

The Investigation of the Effect of Raw Materials in Packaging Costs

Mustafa INCE*, Mehmet OGUZ**

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Abstract

Packaging is the entirety of techniques used to protect and store the product in distribution, storage, retail and usage. Packaging is a precious medium that serves to protect its physical attributes, secure it from the external effects, keep it clean, make transportation easier and also advertise the product it contains. Packaging is also a silent means of communication between the consumer and the product.

Primitive packaging is almost synchronous with the human history. The first primeval packaging became the modern varied one after the changes it underwent. The first packaging materials were barrels, chests, earthenware, leather bags, and sacks. Nowadays they are made of more common and economic materials such as paper/cardboard, plastics, glass and metal. These varied materials are processed with respect to design, printing and post printing processes to become the end product for packaging. There are a number of printing processes to produce packaging from a raw material. The choice of the appropriate method is not a random one. Both cost and the technical compliance are very important. For example the printing of cardboard box in large quantities should not be done with silk screen printing.

Another important aspect in packaging production is the economics of the material used, because this will have a direct effect on the product price the company will take this into account while ordering a particular packaging.

* Karabuk University, Safranbolu Vocational School, Sadri Artunc Cad., Safranbolu, Karabuk, Turkey

** Marmara University, Technical Education Faculty Department of Printing, Goztepe, Istanbul, Turkey

The revenue of the products has diminished because of the costs of the packaging materials which is thought to be effective in consumer's purchasing decision.

In designing the package of the product, there are some crucial factors like physical effects on the natural environment and the visual effects on consumer. Also other factors are the type and the cost of the packaging materials, the method of printing and the cost of the processes after the printing activity. The selection of the printing on the package is determined by the texture of the materials and the quantity.

In this study, alternative packages which are made of metal, wooden, plastic and cardboard for a candy, already in sales, are designed. For each alternative material, models are prepared, appropriate printing for each type is suitably chosen and the packaging costs for 10.000 units are calculated. By using graphics and tables the cost of the materials are compared and optimum packaging material is determined.

Introduction

According to the explanations of the World Packaging Organisation, 30% of the use of packages is constituted by industrial packages, 70% of their use is constituted by retail packages and two third of these retail packages is comprised of food packages.

First supermarket was established in 1954 in Turkey, markets gained popularity and they were established in a widespread manner in 1980s and today, hypermarkets constitute 20–25% of all the markets. Packaged foodstuffs gained an important role in every phase of our lives along with such factors as the increases in average income, increasing urbanisation trends, the increase of life expectancy, changes in the consumption habits, the increase of the women participation to working life and the changes in the consumers' expectations [1].

In 1960s, packaging materials were paper, cardboard, cellophane, glass and wood in Turkey. Wooden boxes and jute bags were used in export and the other materials except for these were considered to be luxurious. However, in 1970s, importance of the packaging industry was realized especially in export. At the same period, it was known that many countries had packaging industries. In 1977, first steps were taken for the establishment of the Turkey's first Package Research Center. In Turkey, initial development of the packaging industry started with the cans [2].

Today, packaging industry of our country uses packaging production technologies in a synchronized manner with the rest of the world and can compete with the developed countries in the international markets.

Products of the Turkish packaging industry are exported to 180 countries throughout the world including the countries of the Commonwealth of the Independent States, Eastern Europe and the Middle East [3].

While introducing a product to market, needs, trends, habits, tastes, purchase power and even worldview of a specific target group are taken into consideration. This consideration can be conscious or unconscious or can be correct or incorrect but it is inevitable and the objective is to manufacture a product that can meet all needs of the consumer. However, an obstacle emerges between the product and the consumer when the product is introduced to the market: Package. Consumer generally can not touch the product directly, can not smell, even can not see in most cases. What the consumer touches is only the package. This makes package to be a complete mediator. Package should transmit all information as regards to what it contains to the consumer directly or indirectly without adding, omitting or changing. By looking at the package, consumer will make assumptions as such: 'well, this can be useful for me'[4].

Many factors affect the unit cost of a product's package. Most important factors include the type of the package raw materials, the printing method used in the formation of image on raw material, multiplication quantity of the package and the special processes to be applied after the printing.

Nowadays, it is observed that our natural resources that are vital for human life run out due to the increase of world population and consumption, rapid developments and changes in the industry and the other reasons. Rapid exhaustion of the natural resources affects the life quality of humans and the other living organisms in an adverse manner.

Rapid exhaustion of the natural resources poses a threat to the living organisms composing the ecosystem. Unbalance in the ecosystem will affect every living organism bound to the ecosystem directly, some species will become extinct and the other species affected by its extinction will get difficulty in surviving. This process will continue successively. Thus, natural resources need to be used more carefully and effectively.

Due to above mentioned reasons, raw materials that can be recycled rapidly should be preferred in the packaging materials (Figure 1). Recycling of the packaging materials means new paper production out of waste papers, production of new glass bottles out of broken glasses and retrieval of the metals and plastics by being treated with certain processes. Recycling prevents the reduction of the raw materials and the exhaustion of the natural resources by contributing to the economy. For instance, it is known that an energy saving of 90% is provided through the recycling of an aluminium box and an energy saving of 60% is obtained from the recycling of waste papers.

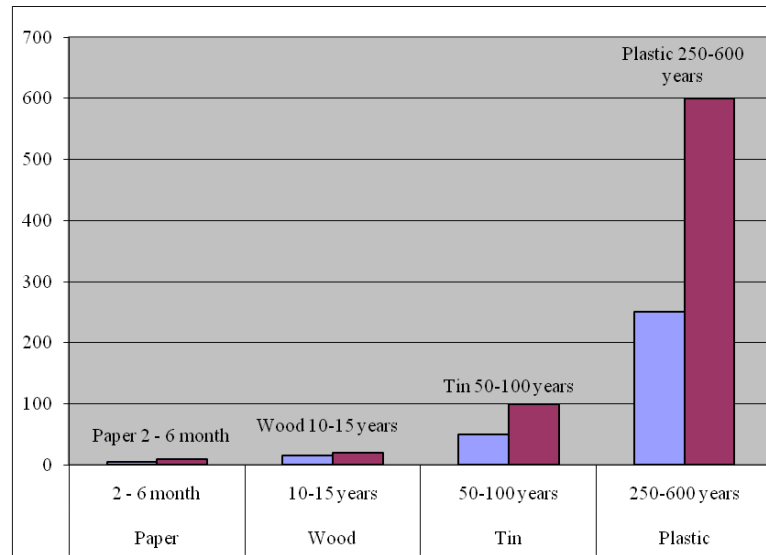


Figure 1. Decomposition Periods of the Packaging Raw Materials [8].

Effects of the Packaging Raw Materials on the Packaging Cost

There are important factors that should be taken as criteria by the designer while designing a package for a product. Because the form, dimensions and the raw materials are determined by the product itself. Most basic criteria determining the physical qualities of the package include such features as the material value of the product, whether it is light or heavy, whether it is fragile or durable, whether it is hard or soft, whether it is solid or liquid and many other similar features.

Raw material of a product also determines the processes to be applied in order to give the package its eventual form, in other words, to transform it into an end product. For instance, primary package of the table water is the plastic raw material and metal injection moulds are used to give it its bottle form. However, different pressing and cutting moulds are used so as to transform the cardboard which is the raw material of a box being the primary package of a toy into box [5].

Packaging elements affect directly the cost of the end product. In some cases, package of a product can be more costly than the product itself. For example, the most costly budget item of the spring waters is plastic bottles. Cost of the plastic bottles is higher than the water that they contain in small plastic bottles. However, there is not many options regarding the selection of packaging raw material in this case. Raw material of the primary package of water must be glass or plastic because of its physical structure.

In fact, packaging material helps the product manufacturer, distributor, retailer and eventually consumer reduce the costs in many ways [6].

Objective, Method, and Results

The objective of the study is to determine the effect of the raw material of a product's primary package on the cost. To this end, a special box was designed for the well-known candies of a town in Turkey. All production costs of this design models made in all process phases until they are transformed into 10.000 items pressed, finished packages out of metal, wood, plastic and cardboard raw materials were calculated. Calculations were made by applying process printing to all packaging materials. Calculated production costs were compared with each other through tables and graphics, effect of the raw material on packaging cost was analysed and the best packaging material was determined for these candies in terms of product-package-cost.

Moreover, it was analysed in the study that to what extent the packaging material of the product affects the purchasing preferences of the consumers and the results were explained through graphics and tables.

Table 1. Table of the Costs of Packages Manufactured out of Different Raw Materials.

Cost	Wood	Tin	Plastic	Cardboard
Technical Qualities of the Package	Hinged Plastered (Pressed)	Thickness 0.23–0.25 mm	Thickness 0.030 mm	350 g/m ² triplex cardboard, bright cellophane,
TOTAL	80.000 \$	14.240 \$	4.840 \$	2.067 \$
Prepress	267 \$	560 \$	280 \$	233 \$
Press	200 \$	600 \$	400 \$	200 \$
Postpress	8.000 \$	1.800 \$	2.233 \$	300 \$
Raw material	31.333 \$	7.333 \$	407 \$	1.333 \$
Special Craftsmanship	40.200 \$	3.947 \$	1.520 \$	0 \$
UNIT COST	8,00 \$	1,42 \$	0,48 \$	0,21 \$

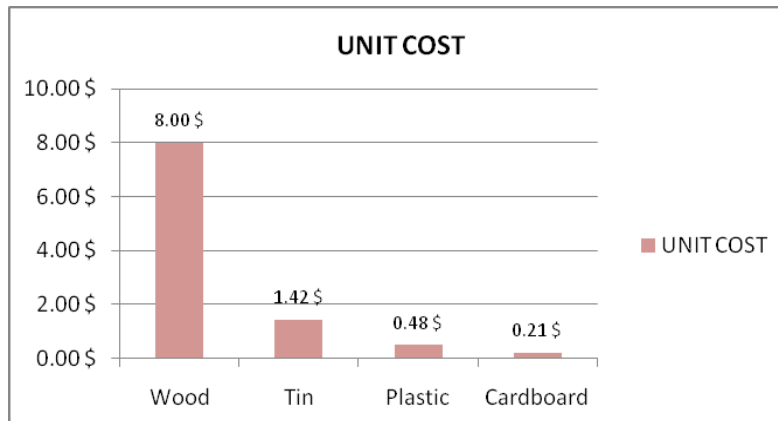


Figure 2. Effect of the Packaging Raw Material on the Cost.

Distribution of the Consumer Preferences According to the Packaging Material of the Product

Distribution of the preferences of the consumers having given answers to the questionnaire according to the packaging material of the product is displayed in Figure 3.

Material of the Package					
		f	%	Valid (%)	Total (%)
	VERY IMPORTANT	11	11,0	11,0	11,0
	IMPORTANT	20	20,0	20,0	31,0
	MEDIOCRE IMP.	35	35,0	35,0	66,0
	LESS IMPORTANT	15	15,0	15,0	81,0

UNIMPORTANT	19	19,0	19,0	100,0
Total	100	100,0	100,0	

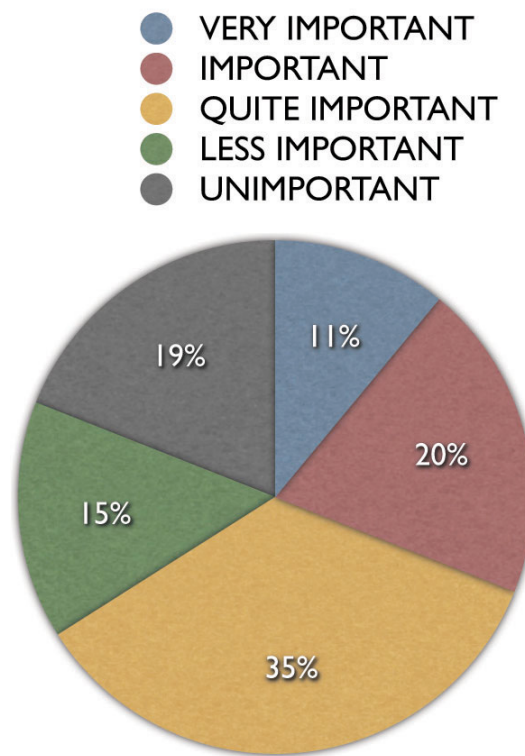


Figure 3. Preference distribution of the consumers according to the raw material of the package [7].

According to the results of the study, it is observed that the ratio of those regarding the raw material of the package as important is higher than those who do not care what the raw material of a package is.

Packaging raw materials become a reason of preference for the conscious consumers who are aware of the harms, recyclability of the packaging materials and the use of natural resources in their production while selecting a product.

Moreover, packaging materials may be included in the factors affecting the consumer preferences due to the fact that the packages manufactured out of some raw materials look presentable in terms of visuality, packages manufactured out of some materials are durable and the luxurious appearance of some packages for the products bought as presents.

Of the answers to the questions regarding the packaging in the study, the highest percentage is constituted by the participants expressing that packaging materials are of mediocre importance. The ratio of those expressing that packaging materials are of mediocre importance in their preference is 35%. The ratio of the participants who state that the packaging materials are not important at all is 19% [7].

Results and Recommendations

According to the findings obtained as a result of the examinations of the candy packages manufactured out of 5 different raw materials at the end of questionnaire studies conducted on the last consumer and practical cost calculations in terms of environment, cost and preferability:

- 66% of the consumers stated that packaging material became influential in their preference towards the product even though the candies within the packages manufactured by using different materials are the same.
- When the production costs of 4 different packaging materials manufactured out of cardboard, tin, plastic and wood, it was determined that the cost of the cardboard package was lower than the other three packaging materials. (Table 1, Figure 2)
- When they were analyzed in terms of recyclability, it was observed that cardboard and wooden packaging materials decomposed in the nature more rapidly than the plastic and tin materials. (Figure 1)
- Another important finding that grabs attention in the research is that: 66% of the consumers stated in the research that they consider the packaging material as an important factor in purchasing the product (Figure 3). However, consumers do not evaluate the packaging materials as factors that increase the price of the product and especially in terms of environmental effects. This shows us that awareness of the consumers should be raised both in terms of economical aspect and the environmental future.

- Furthermore, it is necessary to ensure that environment-friendly raw material are used in the production phase of the packages by supplementing the relevant articles into the laws of the underdeveloped and developing countries.

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