

Environmental considerations in packaging

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Packaging is the science, art and technology of enclosing or protecting products for distribution, storage, sale, and use. Packaging also refers to the *process* of design, evaluation, and production of packages. Packaging can be described as a *coordinated system* of preparing goods for transport, warehousing, logistics, sale, and end use. Packaging contains, protects, preserves, transports, informs, and sells. In many countries it is fully integrated into government, business, institutional, industrial, and personal use.

- The first packages used the natural materials available at the time: Baskets of reeds, wineskins (Bota bags), wooden boxes, pottery vases, ceramic amphorae, wooden barrels, woven bags, etc. Processed materials were used to form packages as they were developed: for example, early glass and bronze vessels. The study of old packages is an important aspect of archaeology.

- The earliest recorded use of paper for packaging dates back to 1035, when a Persian traveler visiting markets in Cairo noted that vegetables, spices and hardware were wrapped in paper for the customers after they were sold.

- Iron and tin plated steel were used to make cans

in the early 19th century. Paperboard cartons and corrugated fiberboard boxes were first introduced in the late 19th century.

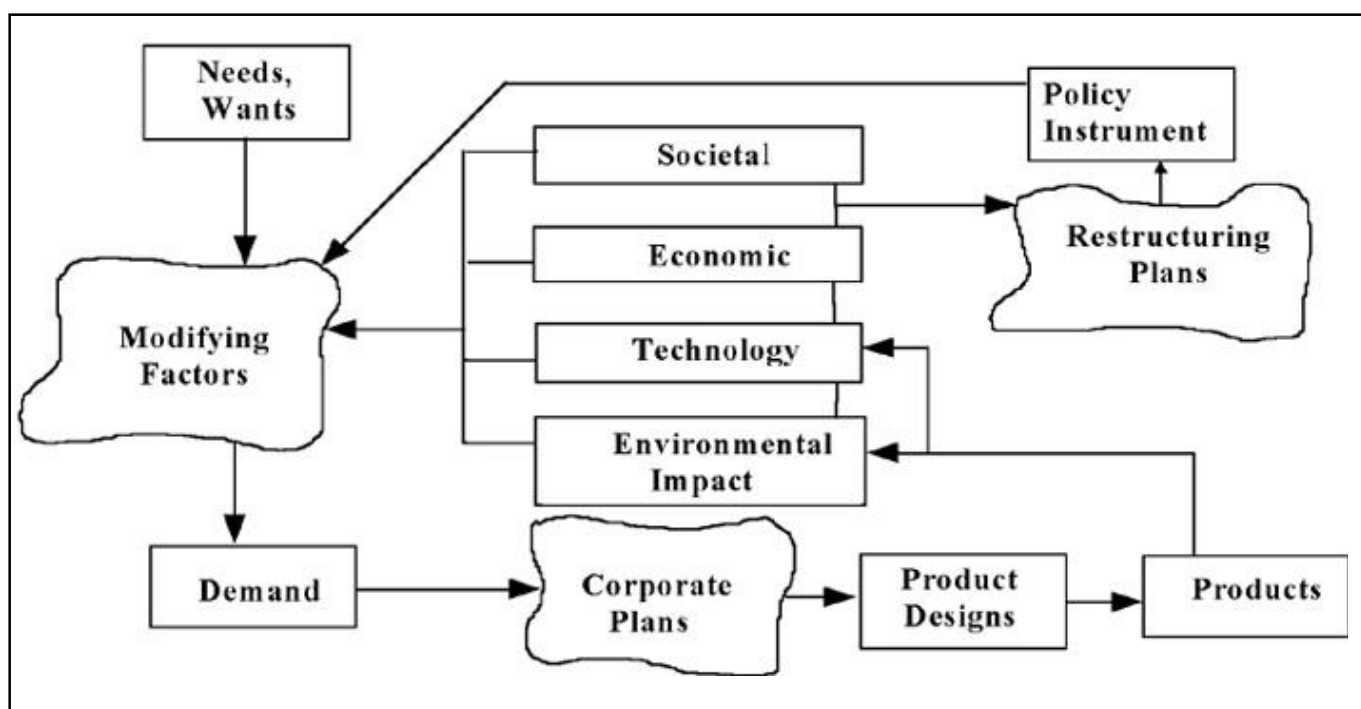
- Packaging advancements in the early 20th century included Bakelite closures on bottles, transparent cellophane overwraps and panels on cartons, increased processing efficiency and improved food safety. As additional materials such as aluminum and several types of plastic were developed, they were incorporated into packages to improve performance and functionality.

- In-plant recycling has long been common for production of packaging materials. Post-consumer recycling of aluminum and paper based products has been economical for many years: since the 1980s, post-consumer recycling has increased due to curbside recycling, consumer awareness, and regulatory pressure.

- As of 2003, the packaging sector accounted for about two percent of the gross national product in developed countries. About half of this market was related to food packaging.

Environmental considerations:

Package development involves considerations for sustainability, environmental responsibility, and applicable



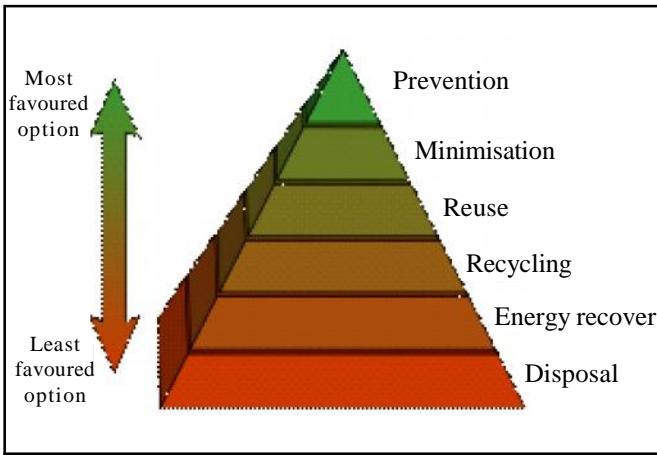


Fig. 1 : The waste hierarchy

environmental and recycling regulations. It may involve a life cycle assessment which considers the material and energy inputs and outputs to the package, the packaged product (contents), the packaging process, the logistics system, waste management, etc. It is necessary to know the relevant regulatory requirements for point of manufacture, sale, and use.

The traditional “three R’s” of reduce, reuse, and recycle are part of a waste hierarchy which may be considered in product and package development.

Waste hierarchy:

- Prevention – Waste prevention is a primary goal. Packaging should be used only where needed. Proper packaging can also help prevent waste. Packaging plays an important part in preventing loss or damage to the packaged-product (contents). Usually, the energy content and material usage of the product being packaged are much greater than that of the package. A vital function of the package is to protect the product for its intended use: if the product is damaged or degraded, its entire energy and material content may be lost.

- Minimization – (also “source reduction”) The mass and volume of packaging (per unit of contents) can be measured and used as one of the criteria to minimize during the package design process. Usually “reduced” packaging also helps minimize costs. Packaging engineers continue to work toward reduced packaging.

- Reuse – The reuse of a package or component for other purposes is encouraged. Returnable packaging has long been useful (and economically viable) for closed loop logistics systems. Inspection, cleaning, repair and recoupage are often needed. Some manufacturers reuse the packaging of the incoming parts for a product, either as packaging for the outgoing product or as part of the product itself.

- Recycling – Recycling is the reprocessing of

materials (pre- and post-consumer) into new products. Emphasis is focused on recycling the largest primary components of a package: steel, aluminum, papers, plastics, etc. Small components can be chosen which are not difficult to separate and do not contaminate recycling operations.

- Energy recovery – Waste-to-energy and Refuse-derived fuel in approved facilities are able to make use of the heat available from the packaging components.

- Disposal – Incineration, and placement in a sanitary landfill are needed for some materials. Certain states within the US regulate packages for toxic contents, which have the potential to contaminate emissions and ash from incineration and leachate from landfill. Packages should not be littered.

Development of sustainable packaging is an area of considerable interest by standards organizations, government, consumers, packagers, and retailers.

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