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Position Paper

Packaging and Supply Chain Management

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To discuss the topic of Packaging and Supply Chain Management (SCM), it may be adequate to start with some definitions. First one may ask what SCM is. There are several definitions available, a broad and commonly accepted definition is provided by the Council of Supply Chain Management Professionals and states: “SCM - Supply Chain Management encompasses the planning and management of all activities involved in sourcing, procurement, conversion, and logistics management. It also includes coordination and collaboration with channel partners, which may be suppliers, intermediaries, third-party service providers, or customers. Supply chain management integrates supply and demand management within and across companies. The loosely coupled, self-organizing network of businesses that cooperate to provide product and service offerings has been called the Extended Enterprise”.

What is packaging in this context?. Packaging can be described as the technology of enclosing or protecting products for distribution, storage, sale, and use. From a functional point of view, packaging contains, protects, preserves, informs, sells and enables handling, storage and transport. Packaging can also have extended functions like being used as a carrier in manufacturing processes, offer convenience and facilitate consumption, and being part of security solutions to safeguard product quality, prevent tampering, pilferage and theft. Packaging can also be described as a coordinated system of preparing goods for transport, warehousing, logistics, sale, and end use.

Packaging may be of several different types. For example, a transport or distribution packages, retail and consumer packages. They come in many different shapes, like bottles, boxes, bags, sacks to adapt both to the product being packed, like liquid or dry food, consumer goods, pharmaceutical, building materials, bulk goods, cosmetics, machinery and so on, and to adapt to the logistics, manufacturing and consumption environment. Several materials, like plastics, paper & board, metal, glass and wood are used, frequently combined to optimize the total packaging solution. Ultimately, packaging can, if adequately used, contribute to sustainability at a higher level like product, company, sector or society and can also, in line with WPO mission, contribute to better quality of life for more people.

In the supply chain context, it is also relevant to categorize packages by layer or function: “primary”, “secondary”, “tertiary”, etc. Primary packaging is the material that first envelops the product and holds

it. This is usually the smallest unit of distribution and is the package which is in direct contact with the contents. Secondary packaging is outside the primary packaging, and may be used to prevent pilferage and/or to group primary packages together for more efficient distribution. A common type of secondary packaging is corrugated boxes. Tertiary packaging is typically used for bulk handling, warehouse storage and transport shipping. The most common form is a palletized unit load. As product, components and materials are moved downstream in the supply chain the adequate packaging size, type and function will change. Components or sub-assemblies, as an example, can be shipped in primary and secondary packaging between a first tier supplier and an assembly plant. This packaging is then removed (and presumably later recycled or reused) at the assembly plant where a new primary and secondary pack will be added at some work station in the assembly line, to suit the assembled product and the anticipated distribution channels.

So what role can packaging play in a SCM context. Firstly, we can conclude that packaging is typically an item that is out-sourced to a very large extent and involves integration and communication within and across companies, i.e. key aspects of SCM. Supply chain networks have also evolved over the years to become more international, larger and more complex. This development has been boosted by a number of factors such as political developments and trade agreements reducing tariffs and barriers, business development within logistics and transport, and technical development in IT and telecommunications. To remain competitive, supply chain actors such as manufacturers, brand owners, component suppliers, intermediaries, logistics service providers and retailers focus on their core business, and operate to a larger extent on a global supply and demand market. A pre-requisite for this is efficient logistics, where packaging can play a key role. The costs for packaging and logistics must be smaller than the potential gains obtained by specialization in the supply chain. To support efficient logistics, the packaging system need to provide adequate:

- Physical protection from e.g. mechanical shock, vibration, electrostatic discharge, compression and temperature.
- Barrier protection against oxygen, water vapor, dust, bacteria etc.. Some packages are even active and contain desiccants or oxygen absorbers to help extend shelf life, others use nano-technology. Modified atmospheres or controlled atmospheres are also maintained in some food packages to extend shelf life and preserve quality. Contents should be kept clean, fresh, safe and also sterile in some cases. Packaging barriers may also enable room temperature storage and transport as an alternative to resource consuming cooling and refrigeration.
- Containment, is necessary for some products like liquids, powders, and granular materials.
- Agglomeration – Small objects are typically grouped together in one package for reasons of handling, storage and selling efficiency. The product and component multiples will have to vary across the supply chain for best efficiency and effectiveness. This is also related to manufacturing processes where in many cases batches of products are produced in economic order quantities. Multiples must also be adopted to turnover in different retail channels, where hyper market store require larger multiples than small service stores.

- Information transmission – Packages and labels communicate how to use, transport, handle, recycle, or dispose of the package or product. In some sectors like pharmaceuticals, food, medical, and chemical products, there are typically also legal requirements. Information is sometimes used for track and trace purposes, and many items include their serial and lot numbers on the packaging. An expiry/best-before date is also very common. Information may be printed or more sophisticated technologies such as RFID may be used to create “smart and intelligent” packaging.
- Marketing – Packaging and labels are often designed to reflect the brand's message and identity using both graphic and physical design. Marketers use packaging as a tool to encourage potential buyers to purchase a product.
- Security – Packaging can play an important role in reducing the security risks of shipment. Packages can be made with improved tamper resistance to deter manipulation and they can also have tamper-evident features. Packages can be engineered to help reduce the risks of package pilferage or the theft and resale of products.
- Convenience – Packages can have features that add convenience in distribution, handling, stacking, display, sale, opening, reclosing, using, dispensing, reusing, recycling, and ease of disposal
- Sizing and Portion control – Single serving or single dosage packaging has a precise amount of contents to control usage and match need. Package sizes has to be adopted to various demands and user requirements across the supply chain.
- Volume and weight efficiency – Lean packages in adequate modular sizes to adapt to carriers and storage facilities, and obtain a high volume and weight utilization. This implies that the primary pack is correctly designed so as to maximize shipping container utilization bearing in mind also secondary pack sizes. Packaging pallet configuration design systems can be very useful in this context.

Purchasing strategies have also changed over the years, partially in line with SCM developments of more specialization and global competition. In the past transaction orientation was dominating in purchasing, where basic solutions and components were acquired from many suppliers with a short term price and direct cost focus. This has to some extent been replaced by more relation-oriented strategies where more complex integrated solutions and components are demanded. To achieve this, closer collaboration with fewer suppliers is needed and long-term total cost is more in focus. Lead packaging system suppliers have a potential to work more closely and in longer relations with packaging buyers and users. Packaging products and services demanded also change from supply of basic standard packages to customized packaging solutions that better support overall supply chain performance and efficiency. A key in this is to build long-term close relations to better understand the requirements at various stages in the supply chain, an integrated approach to collaboration as emphasized in the earlier definition of SCM in this paper.

Packaging processes can sometimes also be in-sourced for better overall supply chain performance. One example here is the integration of packaging printing stations in the production line that will en-

able sourcing of unprinted or partially printed material instead of fully pre-printed material. Potential benefits are lower costs, lower inventory, increased flexibility and quicker response.

Pull and push are two basic philosophies as regards SCM. Push is the traditional way to manage, where the supply chain, to put it simply, responds to demands using inventory. In a push-oriented supply chain, packaging suppliers try to influence the next stage, typically product and component manufacturers, to choose its products. Whereby, with a pull-oriented strategy, packaging suppliers try to influence end-users to create demand and pull the supply chain. A good example here is TetraPak, which is one, of very few, well-known packaging brand among the consumers. TetraPak use different marketing approaches to maintain and develop its consumer relations. To be mentioned is also that the pull strategy has some of its roots in lean manufacturing, where waste elimination, zero defects and teamwork are some of the leading principles.

It is quite clear that packaging can contribute significantly to overall supply chain performance. To realize this potential, it is important for the packaging industry to build and develop long-term relations not only with the direct customers, but also customers' customers and ultimately end-users. Packaging systems that are fit for use and designated for special roles and functions in the supply chain are necessary. Functional requirements include, sustainability demands like adopting and blending into re-use or recycling systems on local markets. Supply chain integration is a key packaging strategy to fulfil the holistic packaging mission to save more resources than it costs.