

1. The reshuffling of the world's top economies.
2. The need for effective energy management.
3. The increased urbanization of consumers.
4. The need for increased consumer data sharing.
5. The need for minimum inventory flow.

Greater operational agility gained from applying packaging value chain concepts can enable corporations to respond successfully to these trends (Global Commerce Initiative *et al.*, 2006).

4.2.1 Reshuffling the World's Top Economies

The 2009 selection of a new leader of the International Monetary Fund (IMF) revealed changes in the balance of the world's major economies. The position is usually filled by the decision the European Union and the United States. But in this case Strauss-Kahn of France, though favored by the European Union, was chosen with much input from a larger circle of countries, including some from the developing world. This was a sign that the influence of developing economies will grow in future global decisions. Earlier in 2009, the global lending crisis produced a rapid reshuffling of leading economic powers.

As economies rise and fall the packaging arena will see challenging changes in raw packaging material sources, packaging converters, packaging customers, retailers, and consumers. By focusing on the value of packaging at each link of the value chain, the agility of an organization can be made more responsive to change in several crucial areas.

Sourcing Raw Materials

Adequately packaging perishable products in the developing world afforded the opportunity to use indigenous raw materials. And, since production began moving to the developing world in the 1980s, the use of indigenous raw materials for packaging products destined to be consumed within the developing country has increased. Consumers in these economies have enjoyed more opportunities to purchase products made in their own countries. This has led to the use of raw packaging materials to package products destined for export as well. A ready supply of packaging materials based on indigenous materials provides agility to retain business and adapt sustainable packaging to the developing world.

Retailers and Distribution Networks

As different worldwide markets are sought and the power of retailers to control product access is maintained, packaging will play a key role in gaining access to markets. Internet markets are consumer-focused retail venues that extend into all world economies. Networks based on value that work along with existing structures have been found to create agility

within distribution (Hofmann and Locker, 2009), which is necessary for meeting consumer-focused retailers needs. As economies reshuffle a packaging value chain designed for agility is needed.

Consumer Needs

Consumers worldwide have differing needs in terms of package sizes (as related to product cost), product shelf life, and transport capabilities. As the world's consumers change, more specific packaging will be necessary to capture growing market economies.

Post Consumer Environment (environmental regulation)

When economies reshuffle, legislation will force expanded environmental packaging platforms. As economies undergo rapid development, infrastructure to handle packaging waste is often absent. For example, when Madagascar began to develop the market for ecotourism in the 1990s, and tourists arrived with PET water bottles, Madagascar had not yet addressed the question of disposal, recycling, or reuse of the bottles. Soon bottles littered the island. In response, one water company approached a PET bottle supplier to coordinate recycling operations for Madagascar. By setting up the infrastructure for recycling with the PET supplier, the major water company gained further access to the Madagascar market for bottled water. The supplier collects the PET bottles from the collection bins on the island and ships them to its recycling facility. This rapid initial solution was evidence of how a packaging supplier can provide agile solutions within the supply chain to help a manufacturer meet market needs in an emerging market.

4.2.2 Need for Effective Energy Management

Managing direct energy costs (raw materials, packaging, production) is essential in the packaging value chain. Sustainable packaging initiatives are addressing energy use to some degree. But this is often done in isolation instead of by considering the entire value chain. Data concerning energy costs is less than transparent. In the value chain, packaging suppliers can gain considerable leverage when an investment in alternative energies is made. There are tradeoffs in other features that packaging provides when the environment is considered in package design, and it has been established that these tradeoffs can be measured and communicated so that solid decisions can be made about package design

(Prendergast and Pitt, 1996). Although Wal-Mart's Scorecard sustainability initiative uses industry averages for computing the environmental impact of specific packaging materials, this scorecard is expected to evolve. Eventually, differentiation by the environmental impact of packaging components from different manufacturers will be needed. So far, data sharing that allows packaging purchasing departments to compare the environmental impact of the same film from different manufacturers is not forthcoming. This data is needed for understanding the environmental impact of alternative energy versus oil, coal, and natural gas. As the source of package production shifts, and Wal-Mart's Scorecard initiative expands to all the Americas, effective solutions—such as transparency of data—oriented toward the energy management value chain, will arrive. The Comparative Packaging Assessment (COMPASS) guide produced by the Sustainable Packaging Coalition (SPC), allows specific calculations on environmental impact to be made (SPC, 2008). Worldwide initiatives offer yet more transparency in decision making to promote energy management aimed at an improved packaging value chain.

In the packaging industry, energy is often subsidized. Some countries subsidize one energy industry and not another. This alters global revenue, cost, and efficiency dynamics for packaging materials. The political and economic risk associated with oil and gas dependency is empowering governments to provide subsidies for conversion to alternative energy in core industries. Subsidies for packaging converters in Germany encourages industries to upgrade to less expensive solar power. When solar panels are installed for no cost, German packaging converter companies no longer have to pay for energy—a great advantage against their their competitors. Due to these subsidies, Germany has 40% of the world's solar panels; and in both short term and long term, German converters will enjoy lower energy costs while the energy costs of their competitors continue to rise. Contracts from manufacturers seeking suppliers with less GHG production associated with packaging components production will increase as well. Subsidies driving the use of various forms of energy effects the entire value chain and will have a powerful influence on its future.

4.2.3 Increased Urbanization of Consumers

By 2016 one-half of the world's population will live in urban areas (Global Commerce Initiative *et al.*, 2006). This migration will effect package design as well as raise the question of how we can maintain packaging resources close to rapidly growing urban centers. New solu-

tions are needed. For example, shipment of products to packaging centers around these urban centers could enable increased efficiency in the value chain. Moreover, the short paths consequently traveled offer opportunities for consolidation of packaging redesign, and more consideration of whether packaging is appropriate for the consumer instead or merely the distribution system.

4.2.4 Need for Aggregation of Consumer and Customer Data as Operating Data for the Value Network

Information flow can be controlled, filtered, and used to benefit business relationships. Enabling packaging suppliers to access customer and consumer data during planning production runs is a means of minimizing inventory flow. Increased transparency of production processes and consumer information means that consumers will gain more responsive packaging suppliers. During the 2008–2009 global recession economy, the advantage of being able to shift production means the ability to reduce overstocks of finished goods. For example, prior to the economic downturn, sales at a high end retailer of the products of a large health and beauty care company were brisk. Once the recession started, however, consumers purchased less at the upscale store, preferring to buy those products at chain drug stores and mass markets such as Target and CVS. Rapid response to consumer data and the involvement of packaging suppliers on consumer response teams allowed the health and beauty aid manufacturer to rapidly alter packaging, create POP displays, and stock their products on the shelves of the stores where the consumers were now shopping. Through the use of an effective packaging value chain involving retailers, suppliers, and the health and beauty aid company consumers were retained.

4.3 PACKAGING VALUE CHAIN AND INCREASING REVENUE, REDUCING COSTS AND GAINING EFFICIENCIES

In the process of package development, whether or not innovative packages are being developed, or packages are fine tuned, or new materials are being explored, economics is a major driver in making decisions. Essentially, package economics is related to:

1. Increasing revenue—will the package decrease or increase revenue?
2. Reducing costs—will the package cost more or less?
3. Gaining efficiencies—will the package increase or decrease efficiencies?

Packaging professionals re-examine processes to increase revenue, reduce costs, and gain efficiencies in the context of the value chain (Hines *et al.*, 2001). Exploring how different companies make decisions often proves insightful. By focusing on the value chain, this decision-making can be explored from a more pragmatic angle.

An example of how increased revenue, reduced costs and increased efficiency improves the packaging value chain can be found when looking at a recent situation between a retailer and multiple gum suppliers. The retailer declared that they would begin charging fees for shelving based on the amount of space being used for the display of gum near their cash registers. The clear aim was to increase their (the retailer's) revenue. The gum category had high margins of 25–50% associated with each item. Increased sales would drive revenue. The gum supplier was seemingly left with two choices—pay the fee, or don't pay the fee and risk the consequences.

One gum supplier looked beyond the two options of pay or don't pay. What was important to the gum supplier was more prominent shelf space. What was important to the retailer was increased revenue. What was important to the packaging supplier of the gum company was increased volumes and efficiencies. The gum supplier, by considering their own need for increased shelf space, involving their packaging component suppliers, and leveraging the retailer's immediate need for increased revenue, worked within the value chain and offered three new options to the retailer:

1. To negotiate for a higher fee in return for more *prominent* shelf placement.
2. To offer a package redesign that would save shelf space, thereby increasing the number of facings and enabling the retailer to have less out of stocks (more revenue).
3. To pay for new in-store racks that increase display space (and provide the specific gum company with prominent space), thereby increasing revenue for both the retailer and gum company.

Initial sales projections on the three options prompted early talks with the packaging component suppliers for the gum company. As a result of input from the PP packaging overwrap supplier, the third option was promoted heavily to the retailer.

The retailer selected the third option. When the new redesigned racks were put in place, the store gained immediate revenue for the increased allocation of space. The retailer sales category rose 40% and the specific gum company had a 35% increase in sales—which fully justified the

payment for the new racks. Other suppliers, less in tune with the needs of their customers, lost sales.

When packaging component suppliers to the gum companies were contacted to make sure they could handle the increased volume, the suppliers had differing responses. The PP overwrap suppliers response was that they would:

- shifting supply from one site to another to ensure continuous supply;
- provide a volume based cost structure to lower costs;
- tighten the supply chain (to accommodate the rapid flow of goods) to enable the use of a thinner, less expensive gauge overwrap film based on higher product turnover.

This response from the PP supplier prompted the push for the third option. It demonstrated that the supplier appreciated the additional business, and that they understood the company's need to recoup these losses from building the racks. This understanding prompted the gum company to source the overwrap solely from this one supplier versus the three they had before. Revenue increased for supplier, company and retailer (and others within this value chain), costs decreased, and efficiencies improved.

4.4 QUESTIONS ON PACKAGING VALUE CHAIN

4.4.1 Improving the Packaging Value Chain Economics for a Packaging Supplier

A large toy manufacturer is sourcing printed folding cartons from China. The print quality and price is favorable. The toys are made in the various countries, cartons shipped in and filled at the toy manufacturer, then sent to the distribution center.

A large global folding carton company, having previously lost this business, is now trying to regain it. They identify a reason for the toy company to switch from its Chinese suppliers to them: namely, the fact that the printing inks used by the Chinese contain lead. So far, the response from the toy company has been disappointing. They remain with the supplier from China. From a value chain perspective, information is needed to understand how the global folding carton company can reacquire the business.

Identify 14 specific information needs of the global folding carton

company and briefly explain what potential advantage might be gained, by addressing these areas, to help the company regain the business. Focusing on the value chain, explain how the folding carton company might offer increased revenue, reducing costs, and increasing efficiencies to the toy manufacturer.

4.4.2 Response from W. Houghton, Package Development Engineer, Kao Brands Company

1. Does the alternate supplier observe the Coalition of Northeastern Governors (CONEG) legislation, and respect the penalties for non-conformance? In 1992 CONEG adopted the Model Toxics in Packaging legislation. Adopted by 18 states as of 1998, this law requires reductions in the amount of four heavy metals (specifically Hg, Pb, Cd, and hexavalent Cr) used in any packaging sold in the affected states, and aims to phase out entirely the use and presence of these four metals (CONEG, 2008). Since packaging comprises over 30% of the municipal waste stream in the U.S., printed packaging should be of particular importance to local communities where waste disposal includes incineration. The presence of heavy metals in fly ash presents significant disposal and emission concerns.
2. What is the expected delivery time for expedited orders? How do they deal with transportation delays? Companies need to factor in the total cost of sourcing globally—including the cost of carrying additional inventory and developing alternative suppliers. The cost of lost or damaged cargo is negligible relative to the cost of shutting down a production line. Clearly, if a company is sourcing globally there is always an additional risk when containers cross waterways. Ports become backed up, or even completely shut down, because of terrorist threats. Over 200 container ships and supertankers have sunk in the last 2 decades (Sinking Ship . . . , 2004). The risks are many, but one thing is sure: delayed or damaged cargo will ultimately hurt a company's profitability, unless the procurement and operations teams are prepared with a suitable risk mitigation plan should something go wrong (Jason, 2008). A stateside supplier offers a lower-risk option without the need of calculating responses to a list of long-distance disaster scenarios.
3. How might political intervention or instability affect delivery? A few years ago, a well-known toy company was developing a commemorative set of Korean War airplanes in a Chinese factory. One

of the toys planned would carry wartime decorations with "Flying Tigers" text and the Taiwanese flag. During prototype development, the plant manager was unexpectedly detained by authorities for several days. Progress on the project was inefficient and eventually failed. This is an example that also illustrates our inability to accurately predict cultural and historical sensitivities.

4. How will sub-standard components be handled? Components that fail to meet specification (OOS) eventually surface from nearly any manufacturer. It's important to agree on who will pay for rework, return shipment or disposition before they happen. These situations inevitably cause sourcing inefficiencies and consume crippling amounts of time. The stateside supplier might present a plan that can quickly rectify these situations with shorter supply lines and timely disposition.
5. How will inevitable language and cultural differences be handled? The differences between Asia and the West have been discussed at length over the centuries. There are notable differences in values. Approaches and disagreements can become rather volatile when cultural issues complicate the path to resolution.
6. Does the business understand import regulations? Importing goods can be a complicated business. If wooden pallets are used, they need to be heat treated, disease-free hardwood. If documents aren't in order, there could be significant delays in Customs. The global supplier can use less expensive reconditioned pallets and pass the savings onto the customer.
7. How does Asian sourcing affect the enterprise green initiative? Chinese sourcing requires longer supply lines and significant fuel consumption. If the finished products are eventually sold in Wal-Mart, the scorecard categorizes delivery distances and uses it to calculate a score. The scorecard also requests information on the type of energy used to manufacture goods. The stateside supplier can offer lower transportation costs and add perceived value to a distributor like Wal-Mart.
8. Have the true costs of offshore sourcing been compiled? In recent years some highly publicized events exposed hazardous products of non-indigenous origin. The cost of such revelations to a business impacts both its bottom line and its reputation. Tainted pet food, fish, lead-coated children's toys, banned beef, and toxic toothpaste, are among the imports deemed hazardous to global consumers. According to the *New York Times*, Chinese products now account for 60 percent of all product recalls today (American

Lawsuit, 2008). Litigation arising from injury or death has been very costly to American corporations that have not successfully mitigated their risk in global sourcing. Anything globally sourced carries some additional risk, including folding cartons.

9. How is quality assured and maintained? On-site inspection and qualification is a must for Chinese sourcing. In our current scenario, the folding cartons are already being sourced in China. That indicates a crucial need to maintain a minimum presence in China in order to audit production quality or pay for a third party inspection service. The American supplier should already have an elaborate sampling plan in place to ensure quality.
10. Can trade secrets and intellectual property be protected? Although there is IP reform happening in China, it's unlikely. One case in point is Chevy's infringement lawsuit against Chery. American manufacturers are forced to battle in local courts and are restricted to using Chinese legal representation. As we've seen in many industries, manufacturers have successfully copied existing products. Given that contemporary folding carton production is the product of several decades of refinement, sharing trade secrets is a risky business. The American supplier is bound by United States patent law, which imparts some degree of leverage and trust in the business relationship.
11. How might holidays affect business in China? Many holidays are celebrated in China, of which the Chinese New Year may be the most significant. While it typically lasts about 2 weeks, some Chinese visit family and vacation for up to 30 days. It's important to understand and plan for such occurrences.
12. What level of expertise does the Chinese company bring to the business relationship? Many contemporary Chinese companies over-indulge their eagerness to grow new and profitable business. A few short years ago, I was evaluating a Chinese company that wanted to provide flip-top cap closures. Their core competency, however, was strictly in injection molded tea pots. They eventually built a tool that could mold functional components, but they were clearly incapable of meeting the cleanliness standards required in the United States personal care market. Furthermore, their PP resin expertise was wholly inadequate to troubleshoot living hinge failures and snap-fit tolerances. In the same manner, the production of folding cartons is a craft that requires troubleshooting and planning foresight.
13. Are folding cartons made in China identical to those made in the

states? It's important to note some of the differences in compression strength and differences in SBS aesthetics. This is especially important for load bearing secondary packaging like corrugated. Fiberboard manufactured in China uses a source of pulp composed of shorter fibers from recycled content. There have also been rare reports of medical waste finding its way into Chinese paperboard (primarily corrugated).

14. How might currency fluctuation in the future affect the economics of offshore sourcing in China? By 2004, the trade deficit with China had climbed to $213.55 billion (Lin, 2007). The U.S. has harshly criticized China for allegedly under-valuating theYuan, contributing to the trade deficit and dramatically undercutting global United States prices. These market forces are complex and can have significant effects on profitability.

These 14 areas within the value chain may assist in increasing the competitive advantage of the EU company.

4.5 CONCLUSION

Global trends within the value chain can be used to build increasingly effective packaging value chains. This increased efficacy will result in agility being required by a changing world. The packaging value chain addresses the ability to meet age-old needs of increased revenue, reduced costs, and increased efficiencies.

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CHAPTER 5

Raw Material Suppliers and Converters in the Value Chain

5.1 INTRODUCTION

The number of packaging suppliers worldwide exceeds the number of corporations they serve. Most product companies have multiple packaging suppliers, to supply them with the same package component. New suppliers, with optimal manufacturing technology, or cost saving operations form. Because of this, the competition between packaging suppliers is intense.

This chapter addresses the role of the value chain in achieving competitive advantage. The history of packaging suppliers in the supply chain compared with present conditions is addressed. Current issues in disaster management, chain of custody, and the role of the developing and developed world in sourcing packaging supplies will be considered, as well as value drivers of confidentiality, speed, innovation, and agility. This chapter focuses on the paperboard supply and converting industry.

5.2 HISTORY OF PACKAGE SUPPLIER COMPETITION WITHIN THE VALUE CHAIN

Suppliers in the packaging value chain have grown with the businesses they support. The paperboard packaging industry is an example of how such relationships have developed over the last 150 years. The challenges of being competitive in a continually evolving marketplace are now made easier by linkages within the value chain. These linkages, however, have not always been strong, or even of interest.

One of the first uses of paperboard for large distribution illustrates how paperboard suppliers worked with customers in the late 19th century. At that time, the number of paperboard suppliers was small, and much of the development work was undertaken by the manufacturers of goods that required packaging. Such was the case with the National Biscuit Company.

Aldolphus Green, who produced one-half of the crackers in the United States market, assessed the developments in the supply chain and in society:

- cracker making was compatible with mass production;
- new railroad transportation lines facilitated nationwide distribution;
- migration to the cities was increasing;
- consumers needed more inexpensive, ready made foods (such as crackers);
- consumer packaging (versus packaging solely for retail display) was essential.

But there were also image and technical issues. Prior to their use in the cracker industry, paperboard cartons had developed a rather suspicious reputation because of their use in covering medicine bottles with misleading information (Twede, 1997). Furthermore, before a nationwide distribution of fresh crackers was possible, a moisture barrier was needed to keep the product fresh. Finally, the package had to be inexpensive enough to compete with the wooden barrels in which crackers were then sold. All of these facts demanded innovation.

The chief players were Green (the Cracker King), and Gair (an inventor/manufacturer of folding cartons). As was usually the case at the time, the customer (Green) led the innovation in design: the wax-based inner seal was created by a partner of Green's, and the carton design itself was inspired by a book in his library. Once the design was established, Robert Gair focused solely on getting it manufactured. There was some competition from Germany, where a more complex method was being developed; but it was small and distant and no threat to Gair, who was guaranteed the business. He maintained his competitiveness by various efficiencies, including, after 1918, the use of recycled paper.

Although Gair pursued strategies to make his business competitive, the actual working relationship between the customer and supplier did not change much from the method of the 19th century, with the customer acting as the package designer, overseer, and innovator in packaging. Gair's role was to concentrate on the manufacturing process so he could

serve his customer by making his cartons efficiently. Machines were built to meet the specifications of paperboard carton designs. Suppliers remained competitive by making their customer's design a reality on the production floor. Little else was expected. Since then, suppliers of the paperboard packaging industry have become highly connected with their customers and the two interacting closely within the value chain.

In general, this evolution in connectivity in the value chain has progressed from the late 19th century to the early 21st century in three phases:

I. Limited Role of Package suppliers (1880s–1930s)
   1. Package suppliers focus on manufacturing to specified package design.
   2. Package suppliers produced specific packages based on what product manufacturers needed for their goods.
   3. Pollution produced by papermills in the early 20th century is evidence of how disconnected paperboard suppliers were with the world outside their facilities.

II. Expanded role of Package Suppliers (1930–1980s)
   1. An expanded role was prompted by product manufacturers reshifting their focus back to product to remain competitive.
   2. Packaging suppliers begin to supply a larger number of customers versus being tied to one manufacturer.
   3. The number of viable packaging suppliers grows exponentially as global commerce increases.

III. Extended Role of Package Suppliers (late1980s–present)
   1. Suppliers link to consumers in efforts to extend influence through the value chain. Paperboard companies align by business unit to understand retail markets and consumers.
   2. Strategic supplier alliances where suppliers compete for long term contracts.
   3. Contracts for paperboard were so competitive in the 1990s that many companies bid so low that they had to dissolve the much sought after contracts in order to stay in business.
   4. Product manufacturers consider joint ventures with suppliers as a means to ensure financial solvency.
   5. Suppliers focus on compliance with worldwide regulations and ways to compress time for their customers.
   6. WWF, SFC, and paper supplier teams fine tune stewardship of earth's resources.

In the early 21st century, the paper industry is now very cognizant of their role in the value chain as well as in the world. This relationship developed due to understandings gained from the packaging value chain.

5.3 INSTILLING COMPETITIVENESS: GAINING AND MAINTAINING A COMPETITIVE ADVANTAGE VS. OTHER SUPPLIERS IN THE VALUE CHAIN

Based on the third stage of evolution above, competitiveness of the packaging industry in the 21st century is a function of how well a company connects in the value chain. To compete, suppliers, such as those in the paperboard industry, identify what value means within their value chain. When the focus is on the value of the package provided, four themes can be used to define what is now required by suppliers to deliver value (Hansen and Birkinshaw, 2007). These themes are confidence, speed, innovation, and agility.

5.3.1 Confidence

Within the value chain confidence in suppliers is imperative (Roth *et al.*, 2008; Laeequddin *et al.*, 2009). There must be trust that packaging components will be delivered according to specifications and that the product/package will be viable. Such confidence relates directly to financial solvency and the source of package materials (Solomon *et al.*, 2003). The selecting of a source of raw materials is related to the confidence of the supplier's relationship with the raw material suppliers (Godsell and van Hoek, 2009).

Evidence of financial solvency is becoming a cornerstone of providing confidence. For example, paperboard suppliers seeking contracts need to demonstrate that they will be financially solvent if contracts are granted. And, likewise paperboard suppliers need to be assured that their raw material providers can remain financially viable to maintain the supply. This high degree of transparency in the interaction between supplier and customers is essential to gaining confidence. While transparency is not the only key to gaining financial confidence, it is a critical element in establishing business contracts (Wu, 2009).

Examples of lost confidence within the packaging-supplier relationship are common. In one example, the purchaser defined the value of the packaging component by more criteria than price. Without knowing this, suppliers bid low on price. In the end, the purchaser selected a paperboard supplier based on how financially stable the supplier's business

was judged to be—confidence in the supply of packaging components overrode consideration of price. In another case, competitive bids from five paperboard suppliers were sought by a major personal care manufacturer for a premium line of cosmetics. The closed bidding revealed a vast range (the largest seen) of prices. Prior to negotiations, the Purchasing Manager had determined the lowest possible bid his company could entertain while still allowing a paperboard supplier to make a reasonable profit. He then ranked the bids based on his confidence that the supplier could deliver what was promised and remain financially viable. One low bid was below this figure. The potential supplier was asked for further financial information. When provided, the information did not suggest that the supplier could be financially viable during the period of the contract. Confidence in this supplier eroded. Because the overriding factor in confidence was financial solvency and therefore the ability to supply promised paperboard, the paperboard supplier who submitted the lowest bid was not selected. This is a landmark situation for a number of reasons. It demonstrated that:

1. product manufacturers know that their supplier must make a profit in order to supply them with package components;
2. product manufacturers accept that they, and not just their competitors, need to contribute to the profit-making potential of suppliers worldwide;
3. packaging suppliers still compete on a cost basis where the lowest cost will not always win;
4. the value of a reliable, financially solvent supplier is high.

The lack of confidence in the low bidder's ability to deliver the packaging components in a consistent and long-term manner lost them the contract. The business was gained by the supplier who instilled the most confidence.

While the above situation with paperboard measured confidence in financial stability, there are other drivers as well. For instance, the area of recycled packaging material requires that suppliers deliver the specified amount of recycled board to converters and the end user. For product manufacturers, SFC-derived fibers and high percentage recycled paperboard is a means by which they address the concerns to environmentally conscious consumers, meet corporate goals, and comply with retailer and government regulations. However, the chain of custody within the packaging supply industry is not airtight, and the level of counterfeiting in recycled and SFC content is so high, that many product manufacturers no longer flag the use of recycled content or SFC-derived wood on their

packages. Purchasers of such material must feel confident that their suppliers really are delivering the required amount of recycled content in order for the package label to make the claim.

This demand for confidence has opened the opportunity for suppliers who focus on this area and deliver the specified recycled content. For example, Johnson & Johnson has a goal of 30% recycled content in 75% of their paper-based packages by 2010, and specifies the use of SFC certified wood. Because the chain of custody is not iron clad within the industry, Johnson & Johnson must have confidence in their value chain to achieve their goals. The company works with suppliers to provide needed transparency. Since Band Aids cartons made in Brazil do mention the use of SFC derived wood on the package, Johnson & Johnson requires assurance that cartons supplied to them will always be from SFC derived wood. The company focused investment in suppliers delivering what they need at every step in the value chain from package manufactures to board and raw material suppliers. The process used by Johnson & Johnson is outlined in Best Practices for Keeping Illegally Harvested Timber Out of Your Supply Chain by the WWF. Without confidence in suppliers, Johnson & Johnson would be at risk of noncompliance with corporate goals, and not meeting retailer and/or governmental regulations.

Confidence extends beyond legal documents and specifications. When mutual trust within the value chain exists between supplier and customer, then time, energy, and dollars are reduced in making a package for the next customer up the value chain (Wu, 2009).

5.3.2 Speed

Short response time has tremendous value within the supply chain. Speed is multifaceted, often a quantitative measure of commitment by a supplier within the value chain. Consistent, on-time delivery of recycled pulp to a papermill, for example, is a given. Beyond that, however, is a question of perception. Putting a customer first, completing high priority delivery in record time, convinces the customer that his business is valued by the supplier.

Speed in supplier-customer relationship is properly valued when organizations are aligned with each other to consistently achieve rapid response. In the electronics industry, package changes happen at a fast pace. In 2007, when a global electronic company announced it was switching away from wax-coated board to another water-resistant corrugated structure, numerous suppliers competed for the business. But few bidders met the electronic company's self-imposed deadline. That deadline allowed two weeks to offer replacement structures. It was a test mea-

suring how fast potential suppliers could provide an innovative solution. Of the few suppliers who met the deadline, only one met the test specifications: a paperboard supplier that was able to focus in turn on its own supplier and then the supplier's supplier, to provide an innovative solution. Rapid development of an innovative wet end process improved the resultant paperboard's wet strength. In other words, gaining new business was important to the supplier, converter, and the pulp mill, but so was scientific evolution of method to meet a specific customer need—speed. Communication within the value chain proved essential to gaining the contract. The electronics company recognized that it had found a supplier with the ability to respond quickly to the next crisis, because this supplier was aligned with its own supplier in seeking innovative solutions.

5.3.3 Innovation

Innovation in the context of the value chain goes well beyond delivering innovative solutions for customers. It involves innovation that links customers and suppliers. For a typical paperboard converter, value chain innovation means linking the core technologies of their suppliers to deliver innovative packages to their customers (Hansen and Birkinshaw, 2007). The better this is done, the higher the level of innovation. The vast number of pulp mills and abundance of paper converting operations is a testament to the volume of paperboard that the packaging industry uses. But mere volumes do not equal innovation. Going beyond sourcing logistics, many paperboard companies such as MWV (Richmond, Virginia) have realigned their business units to correspond to various manufacturer product types. In MWV's case, categories include snack foods and liquid products. In each, the requirements for innovation are different. Recognizing this fact has allowed MWV to bring innovation to food and beverage manufacturers, because they understand the core requirements of each specific need in food preservation, MWV can better align their own suppliers to deliver innovation and compete with other paperboard providers and other packaging materials.

TetraPak has established its quality based on the materials of the composite package. When TetraRecart—a retortable paperbased container—was introduced in 2008, MWV played an integral part in developing higher moisture barrier board and gaining TetraPak's new business.

5.3.4 Agility

In recent years agility has been the cornerstone driver of value chain

competitiveness. The ability to rapidly adjust workflow is a competitive advantage. This is vital due to the increasingly fast pace of business, the higher expectations of consumers, and rapid global shifts of economic power (Latheef *et al.*, 2008).

Agility in the packaging value chain is akin to the strategy of Red Cross and Disaster Relief Management operations in anticipating what is needed. In those cases, agility to move from one location to another is critical to success. In packaging, the agility of a supplier in ensuring a continuous flow of components requires the use of action teams to address an issue quickly. This requires forethought and planning for various scenarios.

5.4 QUESTIONS ON PACKAGING VALUE CHAIN

5.4.1 Attaining Competitive Advantages for Suppliers Using the Packaging Value Chain

Explore what suppliers (who often obtain their raw materials from the same or similar sources) can do to gain a competitive advantage. Specifically, address on the following areas for focus:

1. *Performance Management:* Activities associated with active management of supply chain performance, including development and maintenance of metrics program, data collection, interpretation of results, and implementation of corrective actions.
2. *Application Technology & Infrastructure:* The platform of application technologies and infrastructure used to support cross-supply chain activities.
3. *Sales & Operations Planning:* Collaborative, cross-functional process that aligns a firm's business strategy with supply, demand and product management tactics.

Now, explore your company (if you are a packaging supplier) or *one* of your company's suppliers in packaging. Identify and explain 10 specific activities that need to take place within the supplier's company to be more competitive in the value chain using this above focus.

5.4.2 Response from Javier de la Fuente, MSc, IDSA Founder & Director, Factor IDD

Focus: Sales and Operation Planning

Sales and operation planning (S&OP) works as a synchronization

mechanism that matches the demand forecast with value chain capabilities according to a defined business strategy. This mechanism operates through coordination of sales, marketing, development, manufacturing, sourcing, purchasing, logistics, and financing decisions and activities. On the one hand, S&OP is constrained by the capacity strategy of a company; but, on the other, also influences long-term capacity planning via feedback from the execution of the sales and production plans.

The Association for Operations Management in its APICS Dictionary, describes the following four fundamental S&OP's characteristics.

- It is a cross-functional tactical planning process that combines all functional units of a firm in one integrated set of plans.
- It facilitates coordination with detailed scheduling.
- It supports the strategic business planning.
- It is a routine, on-going planning, reviewing, and evaluation process that covers a horizon of one to two years.

This paper explores the S&OP of Company X with a focus on economics. In the following, a brief description of the company is provided and 10 specific activities to improve competitiveness in the value chain are described.

Company X, an Argentine olive oil company, is part of a diversified holding that includes casinos, hotels, restaurants, a petroleum company, a waste collection company, and trains. Company X owns olives groves and a plant in Catamarca, Argentina, for manufacturing olive oil. It also has a distribution center and a commercial office in Buenos Aires. Catamarca is located at 2000 miles from the capital. All of its main suppliers are located in the Buenos Aires area. These include sources for labels, glass and PET bottles, caps, corrugated boxes, as well as professional services suppliers. All transportation is done by truck. Factor IDD, is a supplier of design services to Company X.

Ten specific activities:

1. *Establish a clear business strategy.* The company should define clear business objectives in order to optimize its S&OP. The company's core expertise is the production of olive oil. However, in the last year, the company has considered entering the market for olives in brine and balsamic vinegar. Although these two markets are potentially a good fit for Company X, and complement its current operations, it diverts resources from its core product, olive oil, which is not well established in both the domestic and international market.

2. *Delineate and implement an integrated plan.* By definition, an S&OP needs to integrate functional units within the company according to its business strategy. Company X is half way in this regard. They have a decoupled management of its supply chain: procurement, production, distribution, and sales are managed independently and buffered by inventories. Although this approach facilitates the decision making process, it ignores the value chain interactions. As a consequence, further cost reduction is limited, infeasible solutions are common place in the organization, and global profitability is affected. A more coordinated and integrated planning and control would help to reduce costs, improve performance, and increase service levels.
3. *Use collaborative new product development.* Company X's marketing department should plan more carefully the timing of new product launches. This planning should involve all functional units in the company through a collaborative team. This will reduce the chances of infeasible solutions and speed up the new product development process.
4. *Use metrics for product market performance.* The company needs to implement a system to measure product performance in the marketplace. During the last year, they have redesigned several product lineups. It is vital, then, to determine if the new introductions are adequate and successful by keeping detailed records of product launch, sales, channels, and competitors. Without this information is impossible to calculate any return of investment for a specific marketing action.
5. *Integrate purchasing strategies.* Company X's purchasing department focuses on the best price they can obtain. The consequences have been disastrous. For example, the purchasing department found a glass bottle on sale at a very low price. They bought it, and communicated the good news to marketing and manufacturing. But when marketing consulted with manufacturing, they found out that Company X's current machinery was not able to label the new bottle. The bottles were never used. This is also an example of lack of integration. In an organization that works in this fashion, the first step is to educate every department about value chain basics and how departmental decisions affect the whole organization and its products.
6. *Use information-sharing methods at the supplier level.* The olive oil supply chain in Argentina is characterized by having a few major packaging suppliers (for tins, plastic and glass bottles, and cor-

rugated boxes) that are common to a myriad of brands and olive oil manufacturers. A small company has little power to negotiate conditions with these suppliers because there are few other choices. However, there is room for improvement with small suppliers, such as label suppliers and design suppliers. An information system shared by these players would improve project lead times and quality control.

7. *Improve alternative sourcing.* Olive harvest is seasonal, between February and April. The company estimates its olive oil production one year in advance. If due to climate conditions the harvest fall short of expectation, the company must buy olives from another source. This is expensive and it erodes profits. Company X should establish long-term alliances with small olive producers in the area to secure harvest surplus. This may imply sharing information and establishing incentives for small producers even when Company X's harvest is sufficient to meet demand.
8. *Minimize transportation of items.* Right now, labels are printed in Buenos Aires, shipped to Catamarca, and then the labeled products are shipped back to the distribution center in Buenos Aires. Since some of these products are sold to retailers close to Catamarca, the final product is shipped back again. Recognizing that the manufacturing plant and distribution center and major suppliers are far apart, Company X should establish an information system to minimize transportation and inventory costs based on geographical demands. The company could implement coordinated and integrated production-distribution planning. The manufacturing plant could work as secondary distribution center for the northern part of the country, and local suppliers could be use whenever is possible.
9. *Increase exports of Company X's brands.* The actual macroeconomic circumstances favor Argentine olive oil exports. Company X develops private labels for clients in the US, Canada, Mexico, Brazil, and China. Although this is a profitable business, it would be even more profitable if they would sell their own added value brands. The main obstacle is the knowledge of local markets and their preferences. Therefore, Company X should send marketing missions to explore these new markets in order to tailor new product strategies.
10. *Increase interaction/communication with the end-consumer.* Company X's marketing department has the enormous responsibility of forecasting and shaping demand. In order to forecast de-

mand, marketing needs to conduct periodical market measurements in different channels. In addition, marketing helps to shape demand by interacting with the end-consumer. This allows the company to respond quickly and effectively to opportunities arising from markets, such as creating new flavors, packaging its products in new sizes, and addressing demand for more convenient products.

5.4.3 Consideration of a Supplier-Purchaser Relationship: Solvay-BASF

Discuss the joint venture between Solvay and BASF involving joint production of Polyvinylidene chloride (PVDC) latex. In the discussion, identify four key elements in BASF's strategy for making this and other joint ventures work well.

5.4.4 Response from Hoog Su, Principal Engineer at AstraZeneca Pharmaceuticals

Belgian SOLVAY Group and the German BASF Group created a joint venture for their European Polyvinyl Chloride (PVC) and worldwide Polyvinylidene Chloride (PVdC). There are four key elements in BASF's strategy for making this and other joint ventures work well: Supply Chain Management (SCM), product use, end of primary use, and external networks.

Supply chain management: This includes activities involving the interaction of a firm with its suppliers, such as product quality, R&D, product-development partnerships, and sharing of production knowledge. The result of the joint venture between SOLVAY Group and the German BASF Group offered the two companies several opportunities:

1. Increasing capacity to satisfy customer requirements and expand to new territory.
2. Reducing cost for raw and intermediate materials. Prior to the joint venture both companies required the same raw materials for their operations, but at different quantities. With the joint venture, the ordering volume could be increased, resulting in volume discount.
3. Increasing coordination. Since one of the outputs from Solvay's process is an input to BASF's process to make the final product (PVC and PVdC), the joint venture increased coordination, resulting in mutual benefits and cost saving due to reduced hand-off.
4. Increasing opportunities for other joint ventures and market shares.

Since a business model was created from the first joint venture, a learning curve has been established. The same model can be applied to other joint ventures—as demonstrated by the venture between SolVin (the joint subsidiary of Solvay and BASF for vinyls in Europe) and Sibur LLC.

Product use: Activities related to how the customer uses the product, including managing customer networks, product testing and development, and outsourcing. Product development required specific knowledge, expertise and organizational focus. The joint venture between Solvay, BASF, and Sibur focused specifically on the PVC market. Because of focus in this specific market, the joint venture was able to develop a new product. As an example, SolVin developed NanoVin®, an innovative nanocomposite combining polyvinyl chloride (PVC) and nanoparticles of clay.

End of primary use: Activities related to the management of the product after the customer is finished with it—such as leasing management, product take-back, management of secondary markets, and recycling. Hydrochloric Acid (HCl) from BASF, once considered waste product, is being recycled by joint venture into VCM/PVC. Solvay would now be able to use the HCl in their plants that were purchased from BASF and other suppliers. As mentioned above in the supply chain section, the joint venture, because of close coordination, should be able to response to demand increase or decrease more effectively.

External networks: Activities related to the management and interaction of external networks may include other firms, educational institutions, communities, governments, civic organizations, and groups of customers, which provide an opportunity to co-create unique value.

External networks, in this case Russian government agencies, played an important role in forming the joint venture and allowing the construction of the new plant in Kstovo, Russia—the first world-scale, fully integrated vinyl plant in the country. Tremendous amounts of background work and negotiations with government officials were required.

5.5 CONCLUSION

Value drivers of confidentiality, speed, innovation, and agility were explored in the context of gaining competitive advantage for packaging suppliers and converters. These drivers are core to the needs of customers. Understanding the role that these drivers play in impacting competitive advantage and business is at the core of the packaging value chain.

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CHAPTER 6

Large Global Manufacturers in the Value Chain

6.1 INTRODUCTION

The packaging industry supplies large global manufacturers with components needed for retailers and customers. Innovation is profuse in the packaging industry—as is counterfeiting. These two areas—instilling innovation and thwarting counterfeiters—are overriding concerns of large global manufacturers. While the supply chain assists the logistics of moving products and their packages, the value chain is needed to deliver value in innovation and provide new approaches to combat counterfeiting. When external suppliers and customers unite in networks, their combined effort may offer to shareholders and customers a true value proposition for innovation, as well as solutions to the problem of counterfeiting.

6.2 CONTINUOUSLY DELIVERING COMPETITIVE INNOVATION

For large global manufacturers, innovation is essentially a function of how well ideas are generated, processed and launched. These three phases require intense input from a value chain context. Unless the value of the good/service is defined concretely, to assure that it has value up and down the value chain, success is likely to be limited. Such innovation is achievable through a variety of strategies. The main challenge is to design an innovation strategies that fits well within a certain company

(Sonneveld, 2000), because one company's innovation strategy may not fit comfortably with that of another. One company may suffer from competitive innovation weaknesses that are another company's strengths. Innovative strengths have long been relied upon to deliver progress within companies; but weaknesses, too, when recognized as such, can be the focus of effort that builds new strengths and results in novel approaches to innovation. Focusing on the weaknesses within a company will produce the greatest gains. For most companies, the innovation of new products and the profit gained from them is a constant strategic goal. At 3M, no less than 25% of revenue is expected to come from new products. This aim fuels innovation and focuses each unit of the business to deliver viable new products.

The value chain can be used to guide internal processes toward the development of a few great ideas (instead of a confusing multitude), to explore what areas of the value chain must be refined to deliver innovation. This next section addresses the generation, processing, and launching, of ideas. The focus is on pinpointing, within the value chain, the best means of achieving higher innovation.

6.2.1 Idea Generation

Without ideas, process and launch are irrelevant. To develop the best ideas, successful global manufacturers reach out to their external networks. Such networks ordinarily include suppliers and customers; but when the concept is seen in the perspective of the value chain, it can extend well beyond these traditional constraints.

When a Wisconsin paper converter wanted to tap into the Quick Serve Restaurant (QSR) market, it convened a three day think tank to present academic research and expertise that encompassed the whole value chain of food science and packaging. This has since become an annual event, with different issues tackled each year. This paper converter, and numerous other corporations, thus gain access to innovative minds. Siemens goes beyond this, sending a team of 10–20 employees to gather and scout technology at global universities and research centers that may translate into opportunities for Siemens.

Other external processes can be more pragmatic. Eli Lilly, P&G and many other corporations use Innocentive, a website that provides specific answers to questions. Answers are monetarily rewarded. In the developing world, where the circle of external networks is limited geographically or impeded by differences in culture, the Innocentive model can prove to be a valuable tool

Seeing the value chain through the eyes of a customer is often enlight-

ening. When a major rental car agency wanted to upgrade its image to attract higher-end clients, information from the clients was neccessary. While focus groups are usually conducted on the basis of consumers receiving monetary gifts, the same method would not be as valuable for gathering feedback from high-end clients. Instead, analysis of services offered by other rental car agencies to their high-end clients were explored by workers in the field. Disguised as high-end travelers, executives rented cars. They heard first hand comments from other customers about what was good and what was bad. The idea of delivering cars to customers as if they were their own cars (only better, perhaps cleaner) became the main idea. It resulted in line elimination, paperwork elimination though the use of electronics, and seamless expense reporting. Packaging seeks to do this as well with seamless delivery of product. Generating ideas using the value chain is the first step.

6.2.2 Idea Processing

For two reasons, there is a great danger that the development process will shut down after idea generation:

1. Ideas are crushed by unattainable business goals.
2. When ideas are not screened, so many may be selected for development that gridlock results.

There is a high risk in developing ideas that are not viable in terms of the corporation's business goals. This is especially true when they hamper the spirit of innovation within a corporation (Garcia-Arca and Prado, 2008). Sometimes idea innovation gets stuck. An example of ineffectual idea processing can be seen when looking at a package development project at a large food manufacturer. They were the third player in a margarine category that had very little to offer in product differentiation. The package was seen as a means to build brand equity and remain competitive. An innovative package design was the result of brainstorming sessions and extensive work with consumers. It involved a rectangular shaped margarine package that would enable consumers to fit it in the refrigerator butter shelf. The development and manufacturing cost estimates provided by packaging research did not, however, meet criteria for development. Costs were simply too high. Within the packaging department, the project was pursued in an attempt to prove the value of packaging in increasing sales. As development progressed, costs increased as predicted. When the new package design required new injection molds, packaging management was shocked by the cost. The project was put on

hold. Two years later, another sequence of brainstorming and consumer studies produced the same idea, which by this time Benecol (Finland) had successfully introduced in the European Union. The project began again, this time with the new molds approved. But management was taken aback once again when the next phase of development projected that manufacturing costs would climb higher yet, due to the package's shape being rectangular instead of round. The general manager judged that spending 40 million US dollars to retrofit a production line was a foolish expense for a third player in a crowded category. The project was shelved again. Using a value chain approach involving retailers, distributors and suppliers, the food manufacturer could have lowered the package system cost. Instead, the idea was stuck, restarted, then stuck again. This consumed valuable resources and caused frustration.

As we shall shortly see, using the value chain and internal networking to screen and guide the package development might well have saved four wasted years. Measured by increased sales and costs, the value of the package was known from the beginning. What was missing was the value of the redesign to suppliers and retailers. Middle management was not empowered to cease development even when problems arose. The result was paralysis. Numerous ideas were developed, but none brought a return on the investment.

One way to break the logjam of idea paralysis is the concept of *cheap, good, and fast*—which requires the manufacturer to choose two of the three and then concentrate on them. It seems a simplistic concept; but it does focus members of the value chain on the most important goals. For example, when another CPG developed a new margarine container, they decided to aim for cheap and good. Working with suppliers, they pinpointed the most economical way to deliver an innovative package design. Initial consumer research pointed to the rectangular margarine tub common in the European Union (e.g., Benecol, Finland), which was similar to the one abandoned by the paralyzed CPG of our previous example. By enlisting suppliers to deliver the most economical solutions, the second CPG made it clear that the project would not move forward unless the goal of cheap and good was met. They also sent a message to retailers that the package would cost the same as the current package, and that this would not be a premium product. Retailers provided feedback indicating higher case pack counts because the new containers—not only rectangular, but easily stackable—fit more easily into retail freezer cases.

At every step of the package design process, economy in inspection processes, specification approvals, case design, case pack, and shipping, all added value. The validation process was fine tuned to impose financial penalties for packages out of specification. The overall package

costs were less than the previous package. Sales rose and brand equity was gained.

Another solution is to develop processes that screen out promising ideas based on business performance. When development, manufacturing, production, and launch costs are ranked on investment return, opportunities can be identified. Other positive impact rankings are employed to assess the value of an innovative package in the face of competitive threats, its impact on brand equity, sustainability, and its ability to reach emerging markets.

6.2.3 Launching Innovative Packaged Products

Once the great idea is realized and reaches top priority status within the value chain, it needs to be launched. Many companies ride the tide of good launches followed by bad ones. Few consistently conduct launches well. Nintendo does, and the company is reaping the same benefits from innovative products that Sony achieved in the 1980s with the Walkman. While Nintendo sells fewer products than Sony or Microsoft, its lower production costs result in higher profits. Nintendo's chief innovation process is a focus on platforms. Nintendo's successful launch of the 2 and 3D platform, Pokémon, and Wii, were all a result of the company's decision to purposefully control the hardware for these new platforms.

Nintendo's success in launching ideas involved suppliers as well as retailers. The clean, off-white, small and distinctive Wii package encouraged the "second moment of truth" (SMOT)—a customer connection similar to the one Johnson & Johnson has achieved with its strikingly redesigned packaged Rembrandt dental products line in the crowded, color dense environment of the toothpaste aisle. Proctor and Gamble's Febreze Décor Collection and Crest's WhiteStrips are other examples of the connection to consumers via the retail package. Nintendo's packaging supplier, Duplium (Dallas, Texas) was key to this success. Duplium's focus on "getting your vision to market" demonstrated how well they understand the value of customer delivery and product launches. Nintendo's use of the value chain, designing its product for maximum impact in the the retail environment while providing suppliers with clear communication, resulted in a highly successful launch. The innovative hardware controller of the Wii produced sales of 52.6 million from November 2006 through June 2009.

Innovative product launches are connected to technology implementation as well. The recent promotion campaigns of Qwest and DirecTV, offering Internet, telephone, cell phone, and TV service, reflects an

understanding that many customers wish to access all four services through one source, thus reducing the time-consuming hassle of placing separate orders and paying separate bills. By partnering, Qwest and DirecTV have dominated the markets they sought. Central to their strategy was allowing consumers to perform activation services normally performed by technicians. The package design, layout, and enhanced graphics were all innovative, but the companies understood that they had to follow through, assuring that the package arrived promptly and was easy to open, and that the components inside could be readily understood and connected. Without that, the experience of the customer would suffer. The innovation in closing the sale with a well designed package demonstrates that customer and supplier needs were valued.

Successful idea generations, idea processing and idea launches by applying packaging value chain thinking are increasing. This type of linking with suppliers and distributors is resulting in a consistent competitive advantage.

6.3 REDUCING COUNTERFEITING AND GAINING CONFIDENCE IN SUPPLIERS

In some ways package counterfeiting pales by comparison with product counterfeiting. Consumers are aware of counterfeits in the pharmaceutical industry that are actually life-threatening. By comparison with those, counterfeiting of packaging material seems less important. But since the primary role of packaging is to protect the product, and since many products are used directly (ingested in the case of foods and pharmaceuticals, and applied topically in the case of HBAs) from the package, product safety is indirectly compromised by package counterfeiting. If products can be counterfeited, so can packaging materials. The technology, moral issue, and complexity are similar.

Product counterfeiting is not new. What is new is the way in which counterfeiting has expanded into the packaging arena, eroding trust between suppliers and manufacturers—and ultimately consumers. This lack of trust, consuming valuable effort and energy, has resulted in component purchasers becoming packaging police, to ensure that the package promised is the package delivered. While safeguarding packaging with specifications and 24/7 testing procedures does enable some control over counterfeiting, it does not address the core issue.

When the concept of package counterfeiting is explored in a broad sense, by defining it as intentionally delivering a packaging material that fails to meet specifications, counterfeiting is seen, at its core, to be sim-

ply dishonest. Often this dishonesty is alleged at the company level: companies are said to have supplied the wrong corrugated basis weight, or supplied the incorrect glue. But companies do not make the decisions to counterfeit; the company culture and its employees make that decision. This is a harsh reality. Counterfeiting is said to be a "social problem" that encourages employees within companies to break trust in pursuit of a competitive edge—to indulge dishonesty in the name of profit. Often, this is explained away in technical terms: by production efficiencies in combining polymer film production runs or optimizing batch sizes, by plant closures, by delivery schedules that are too demanding. Whatever the cause, the justification for counterfeiting is a social problem within corporations with an economic justification. Since economic pressures in the global packaging arena are always increasing, economic motives for counterfeiting are expected to grow.

The packaging industry has historically responded to the counterfeiting with a variety of high technology solutions that focus on the chain of custody. In the early days of laws and regulations, labeling the product, the manufacturer, and the ingredients was considered to be a sufficient deterrent. After the Tylenol poisoning of the 1980s, the packaging industry responded with inner seals, fiber tear on glued folding carton flaps, and printed shrink banding, all aimed at showing the consumer that the product was genuine and that no tampering had occurred. The volume of counterfeit over-the-counter drugs on the market today, however, demonstrates that while the problem of tamper evidence was "solved," counterfeiting was not deterred.

The packaging industry has come well beyond the days of using a simple label to demonstrate that a product is genuine. High tech solutions (beyond those mentioned above) are interesting to consider, invent, and implement. And it is tempting to regard technology as the whole solution. But a technology-based solution is at best temporary. More often than not, technology can be employed by the counterfeiters as well. No matter how innovative it may be, technology is not a long term deterrent.

6.4 THE ROLE OF THE PACKAGING VALUE CHAIN IN THWARTING COUNTERFEITING

While the packaging supply chain optimizes the delivery of package components from raw materials to finished post-consumer package, the value chain starts with the post-consumer and optimizes the value of the package components to raw materials. Counterfeit pack-

aging components affect the value of the package to consumers. For example:

- Value of recycled content: if the package is specified to be made out of a certain percentage of recyclable polymer but is not, consumers buying based on recycled content are duped;
- Value of government approved safety: if a package used is non-FDA approved (for wet food products) RPET instead of virgin PET, the consumer impact is that of monomers leaching into the consumable product;
- Value of performance: if counterfeit spray nozzles on an HBA item do not allow the spray to come out due to a lower chemical resistance of the ferrule within the packaging spray feature.

In all of these cases, due to counterfeiting, the package has less value than intended for the consumer. In terms of the supply chain, package components may be delivered on time and in order, but the value of the packaging component is diminished.

Exactly this sort of diminished value occurred at a CPG that invested heavily in sourcing and purchasing 80% recycled board for a folding carton. A paper mill purchased 100% recycled pulp to make the 80% recycled board for the company contracted to produce the cartons for the CPG.. The cartons were ordered, made, printed, the product shipped in packages that ended up on a retailer's shelf. A consumer, noticing the 80% recycled content label, purchased the product based on the label. After opening the carton, the consumer noticed the package was made from a bleached board. Although bleaching is possible with recycled fibers, the consumer's perception was that the carton was not made from recycled content. The consumer contacted the CPG. The CPG requested the carton and shipped it to a testing laboratory. There, on examination, the carton's fibers were determined to be remarkably consistent in long length and uniformity—indicating that the carton was made from non-recycled fibers.

Counterfeiting had occurred. A non-recycled content replaced the recycled board content. In terms of packaging this most likely happened at one of a few stages:

1. pulp stage, prior to the conversion of pulp to board;
2. after the board was made and before it was printed;
3. after the printing phase and distribution from the board to CPG.

Isolating the origin of the counterfeiting was not difficult in this case. It occurred after the board was made and before it was printed. Board of the

same dimensions and specifications (except for recycled content) was shipped to the printer. Instead of supplying the printer with the 80% recycled content board, virgin fiber, less expensive at the time, was shipped. The decision was based on the need to meet lower costs. Later, the board manufacturer said they thought they were passing along a higher quality (valued more) product to the end user.

It is not a supply chain issue. It is a value chain issue because the value of the package was affected and the supply was not. While counterfeiting may be an honest mistake, because of supply chain optimization in transferring goods, this is most likely intentional counterfeiting. In this case, the value (the need for 80% recycled content board) was not transferred down the value chain. If other sources of cost reduction had been explored, the value of the board could have been retained.

Technology has advanced to allow tracking and verification of package components. But as we have seen, this requires time and effort, and creates an environment of distrust that actually invites counterfeiters to play their game. Another solution, a seemingly lower-technology solution, can be found in the packaging value chain. Because the essential value of a packaging component is violated if counterfeiting occurs, the certainty that a package is genuine has relevance at every stage in the value chain, from raw material to the post consumer environment. There are many ways to address this. The most important is to have a trusting business relationship with suppliers. The level of trust in the corporate culture of a supplier is an index of that supplier's trust in its own suppliers. Several factors are key to increasing that level of trust.

1. Seek cultural alignment.
2. Build relationships.
3. Orchestrate communication.
4. Develop functional relationships with multiple stakeholders.

6.4.1 Seek Cultural Alignment

In the value chain, we consider relationships between suppliers and customers that optimize this relationship and build it upon trust. Alignment of the company cultures within a value chain permits the value chain to operate optimally.

The attitude of a company in dealing with out-of-specification packaging materials is indicative of the company culture. The important point when making such assessments is the justification of mistakes. Because

most companies engage in counterfeiting for economic reasons, this is easy to spot.

When confronted with an out of specification glue, a large starch supplier justified the situation by explaining that they had been doing some testing on a new glue with a higher water content, and they thought that the CPG would not notice the change. When labels began to fall off a 2-year shelf life product, the CPG noticed. Moreover, the starch supplier's attempt to justify the mistake only led to further exploration of it's glues, and to fines being imposed. The cultures were not in alignment.

New glue suppliers were considered. Frank discussions of their ability to meet specifications ensued. Numerous potential glue suppliers stated that the specifications could be met without a problem. What the CPG valued most was trust: it needed to be confident in a new supplier. One potential glue supplier proved its honesty by saying that the specification range was too tight for their processes. As a result, the CPG worked with the new glue supplier to upgrade processes and reassess the range of specifications. To cement growing trust, the CPG took part in operations that enabled the new supplier to meet specification. The cultures were aligned.

6.4.2 Build the Relationship

Relationships within the packaging value chain have evolved from CPG being king in the 1970s to the tremendous power of retailers in the late 1990s and early 21st century. In terms of power shifts, we are seeing a shift up the value chain toward consumers, who lack increasingly loyalty to retailers.

For example, during Wal-Mart's period of rapid growth in the 1980s, its relationship with CPGs was largely financial. As the supply chain was optimized, however, this relationship was extended. In 2003, an edict was issued by the top 100 CPGs demanding RFID implementation (at the pallet level) by the end of 2005. Case level RFID identification was expected by the end of 2006. Wal-Mart made RFID a requirement of large CPGs, and therefore a requirement of packaging components. It is estimated that Wal-Mart's top 125 suppliers have spent $50 billion to achieve compliance with the requirements. Some negotiations on start dates and number skus with Wal-Mart and CPGs did occur.

Since then, the Wal-Mart RFID edict has fostered an image of the company as an unreasonable member of the value chain. The results have been less than optimal. The relationship between CPGs and the retailer was not extended, and minimal assistance was provided to achieve the RFID implementation targets. Further, the expenses were not shared

equally and neither were Wal-Mart's savings. Later, when Wal-Mart actively sought consultants, universities, and assistance from CPGs to create their "Scorecard" for sustainability, many CPGs held an unfavorable preconceived notion of Wal-Mart's motives, despite the "greater good" arguments offered by the store. Trust was lacking in the relationship.

Many CPG's, considering options of direct sale to the consumer, are exploring the question of whether a retailer is needed at all. For example, manufacturers of hearing aid batteries, frustrated with retail out-of-stocks, warehousing and retail display confusion, are investing in precisely such direct sale programs to thwart the power of retailers.

We must learn to make initiatives became reality by involving the value chain. Clearly, a new system of reward is needed to build relationships up rather than tear them down.

6.4.3 Orchestrate Communication

The purchasing system of signed contracts for price and volume, has moved on to an evaluation of how a supplier might respond to particular situations. This addresses the value (beyond its mere price) of the packaging component. The following situations occur with high frequency in the package purchasing environment.

- out-of-specification packaging
- supply issues: too much required, or not enough, at any given time
- quick response to a competitive threat
- implementation of more sustainable technologies
- energy costs that make financials not viable
- consumer complaints
- counterfeit accusations

Resolving how such issues will be handled prior to contract signing is a process that focuses on how the companies will operate together, rather than just supply a component. Creating a blueprint, or "dress rehearsal" for solutions, raises the inherent value of the relationship beyond the price. Transparency in these process solutions is essential. In the packaging value chain, social issues must be addressed and greater confidence in value chain relationships fostered. Technology is only part of the solution. Large multinationals use their packaging to communicate knowledge about the product to retailer, consumer, and the post-consumer environment. They communicate this purpose to their suppliers down the value chain. The multinationals are thus translators of knowledge. By working with the value chain, we develop methods more appropriate and

timely than technology alone can provide. This is done by transparent communication.

6.4.4 Develop Functional Relationships with Multiple Stakeholders

In the preceding case study, involving the 80% recycled content, we noticed the involvement of multiple stakeholders. This is typical of most package development. In the developing world, for instance, we see multiple stakeholders in food packaging, all of whom are vital for efforts to ensure innovation and thwart counterfeiting. At the same time, the value chain in the developing world is still emerging, still rough: it often breaks down before products reach distributors or components reach manufacturers.

In the Kingdom of Saudi Arabia (KSA), for example, 90% of exports are related to the oil industry, yet the value chain there is weak in turning oil into non-commodity plastics for external markets, or for packaging to export indigenous foods (dates and confections). Building a value chain for plastics within the KSA will involve multiple stakeholders. The linkages between suppliers of resin with polymer processing facilities (and their researchers and catalyst suppliers), converters, CPG, and retailers, are weak in the KSA. Internal markets for products are untapped by the KSA plastics industry.

In essence, then, the KSA needs to promote its polymer industry so that products made there, whether for internal consumption or export, use packaging that is also made in KSA. To do this involves multiple stakeholders. The value chain linking these stakeholders starts with what consumers, retailers, and CPGs want. The polymer uniqueness can then be specified and translated to converters and polymer processing facilities in the KSA. In the food packaging industry, stakeholders are responding to a heightened awareness of food safety associated with the Global Food Safety Initiative (GFSI) and the need for Halal products designed for Muslim consumption. There is an opportunity here for stakeholders to work with the packaging value chain:

1. to provide packaging that wins confidence for newly approved suppliers of ingredients and products;
2. to provide packaging for Halal products needed in growing urban population centers (the packaging needs to communicate, visually, that it is a Halal product).

KSA industry can focus on value in partnership with multiple stake-

holders to address the challenges of innovation and counterfeiting. This would develop a functional relationship with suppliers.

6.5 QUESTIONS ON PACKAGING VALUE CHAIN

Describe a situation in package counterfeiting and a packaging value chain solution.

6.5.1 Response from Cristina Bouthillon, Packaging Projects Engineer, Colgate Palmolive-Europe

Our suppliers of PET preforms that used to blow mold PET bottles have production issues. Recycled PET preforms are often out of specification in color or viscosity. We have no internal controls to assess preforms quality. Temptation to send counterfeit preforms may be high. This can clearly affect the value of our bottles. For example, lower quality preforms will result in inadequate bottles.

To avoid counterfeiting with suppliers, the key value chain solution is transparency and open discussion (Protocol, 2006). We can build a partnership with the supplier, trying to find common solutions to the issue that are less expensive for both sides. They can come to us, in full transparency, each time they have an issue. On our side, we are not strict in our position, we try to find a solution to use the out-of-spec preforms rather than decide to immediately destroy them. We are willing to test them, to adapt our production process even by reducing production speed, or to use extra controls in our production lines to ensure the same quality for the consumer. We are also ready to increase our costs and make efforts to avoid destruction costs for our suppliers. Consequently we expect a full transparency and honesty from them. We can also establish a reward system, with common targets of non-conformance objectives, knowing that all issues that are clearly communicated (instead of simply shipped with the problem concealed).

To build a transparent and strong relationship with our customers, the supplier should focus from the beginning, even before signing any contract, on defining clearly their business with our company:

- for the products: specifications/quality controls plans (methods, frequencies of tests);
- for the supply chain: minimum order quantities/delays in filling orders/minimum stock quantities.

These points need to be discussed openly and defined precisely, with realistic (specifications not too narrow) expectations.

Moreover, all quality control results should be available. So that, for example, when there is a concern about a batch of preforms bursting during the blowing process on the customer line, we can access within 24 hours the full quality control results of the tests made on the batch concerned. Of course, results should all be within specifications, with no batch delivered that is out of specifications.

We can then build a team to try to analyze the issue and find both the reason for the failure and a solution. The full value chain should be analyzed: the material used to make the preforms, the preforms production, transportation, storage, and the production line and process used by the customer. Then action should be taken to ensure that the problem does not happen again (modifying the injection process, modifying specifications, adding extra controls to the quality checks).

This strong support and issue analysis and problem solving will build the confidence in the relationship between my company and our supplier of preforms.

6.5.2 Emerging Markets and Counterfeit Packaging

Explore an emerging market of your choice and address three issues. Consider packaging value chain solutions.

1. Counterfeit medical packaging is not readily detectable by distributors and consumers who are unfamiliar with the available products.
2. The difficulty of tracking counterfeit medicines and packaging.
3. Issues of intellectual property.

6.5.3 Response from W. Houghton, Package Development Engineer, Kao Brands Company

In today's information age, the theft of merchandise and intellectual property is eroding corporate profits. Counterfeiting is a significant problem for pharmaceutical manufacturers in Russia, where 2,500 distributors complicate a regulatory process that is in a state of flux (Wechsler, 2009). In his 1996 work, "Farewell My Logo," author David Stipp described drug piracy as being "as lucrative as pushing heroin, about as hard as photocopying and low on the law enforcement agenda." Counterfeiting is a major threat to the economy. It endangers public safety in very

sobering ways. I'll explore the problems presented by counterfeit drug packaging and proposed packaging solutions. In some cases, these scenarios are not exclusive to Russia, but are shared by all nations where pharmaceuticals are sold.

Issue 1

Counterfeit packaging cannot be visually detected by distributors or consumers in Russia. For consumers, that can mean serious side effects, or death. Manufacturers bear the burden of proof when battling damage claims against counterfeit drugs that use their trademarks. In the United States, plaintiffs are holding drug manufacturers accountable for both the authenticity of the drugs and the anti-tampering measures they have instituted (Deisingh, 2004).

Solution

Pharmaceutical companies must incorporate anti-counterfeiting technologies, sometimes employing an array of packaging tactics. The three basic categories are: overt security features that do not require instruments to detect them (such as holographic foils or watermarks); covert features that are concealed and require a simple reader, such as a UV lamp, to identify them; and forensic features that are shared with buyers on a strictly confidential basis. The last category provides convincing evidence as to whether a product is genuine, and may include the following features:

- DNA fragments to packaging;
- Chemical taggants including fluorescent-sensitive materials;
- Physical taggants including microscopic plastic particles.

Issue 2

Tracking counterfeit drugs is difficult and expensive for LDCs like Russia.

Solution

Electronic tracking systems, like RFID, may prove helpful in tracing the passage of drugs through distribution. RFID tags can identify drugs by assigning individual serial numbers to each product. The strategic placement of RFID readers in the distribution network is essential in

tracking products. The FDA has suggested that RFID technology could support a chain of custody, ensuring that drugs are not diverted or counterfeited by allowing wholesalers and pharmacists to determine the identity and dosage of individual products. The technology is becoming more sophisticated, reliable, and inexpensive, although it has not yet been proven and is not in widespread use.

Issue 3

While the pharmaceutical industry in Russia loses more than $250 billion dollars a year to counterfeit medicines, the manufacturers have been party to their own demise because of their systemic lethargy in IP protection efforts. A survey of 53 domestic and foreign pharmaceutical companies operating in Russia revealed that fewer than one in five had registered their trade marks and brands with the State Customs Service. Just over a quarter had sought copyright protection for labels and packaging, and only 36% had registered patents with Rospatent, the Russian Federal Service for Intellectual Property, Patents and Trademarks (Hering, 2002). Corruption and poor enforcement have significantly impeded companies from seeking protection or pursuing infringement litigation.

Solution

The International Pharmaceutical Manufacturers (AIPM) and the Coalition for Intellectual Property Rights (CIPR) will need to be instrumental in driving change by political and industrial lobbying. These organizations can be connected within the value chain. An organized coalition between industry, consumer organizations, and government may provide the most effective force for good in this post-communist state. Both organizations, along with some government figures, are lobbying for strengthened criminal penalties. The Ministry of Health has also established a new inspection service, which is intended to communicate more effectively to the public.

Assumptions

According to the International Federation of Pharmaceutical Manufacturers Association (IFPMA), 7% of all drugs sold around the world are counterfeits, with the value of this trade being about $30 billion. In Russia, 12% of the medicines are counterfeit, and in Ukraine perhaps as much as 40%. Other sources claim that only 3.6% of all drugs in Russia

are fake, according to the deputy minister of health, Anton Katlinsky, at a recent press conference in Moscow (Schofield, 2001). In any event, let's assume the accurate number falls in the range of 3–12%. The solutions proposed can only be successful if federal authorities understand the impact.

6.6 CONCLUSION

This chapter addresses how large multinational corporations can compete more effectively using the packaging value chain. The focus on innovation and counterfeiting reinforces how the value chain is needed for meaningful innovation to occur and for greater consumer product confidence.

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CHAPTER 7

Retail Opportunities With an Agile Packaging Value Chain

7.1 INTRODUCTION

Retailers who want to create relationships that foster and retain competitiveness beyond their internal capabilities are looking to the packaging value chain. Changes in global demographics prompt retailers to be agile in their approach to both new and existing markets, because they are learning that an agile response, rooted in the packaging value chain, assists retailer competitiveness in all retail platforms worldwide: product-specific markets, mass markets, and internet markets. This chapter addresses how increased agility can improve competitiveness for retailers and the members of the packaging value chain.

7.2 AGILITY IN GLOBAL MARKETS

Change is the common factor in both mature and emerging markets. In emerging markets, there is a rapid growth in populations under thirty five years old. Mature markets, on the other hand, have their greatest growth in the group over thirty five. Growth potential in emerging markets is larger than in mature markets. But while mature markets respond to the known needs of an aging population, agility in emerging markets means the readiness to respond to unknowns. The stakes are high, competition fierce. Regulations in both markets are starting to define how agility can increase competitiveness. A new approach using the packaging value chain provides needed leverage to gain and retain these markets.

7.3 MATURE MARKETS

The packaging value chain in mature retail markets is challenging, because the path from raw packaging materials to the retailer and then the post-consumer environment is fragmented and quite extended (Field, 1998). By taking a leadership position, however, retailers can guide decision-making down the value chain. The top four retailers in mature markets are: Wal-Mart (United States), Carrefor (France), Tesco (United Kingdom), and Metro AG (Germany). The largest retailer, Wal-Mart, with its Global Food Safety Iniative (GFSI), offers a good example of how a retailer can make an impact in improving the quality and safety of products in its supply chain. The effect of this initiative has been far-reaching: as soon as food safety processes are put in place, ingredients are certified. In a manner similar to the GFSI, other global retailers are refining the customer's selections by offering:

- foods without high fructose corn syrup (Trader Joe's);
- diamonds, established by the Kimberley Process Certification (Tiffany & Co), to be untainted by war crimes and human rights abuses;
- fair trade via the internet (Fair Indigo);
- fair manufacturing practices (IKEA).

This same concept can be applied to packaging. By linking with retailers, other members of the packaging value chain increase their retail presence and resultant sales (Huber *et al.*, 2001). Private label packaging has been used effectively by large corporations to gain a direct package connection to consumers. Further down the value chain, private label packaging designs and sources can both better resonate with consumer needs. Culinary Circle, a SuperValu product line, has strong product image and logo recognition, but the package design and development lacks the innovation and connection to match. Using the packaging value chain and focusing on the high-convenience and taste-oriented consumers, the packaging value chain could be employed to deliver:

- easy open;
- portion sizes;
- package pairing of items for a meal;
- separation of meal parts to increase shelf life;
- use of handles to improve portability;
- raw material specifications to enable further design options;
- package design to incorporate non-stock container packaging;
- directions for ease of recycling/reuse options (SuperValu, 2009).

These same concepts can be applied to other private label package applications. Attention to every step of the packaging value chain from raw materials to post-consumer handling is needed to be competitive in a crowded market.

IKEA was the 2007 recipient of the multi-market retailer of the year award. IKEA's Natural Step program, initiated in 1990, has led the way in connecting consumers at one end of the packaging value chain to the packaging suppliers at the other end. This program mandates the use of recycled materials for distribution and retail packages. As environmental regulations have evolved IKEA has been able to be agile and adjust protocol since it already had a system in place.

Migros (meaning "my wholesale" in French) was the most responsible retailer in 2009 as selected by the World Retail Congress. Migros is an excellent example of how a retailer can retain competitive standing by connecting to the packaging value chain. Migros connects with consumers in traditional ways, offering cooking classes, cultural event sponsorships, and providing shopping areas close to public transportation and these flex by location. But, uniquely, Migros also extends efforts down the packaging value chain, using the rail system for transport and addressing energy use in transport and package manufacturing. Migros customers return 90% of their plastic bottles to the company. Migros then goes beyond this by working down the packaging value chain with their bottle supplier, Aproz Sources Minerales SA, to address reuse of PET. These efforts have resulted in exceeding the goal of 75% of PET containers being recycled in Switzerland by 3% (Federal Office for the Environment, 2008). In the company's sustainability report (Migros 2008), Migros highlights the importance of the packaging value chain:

> Migros has roughly examined the standard assortment in the food sector and conducted the first comparative life cycle assessments on the full range. These take into account the whole packaging chain, apart from the extraction of the raw materials, for example, also the manufacturing and transport processes as well as the disposal and reutilization. Some of the items closely examined included cold meat packages, coffee sachets, milk packages, yogurt cups and cosmetics jars. Result: the carbon dioxide savings potential ranges between 20 and 80 percent.

Migros has been able to flex its agile customer focused value chain to deliver what is important to is customers. The activities of Wal-Mart, SuperValu, IKEA, and Migros demonstrate how successful retailers in mature markets can remain competitive using a fluid and agile packaging value chain.

7.4 EMERGING MARKETS AND THE NEED FOR PACKAGING VALUE CHAIN AGILITY

Among the most now sought-after retail markets are those of India, Ukraine, Russia, Malaysia, China, Colombia, Brazil, and Turkey. In these countries the controls on retail offerings include requiring products (especially food) to originate within the local area. While it is true that in the mature markets, with agricultural strength and subsidies, there is a growing trend to "buy locally," the trend reflects a consumer preference versus regulation. In emerging markets, on the other hand, there is fear of predatory pricing aimed at driving out the indigenous markets—as happened in the United States between 1980–2000, when large retailers locating in small towns overwhelmed small retailers. These emerging markets can be divided into two basic retail environments.

1. Markets in which large retailers already dominate.
2. Markets where small retailers dominate.

This section addresses how agility in the packaging value chain can be competitive advantage in such markets.

7.4.1 Large Retailers Dominate

Though the Indian, Chilean, and Chinese retail markets are dominated by large retailers, there is an opportunity to work with the packaging value chain and remain competitive in these countries.

In the Indian market, where two thirds of a population of 1.15 billion people is under the age of 35, the packaging value chain maximizes the opportunity for retail growth opportunities. There are, however, increasingly numerous regulations to consider, that will impact the packaging value chain. In India, retail regulations focus on two central needs:

1. Fostering continued growth in domestic companies through the retailer.
2. Protecting indigenous retailers from multinational retailers.

These regulations are based on preventing the negative impact that the predatory behavior of multinational retailers have had in some mature markets. Regulations to foster growth in domestic companies try to ensure that retailers sell domestic products such as produce and electronics. Enacting such regulations is an attempt to prevent the large retailer from charging lower prices on select goods in order to drive consumers from an existing retailer. These protections are deemed necessary in emerging

markets such as India, which is transforming itself from an agricultural powerhouse to a consumer-based industrial power. What is interesting about these regulations is that they address retailers rather than specific imports and exports. Such regulations represent barriers for the multinational retailers. Regulations offering similar protections are now being considered in China.

Shoppers' Stop operates 27 stores in India under various names and offers one-stop shopping for food, clothing, and home supply products. As emerging market retailer of the year, the company has an opportunity to connect with the packaging value chain by using indigenous packaging materials and modifying established packaging systems to upgrade capacity. Controlled supply chains and value chains, where goods are securely transferred from one distribution center to another, require refinement in emerging markets where large retailers already exist. Packaging suppliers that make linkages with distribution centers, and offer secure distribution centers and transit, help secure business. For example, a PET bottle supply company can secure transport for labels and caps to arrive simultaneously. This supplier can also provide secure transport to their distribution centers as a means of lowering transit costs (trucks arrive with packages and leave with product). The ideas that Migros devised for mature markets can be applied to emerging markets as well.

As economies reshuffle, product for export markets is shifting to in-country retailers. In China, where economic downturns in the export market have refocused company sales on the Chinese market (*China Daily*, 2009), products formerly sent abroad are now purchased at home. Large sales of these products are reported by the store chain Wumart (Chinese for good product) that operates over 500 stores in Beijing. The proposed Time-Wumart buyout would enable coverage in the respective markets where Time and Wumart now dominate. The packaging value chain connection offers many opportunities for in-country production of packaging for domestic sales. Agility in response to regulations and the sheer size of emerging markets with established retailers, is needed to gain a competitive advantage in the market through packaging.

7.4.2 Retail Environment is Loosely Connected

While India, Chile, and China are dominated by large retailers, Ukraine and Colombia are not. In the Ukraine only 9% of the market is controlled by chain retailers and in Colombia 15%. Such fragmentation is attractive to large retailers, which is why the regulations already in place in India are being enacted in Ukraine and Colombia. This difference prompts different retail strategies for packaging companies in the

Ukraine and Colombia, where a multitude of goods are imported. There is a need for rapid package designs based on size, refrigeration, and appeal to the emerging consumers.

By organizing a subset of its sales operations to focus on the Ukrainian market, a large polymer supplier (let's call it PS) to the HBA industry refined the value chain when a subset within PS sales operations went beyond the logistics of supplying a package component for the Ukrainian market. PS realized early that their customer's need was sourcing packages quickly to meet an unknown and untapped retail market. While the HBA possessed market research to enable sales projections, they were not confident in their accuracy. They wanted to be able to increase and decrease shipments based on the Ukrainian consumer's response to ad campaigns. The HBA's need for agility in regard to packaging supplies and inventories was high. This need transferred down to PS as a packaging supplier. PS took on the role of designing packages with flexible components to enable quick response time. This involved the identification of common packaging components for various product lines being launched, the exploration of viability to consolidate other package components, and the necessity of providing finishing services such as positioning the ferrule, stem, and cap for a perfume bottle, prior to shipment to the HBA for bottle filling.

By working closely with PS, the HBA can offer confidence in secure packaging through solid supply and value chains in emerging markets where product tampering, theft, and shipping damage rates are higher than in mature markets.

7.5 NEW GLOBAL RETAIL PLATFORMS

Global retailing on a truly international scale has enabled cross-country competition. The challenge of the internet platform is to connect, through the packaging value chain, the post-consumer environment to the raw materials used for packaging. There is a plentiful opportunity in this arena. The Apple Store, recipient of the 2008 recipient of the E-Retailer of the Year Award, connects to consumers well. The store can be accessed from almost any country and responds to customers with agility. Other contenders for the award—Alsi, Pao de Acucar Group, Fast Retailing, Primark, and Wal-Mart—demonstrate the breadth of the on-line environment and the challenge. Pao de Acucar (second largest retailer in Brazil) has, in particular, connected well with consumers through their purchase behavior. Innovations in package sizes for internet products such as cooking oils have addressed consumer needs

successfully. While this market represents a sizable opportunity, focus on the packaging value chain, specific to this market, is still insufficient.

7.6 QUESTIONS ON PACKAGING VALUE CHAIN

7.6.1 India and the Packaging Value Chain

Many applications of technology that are not appropriate in the United States are being applied in the rapidly growing markets overseas, especially in the BRIC nations (Brazil, Russia, India, and China). As multinational companies enter the Indian market, small-scale retailers can only compete by efficiently building their supply chains. List and explain five ways Indian retailers can employ packaging value chain concepts to better compete.

7.6.2 Response from Richard A. Batton, CPP, Packaging Manager, JohnsonDiversey, Inc.

In 2006, Bharti and Wal-Mart unveiled their retail plans to enter the India market and thereby bring a strategic entrepreneurial expansion into the second most populous nation in the world (Reliance Retail, 2006). Bharti and Wal-Mart plan to share equally in the partnership, Bharti managing the front-end operations and Wal-Mart powering the logistics and back-end operations. Bharti made an initial investment of $100 million. The plan includes making deals with major real estate developers across India and opening Hypermarkets and Neighborhood stores alike. This leaves the question: how do small retailers compete with a joint venture like this? This exploration looks at five ways small retailers can employ value chain concepts to compete.

1. Seventy percent of India's population (approximately 700 million people) live in rural areas (Tapping India's). Less than 4% of the retail sector is accounted for by organized retail (Retail Rage). In such an environment, distribution and transportation presents a big challenge to any large joint venture company. A smaller, local retailer, must find ways to strengthen its distribution system in such a way as to lower its cost while providing more value to its customers.

   It will need to consolidate its manufacturing and facilities for converting raw materials in proximity to areas of customer concentration and raw material sources.

   It will need to focus on products that take advantage of locally available raw materials that are lower in cost and easier to obtain.

It will have to ensure that its low volume shipments are efficient by seeking partnerships with shippers and distributors.

2. Multinational retailers, in concentrating heavily on partnerships with Indian companies that are already successful, can enjoy all the advantages of the knowledge and experience of these local companies and their distribution and manufacturing networks. Local retailers are already established in their neighborhoods; they cannot afford to lose this advantage. They must embrace partnerships themselves and do it better, more efficiently, than the foreign companies. Working from relationships already in place, and enjoying knowledge of local suppliers and local markets, they must link with still more local players to find complementary distribution, manufacturing, or information resources. They may also seek to form partnerships with an established, larger company, such as Hindustan Unilever (HUL). HUL, recognizing large multinational retailers as direct competitors, will be open to any advantages gained by partnership with local, smaller retailers. A small retailer needs to identify its core competencies and strengths, offering those strengths to any local player of any size that be willing to form a lucrative value chain partnership.
3. Understanding which products have a higher demand in various regions is essential to the small retailer. Large corporations may find it more difficult to cover specific product offerings demanded in different regions, but the smaller retailer can channel its value chain toward products that will meet such demands in the local area where they operate. For example, in urban India customers prefer toothpaste, while in rural India customers favor tooth powder. Mastering such knowledge about product demand is essential to the small retailer. Sharing this information with other local small retailers could provide additional advantage and insight in a given area. The retailer must then focus on using that knowledge to select the most popular products as part of its offering. Such products should then be the subject of in-depth cost analyses to find ways to reduce cost.
4. Because India's rural customers have little disposable income, local retailers must find ways to cut costs as much as possible. One way to do this might be to eliminate secondary or even primary packaging wherever possible. Retailers could allow customers to bring their own containers, or to purchase one for a nominal fee, and then take the product directly out of bulk bins. By reducing unneeded packaging and manufacturing, these products could carry a lower cost and a higher margin to the retailer.

5. Small retailers will be confronted by the low cost products and wide product varieties offered by larger joint ventures of multinational companies. One way to counter this situation might be for local retailers to offer some sort of delivery service. Shoppers at local retailers make the trip to the store daily, which requires a lot of time and energy. If local retailers could either create, or partner, with a delivery service to bring the product directly to the customer's home, it would eliminate transportation hassles. This might also serve to limit the customer's exposure to competing products by reducing the need to shop around as much.

7.6.3 Wal-Mart, Sustainability, and the Role of the Packaging Value Chain

In the last few years sustainability has dominated the retail environment at Wal-Mart—and its packaging value chain initiatives. While Wal-Mart's focus on sustainability does offer triple bottom line benefits (TBL: people, profit and planet focus), it has also created conflicts in its packaging value chain as a whole, and opened opportunities for improvement in other areas of the packaging value chain. Let's explore the demand side of the retail value chain in packaging from this perspective. Develop and explore three implications for the packaging sustainability focus of Wal-Mart related to the packaging value chain.

7.6.4 Response from K. Lively, Michigan State University Masters Degree Candidate

Implication #1

Brand-Owners are Encouraged to Switch Materials. Wal-Mart's scorecard gives industry averages for material types, which leads to certain materials being chosen by packaging makers over other, lower score materials. Consumer Packaging Groups (CPGs) can use the Virtual Packaging Show to aide in choosing materials and suppliers. CPGs cannot see a supplier's individual score but will make decisions based solely on material type average. The individual score of the supplier may vary drastically. Choosing a supplier based on material type average is not a complete assessment, and will lead to CPGs picking a partner who may or may not have the best process within the packaging category. Larger firms would have a capacity advantage, but would also have variable scores because of inconsistencies across their network. At the same time,

they could have a cleaner process than their competitor because of capital expenditure and asset upkeep. A smaller firm, more concentrated on one type of material, may have a better, more efficient process. But this is not apparent through the scorecard method, and it is a disadvantage to the packaging value chain.

Bio-based materials score higher through the Wal-Mart scorecard than traditional polymers. This will lead CPG packaging engineers to trend toward bio-based polymers. The Wal-Mart score card does not effectively score the interaction of materials within the supply chain as they relate to other materials. For example, PLA (a bio-based material) may be somewhat hard to distinguish from PET. They both have similar clarity and feel. This leads to sorting issues during recovery. If a significant amount of PLA ends up in the PET recycling stream, the recycled PET quality will be compromised. And, the scorecard is not agile in reassessing the sustainability of PLA when a compost site is not available or there is a shortage of corn (PLA's base) for food.

Implication #2

Barriers to Entry May Increase. Smaller firms that do not employ packaging engineers will lack the resources to input data into Wal-Mart's scorecard system. Analysis and input of the scorecard data requires some level of understanding of packaging principles. This results in fewer players, and ultimately eliminates competition by giving business only to packaging suppliers with more resources at their disposal.

Suppliers who may have an extremely innovative design but are not strong in other areas could score low, and never break into the supply chain. Innovation could stagnate. A new process, design, or material that isn't mature is much less efficient than mature processes that have been subject to cost savings, lightweighting, and re-tooling. New technology, in this case, would never be noticed through the scorecard process. Promising technology is sometimes discovered through end user endorsements, and during innovation phase is rarely as efficient as it will be later. By only encouraging what looks best right now, the scorecard does not promote long-term strategy development.

Implication #3

Brand-Owners Ability to Market to Retailers Will Be a Competitive Advantage. Until now suppliers were never able to tout all benefits to Wal-Mart on a basis of comparison with competitors. This is an advantage for brand-owners who have a particularly sustainable process.

While their design features may be weaker than their competitor, they can still win on sustainability score. Wal-Mart is making choices that give weight to a reduced carbon-footprint and are not dependant on aesthetics. Another aspect of the scorecard is that Wal-Mart cannot choose a brand-owner that refuses to provide product information. Only brand-owners that achieve the best score and share information enjoy a competitive advantage.

Brand-owners offering the right combination of sustainability and aesthetics will be rewarded with Wal-Mart's business. Because Wal-Mart is a leader in consumer retail, packaging suppliers will shift their industry to invest in packaging with the highest scorecard values. Wal-Mart's scorecard is not a full Life Cycle Assessment (LCA). The industry is being shifted in a skewed direction based on Wal-Mart's interests.

7.7 CONCLUSION

When the power of retailers is considered, many opportunities for agility in the packaging value chain are discovered. Changes in the global economy and demographics fuel the need for new approaches to competition in new and existing markets. The current focus on sustainability offers a platform that is being explored by many retailers. Further opportunities in the arena of e-commerce can be achieved with more agile packaging value chain.

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CHAPTER 8

Using the Value Chain to Ensure More Sustainable Packaging

8.1 INTRODUCTION

Among its other uses, the value chain provides a context for the development of sustainable packaging. Collaborative relationships between suppliers and customers on innovation, R&D efforts, or confidential development are not new. The packaging industry has worked on environmental initiatives since the time of *Silent Spring* in the 1960s and 1970s, and then again in the 1990s with Proposition 65 in California, the Green Dot system in Germany, Japan's far-reaching 1995 regulations, and forthright directives from the European Union and other global markets. During this period, many packages were light-weighted, alternative resins selected, and inks and dyes replaced by more environmentally friendly components.

Two decades later, the packaging industry is faced with the need to comply with growing regulations that vary by continent, country, region, and city, as well as from one retailer to another. Decisions on sustainability cannot be made without comprehensive information at every stage, from raw material suppliers to post-consumer disposal solutions. And yet, too much information, the complexity of information, lack of confidence in the information, and lack of transparency, all combine to make the aim of delivering more sustainable packaging a struggle. Supply chain solutions have indeed proved successful (Prendergast and Pitt, 1996). But if further progress on sustainable packaging is the goal, a new business process is needed—a solution beyond traditional supplier alliances.

That solution is the value chain, which inherently defines what has

value for the customer (and post-customer environment). It is within the value chain that information can best be focused, starting from the initial packaging raw material supplier (Lai *et al.*, 2008), and moving on to the needs of a customer's customer—and beyond. When relevant information about the customer's customer is provided and understood, a competitive advantage in the market is gained. This chapter addresses how the value chain can deliver sustainable packaging that is more valued than it otherwise would be. The value chain is a connected approach to sustainability: it resonates with initiatives connecting suppliers with manufacturers and manufacturers with retailers, then extends this connection so that raw packaging material suppliers connect with consumers and the post consumer environment.

8.2 PROVIDE A SOLID POSITION ON SUSTAINABILITY WITHIN THE VALUE CHAIN

Simply stated, the key concerns regarding sustainable packaging are air, water, land, and energy. A solid stance on sustainability allows clear communication to customers (and their customers) and suppliers (and their suppliers).

For packaging raw material suppliers, such understanding focuses efforts to ensure that goals and activities align within the value chain. Nestlé, for example, has a clear core strategy of water conservation. Nestlé communicates this strategy to its vendors very clearly, and vendors that listen and respond do well in dealing with the company. Nestlé's Water Management Report, released in 2007, detailed the WATER initiative:

- **W**ork to continue reducing the amount of water used per kilo of food and beverage produced;
- **A**ssure that our activities respect local water resources;
- **T**ake care that water discharged into the environment is clean;
- **E**ngage with agricultural suppliers to promote water conservation among farmers;
- **R**each out to others to collaborate on water conservation and access, with a particular focus on women and children.

Suppliers focus their sustainability efforts to demonstrate that they are on board with Nestlé initiatives. The importance of partners can be seen in the solid vision from Peter Brabeck-Letmathe, Chairman and CEO of Nestlé: "No one partner can do it all, but together we can influence, alter, protect, and preserve the vital resource of water for future generations."

When Nestlé assessed blow molding bottle suppliers, alignment to the value chain was a factor. When a potential PET bottle supplier presented a detailed account to the Nestlé purchasing manager, explaining how the supplier uses minimal water to cool bottles after blow molding, and invests in reuse technologies, Nestlé recognized a good fit with its core environmental strategy. This supplier gained the business by offering a competitive advantage beyond price. The two companies refined the value chain and innovated in an area of packaging that was important to Nestlé. From a competitive standpoint, this supplier gained an edge over its competitors because it recognized what was important to Nestlé and Nestlé's customers—namely, working synergistically on the water scarcity issue and making a meaningful contribution to more sustainable packaging.

8.3 INNOVATE BY CONNECTING SUPPLIERS AND END-USERS BY MEANS OF THE CRADLE-TO-CRADLE CONCEPT

Cradle-to-cradle thinking and total package life cycle principles offer a context for sustainability that connects the raw materials to the end use of packaging. The concept executes a value chain loop in which post-consumer packages have increased value. Economically viable recovery systems that effectively eliminate waste throughout the value chain are being explored. The concept of cradle-to-cradle originated with William McDonough and Michael Braungart's *Cradle-to-cradle: Remaking the Way We Make Things* (McDonough and Braungart, 2002), and the first industry-wide meeting directly addressing cradle-to-cradle applications in packaging development took place in 2003. Since then, the concept of cradle-to-cradle in package design has become definitive. McDonough and Braungart explain that:

> when materials are created specifically for use within these closed-loop cycles—the flow of biological materials through nature's cycles of growth, decay and rebirth; or the circulation of industrial materials from producer to customer to producer—businesses can realize both enormous short-term growth and enduring prosperity.

In the cradle-to-cradle concept materials are continually made more useful, and the energy used to convert materials from one useful state into another is recovered. For cradle-to-cradle packaging to exist, the value of the package after it has performed its first function must be significant.

Further, the recovery of the package and its conversion into another useful state—or even a value-added, or "up-cycled," one—must be done if at all possible within the existing infrastructure and economic limits. Materials with the least environmental impact, that can be reused rather than "down-cycled," are essential for cradle-to-cradle design. When cradle-to-cradle is applied within the value chain, higher degrees of sustainability between converters, suppliers, manufacturers and consumers can be achieved.

8.4 SUPPLY THE TRANSPARENT INFORMATION NEEDED TO MAKE DECISIONS

Companies that provide and leverage sustainability data demonstrate the transparency and trust required to build a more sustainable value chain. Fifty percent of the Fortune 100 Companies surveyed indicated that they choose suppliers who meet sustainability criteria (Kearney/ISM). Technology, in the form of information gathering on more sustainable packaging alternatives, is at the core of connecting with the value chain. Life Cycle Assessments (LCAs), Life Cycle Impacts (LCIs), use data sharing and technology in estimating the costs to produce, distribute, recycle, reuse, landfill and incinerate sustainable packaging. Standards defining the practice of LCA/I have been developed by the International Standards Organization (ISO 14000), the Society for Environmental Toxicology and Chemistry (SETAC), and the United Nations Environment Program (UNEP).

LCA/I rely on mass and energy balances and other tools of thermodynamics that have a variability of 10 to 15 percent. The high degree of variability has resulted in conflicting claims that some packaging materials, suppliers, or producers are more environmentally sustainable than others. These conflicting claims led to the packaging industry's use of representative information. A representative LCA/I employs a process flow of a package's life cycle that is accepted by the industry. Manufacturers, however, can and do seek to differentiate themselves from the pack. A manufacturer with a state of the art process may demonstrate how its energy use is lower than the average LCA/I data. Sharing this information provides a competitive advantage. More importantly, sharing how the information was collected builds confidence.

LCA is a powerful tool that can:

- improve the environmental impact of a packaging system;
- benchmark company performance against the rest of the industry;

- internally benchmark different packages or processes;
- avoid material introductions and choices that have a negative impact;
- highlight situations where new material development is needed.

The level of investment in and commitment to LCAs is high. Companies who strategically leverage LCA studies and employ them to guide decision-making are often both market and category leaders. LCAs provide essential guidance for achieving more sustainable packaging and are well worth the investment. ISO 14040 and ISO 14044 state the principles and framework.

8.5 USE SUSTAINABILITY TO CONNECT FURTHER IN THE VALUE CHAIN

Some manufacturers have developed their own process to measure the sustainability of their suppliers and/or customers. This goes beyond the LCA/I studies. They are, in concept, similar to the Sustainable Packaging Coalition's (SPC) Comparative Packaging Assessment (COMPASS) tool. BASF uses an internally developed system to provide sustainability information and direction to manufacturers. This system addresses resource and energy consumption, air emissions, potential water and soil risks, and is based on DIN EN ISO 14040 and 14044 standards. Extending the value chain using eco-efficiency since 1995 has allowed BASF to understand and act upon the needs of its customer's customers. The service is seamless, secure, and supplies sustainable packaging information that BASF customers use to communicate with their own customers and interface with other third party suppliers. BASF has received the seal of approval by numerous governmental and non-profit organizations.

BASF received the Federation of German Industries (BDI) Environment Award in 2006 for its Partners for Sustainable Development work with United Nations Industrial Development Organization (UNIDO), United Nations Environmental Program (UNEP), and BASF in Africa. "Our commitment to sustainable development and eco-efficient products must not be limited to the industrialized countries," says Ernst Schwanhold, head of BASF's Competence Center Environment, Safety & Energy. "We need to extend it to developing countries where the potential for improving environmental protection is often greatest. That is why we are so delighted to receive this important award. It bears testimony to the years of successful cooperation between UNIDO, UNEP and BASF."

BASF's interface with customers on package sustainability is an ex-

ample of how a company can compete well within the value chain. BASF solicits, gains, translates, and communicates information that their customers need to better compete in the marketplace. And, BASF customers have a competitive advantage with their customers. BASF has employed sustainability to better connect within the packaging value chain.

8.6 BUILD CONNECTED FUTURES THAT EXTEND THE VALUE CHAIN

Japan's Containers and Packaging Recycling Association regulations, established in 1995, define the unit cost associated with different packaging material types. The unit cost changes each year. Sustainability and how we view our future does not stand still either. Companies must link in synergistic sustainability efforts in order to position themselves competitively for the future.

The polymer industry, for example, dependent on oil for its source, continues to innovate the sustainability promise of polymers. Since polymer manufacturing only consumes about 5% of worldwide petroleum production, the focus on sustainability has been on energy usage and emissions during both processing and post-consumer disposal. The non-oil based polymer packaging industry is working to innovate with its former supplier of oil, BP. This connection to BP has proven valuable for polymer companies formerly based solely oil. BP adopted the corporate identity of being "beyond petroleum." Non-oil based polymer packaging material development is flourishing. By connecting with suppliers and costomers, BP has been able to strategically address sustainability.

8.7 QUESTIONS ON PACKAGING VALUE CHAIN

8.7.1 Adding Value to the Value Chain by Means Sustainable Packaging

Energy costs have hit packaging suppliers hard. Steel is no exception. Leverage on sustainability is more important than ever, energy costs and the GHG production are intertwined deeper than in the last decade. Steel packaging increased 1.2% ytd since 2006. But steel prices are falling. United States steel plants are operating at 75% of capacity. Steel imports from China have increased 106% (2005–2006), and those from Taiwan 175.3% (2005–2006). Imports not only threaten the United States and

European steel industries, they reduce the incentive to recycle steel due to the low price of virgin steel.

Competitiveness in today's steel industry means concentrating on cost instead of the whole value of the product within the value chain. The steel industry needs investment in order to be more sustainable, but low prices provide limited funding for investment. In terms of this situation, one must identify and explore specific areas which the steel industry can use to better leverage the value chain to deliver more sustainable steel-based packaging.

8.7.2 Response from D.C. Seo, Ph.D. Packaging Candidate, Michigan State University

There are many kinds of packaging materials used to protect consumer products in shipment, extend their shelf life in distribution and storage, and deliver information to consumers at the time of use. In addition to these major functions is an emerging one, aimed at ensuring that packaging materials are environmentally friendly throughout all processes of production as well as after their use by consumers. Steel-based packaging has many positive advantages including high physical strengths to resist external shocks or loads, and effectiveness as a barrier to moisture. On the other hand, the production of steel-based packaging materials consumes energy and produces carbon dioxide (CO_2) in high amounts. Only great and continuous effort can overcome such disadvantages (*Daily Telegraph,* 2007). The following six areas in steel's value chain need to be considered carefully.

1. Air and water pollutant monitoring system
2. Reuse of steel by-products
3. Energy recovery/greenhouse gas emission reduction
4. Less consumption of natural resources
5. Promotion of weight-reduced sheets or plates and recycling programs
6. International cooperation on GHG reduction

Air and Water Pollutant Monitoring System

POSCO has established an environmental monitoring system with real-time feedback on pollutant levels, and a forecast system of pollutant density in surrounding areas, thereby opening new ground in environmental management (POSCO, 2002).

Reuse of Steel By-products

In the processes of steel fabrication, there are many byproducts. In the past most were scrapped. Now, through technological development in steel fabrication processes as well as the increasing use of those byproducts by other industries, many steel byproducts are gaining in value. Millions of tons of low-grade superfine iron ore, lying in disused heaps around the world, can be turned into high-grade iron briquettes (*Africa News,* 2008). Slag is used in the cement industry, dramatically reducing CO_2 emissions in cement production. Furthermore, the use of Agslag, made from steel slag dust for use in the agriculture industry to boost grass growth, restore the natural pH balance and mineral content of the land, increase crop yield and improve the well-being of livestock, reduces the amount of such waste sent to landfill (*Farmer's Guardian,* 2007).

Energy Recovery/Green House Gas Emission Reduction

Another way of reducing the greenhouse gas emissions in steel production is to reduce the amount emitted by a steel plant's energy provider. Bluescope Steel has already begun working on a feasibility study for a co-generation electricity plant at its Port Kembla steelworks, which would use byproduct gases from steel-making to generate up to 120 megawatts (MW) of base load electricity and up to 220 MW if peak capacity is added. This is estimated to save 800,000 tons of greenhouse gas emissions every year—the equivalent of taking 185,000 cars off the road (*Daily Telegraph,* 2007).

Less Consumption of Natural Resources

Australia is engaged in developing technologies that will reduce energy consumption during the smelting of iron ore to create hot metal and pig iron suitable for the basic oxygen furnaces and electric arc furnaces used for making steel. HIsmelt Technology, a member of the Rio Tinto Group, has the potential to revolutionize the production of hot metal and pig iron by offering lower operating costs, lower capital costs and lower environmental impact.

Promotion of Weight-reduced Steel Plate or Sheet and Recycling Program

In terms of saving steel resources, the use of weight-reduced sheets or plates in the production of cans or cases offers advantages, providing that

the material is strong enough and meets the technical requirements for the fabrication of the finished goods. In addition, steel makers and metal-packaging manufacturers have to embrace federal and local regulations or laws relating to metal recycling programs and support any upgrade in policy.

International Cooperation on Greenhouse Gas Emission Reduction

There are many ways to reduce greenhouse gas emissions in steel production. Here is a good example of international cooperation in implementing a common objective among steel makers. The Asia-Pacific Partnership on Clean Development and Climate, or AP6, is a major initiative by the Australian government aimed at bringing together Australia, the United States, China, India, Japan, and the Republic of Korea, in a united response to climate change. AP6 countries account for 57 percent of the global production of crude steel, a number which is expected to grow with the rapid economic development of China and India (*The Daily Telegraph,* 2007; *Daily Yomiuri,* 2008). To answer the challenge of reducing greenhouse gas emissions, the AP6 Steel Task Force has developed a number of objectives. The first is to establish relevant benchmarks and performance indicators for member countries. But the real key to progress can only be the development and transfer of best practice steel technologies to reduce energy usage, air pollution and carbon dioxide emissions from steel production (*The Daily Telegraph,* 2007). One of the most straightforward ways of reducing emissions is through recycling. In 2005, the AP6 Steel Committee estimated that almost 43 per cent of global crude steel production came from recycling.

8.7.3 Analysis of Steel Industry Opportunities

Identify 5 specific areas in how the steel industry can leverage the value chain to result in more sustainable steel based packaging. Explore the 5 specific areas in detail on what approach in each area is to be taken. Identify an aspect (company, situation, area) of the steel industry where the steel industry does add considerable value to the value chain.

8.7.4 Response from H. Su, Principal Engineer at AstraZeneca Pharmaceuticals

One of the steps of value chain analysis is to generate a map of the chain (processes and interactions). The map identifies where the inputs and outputs are within the organization and the industry. Once the map is

completed, analysis to extract value can be performed. In the areas of how the steel industry can leverage the value chain more sustainably, below are five specific areas and stages (Dahlström and Ekins) within the steel life cycle:

- the primary production chain, which processes iron ore into pig iron in the blast furnace, and then pig iron into crude steel in the basic oxygen furnace;
- the production of iron and steel products in mills;
- the intermediate consumption of these products by various manufacturing sectors;
- the final consumption stage—the final consumer;
- the disposal stage.

There are seven approaches/principles of positioning within the value chain that could be leveraged by the steel industry.

1. Know the customer's needs in terms of their customers.
2. Use the cradle-to-cradle concept to understand roles in the value chain.
3. Supply the technology needed.
4. Get ready for REACH.
5. Understand retailer markets.
6. Understand how customers evolve.
7. Think to the future.

The following describes principles within five specific areas that the steel industry could apply. In the process of making iron ore into pig iron and the production of iron and steel products, the steel industry should use recycled steel to save energy, coal, limestone, raw materials, water and waste. Production equipment and layout should be designed to incorporate recycled steels. With the increase in amounts of cheap steel from China and India, the recycling program, as a way to reduce cost, is more important now than in the past. Steel companies should establish information sharing and networking sessions to provide immediate customers the information they need to educate their end customers. The benefits of recycled steel as an input are realized only if the sources are available. Therefore actions taken to promote recycling assist the sustainability of the industry.

In the intermediate consumption of steel products the steel industry employs a program similar to that of BASF, which gathers and provides

information to educate their customers, the intermediate suppliers. For example, as Campbell Soup feels growing pressure from their customers, the consumers, about sustainability and the effect that cans have on the environment, the company cannot provide information to the consumers unless they first understand the carbon footprint and the sustainability of the cans that they purchased from their suppliers. With this program, it would be easier for the steel company to gather and disseminate information because it stands earlier in the supply chain than Campbell does, at a point where the information is in an aggregated form. Values, in terms of information sharing, are added, in that it will help the consumers to decide on their purchase.

In the final consumption stage and disposal area, the steel industry could provide the end customers a cradle-to-cradle approach to steel to help the end customer understand the importance of recycling and reuse. The steel industry should think to the future, focus on recycling, promote incentives and educational programs aimed at encouraging consumers to recycle. The values of recycled steel are huge, as identified in the excerpt below.

Every ton of steel recycled conserves 2,500 lbs of iron ore, 1400 lbs of coal, and 120 lbs of limestone. Steel recycling results in a 74 percent savings in energy, a 90 percent savings in virgin materials, an 86 percent reduction in air pollution, a 40 percent reduction in water use, a 76 percent reduction in water pollution, and a 97 percent reduction in mining waste. Recycled steel is processed at a lower temperature (1600°C) than virgin steel.

Steel adds considerable value in the auto industry. A majority of the parts associate with cars are made of steel, especially the safety features providing passenger protection via the cage concept: steel is the metal of choice because it is one of the stronger metals and relatively inexpensive.

Steel plays an essential role in the modern skyscraper. Before steel, the use of bricks limited the height of buildings because brick structures can only rise four to five stories. After that, compression forces cause collapse. Steel withstand those forces, raising towers as high as desired. The only practical limit is due not to any weakness of steel, but to complications arising from support systems such as HVAC, plumbing, and elevators.

8.8 CONCLUSION

In this chapter, various means of using the packaging value chain to achieve more sustainable packaging in a synergistic manner were presented. Achieving sustainability in the context of the value chain can be accomplished by:

- providing a solid position on sustainability within the value chain;
- innovating by connecting suppliers and end users using the cradle-to-cradle concept;
- supplying the transparent information needed to make decisions;
- using sustainability to connect further in the value chain;
- building connected futures that extend the value chain.

This value chain approach is essential to delivering more valued sustainable packaging.

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