"Dimitrie Cantemir" Christian University
Knowledge Horizons - Economics
Volume 10, No. 2, pp. 27 - 30
P-ISSN: 2069-0932, E-ISSN: 2066-1061
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www.orizonturi.ucdc.ro

THE ENVIRONMENTAL IMPACT OF SUPPLY CHAINS FUNCTIONING IN THE GLOBALIZED ECONOMY

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Abstract *Manufacturing, transport, distribution and use of some of the most common consumer goods are activities involving the use of many resources. Whether raw materials, fuels or electricity, these inputs have in all the cases analyzed in the article, a significant impact, directly or indi-rectly. Its awareness is important not only economically but also because even the simplest actions at individual level, determines the future development of the global economy, of the society and of the living conditions of each of us.*

Key words: logistics, consumption, environment, economy, goods
JEL Codes: A 14

INTRODUCTION

We open the lights in our homes, prepare coffee with a coffee maker, take lunch using a lunch plate. We open the refrigerator and take a refreshing juice, bottled in a tin can, to appease us. We check emails or follow our activities using a personal computer. We clean our hands with a wet napkin ... common gestures that many of us do every day with-out thinking about the impact that each of the mentioned commonly used objects has on the environment.

For although rarely or never think about it, making and using a bulb, a coffee maker, a cup, a dish, a fridge, a computer or a wet napkin, has a significant environmental impact. In the same time, energy consumption is probably one of today civilization ele-ments with the highest environmental impact. Which resulted in research aimed at evaluat-ing the impact of two common consumer object as acidic dairy (yogurt) or "jeans" garments.

1. A 60W electrical light bulb

Producing a simple incandescent (with filament) 60 watts light bulb, requires a primary energy consumption between 0.5 and 1.9 megajoules (MJ). During its average use, valued at 1,000 hours, this type of light bulb consumes an additional 549 MJ of energy, compared to the 109 MJ consumed by a compact fluorescent lamp with identical bright-ness. Another difference between the two types of bulbs is that the filament generates 27 kilos CO2 equivalent atmospheric emissions, compared to only 5 kg generated by the com-pact lamp.

Overall, from the total energy consumption, only 1 to 5% is necessary for produc-ing an incandescent light bulb, the rest of 95 to 99% being only consumed energy.

2. An electric coffee maker

Using a 2 kg electric coffee maker, twice a day, at half load (content for 5 coffee cups), in its oral usage time estimated at five years, requires 3,650 paper filters and an en-ergy consumption of

375 kWh of electricity. The electricity consumption has the largest share in the coffee maker environmental impact.

In addition to the energy consumption, the coffee maker will produce a 9.6 kg of household waste from which a 8.25 kg will be incinerated. Overall, the level of appropriate recycling of such an appliance is about 36%.

3. A refrigerator

The manufacturing of a 54 kg refirgerator with a capacity of 200 liters, re-quires 140 kg of different raw materials, with the addition of 6 kg of packaging material needed for its transportation.

The extraction of the raw materials, requires a primary energy consumption of 3,400 MJ. The manufacturing of the appliance itself requires a 600 MJ energy consumption and its transportation requires a 200 MJ of additional energy consumption. During its 13 years average using time, the electricity consumption of the refrigerator is equivalent with a another 3,120 MJ of energy consumption. From its components, only 70% are recyclable.

4. A lunch plate

A paper plate or a porcelain one? Manufacturing a 300 grams porcelain plate re-quires 3kg of clay, transported on an average distance of 1,000 km. Given that such a plate may be used for an average of 1,000 times, its use is equivalent to the use of 1,000 paper plates for which manufacturing would be required a quantity of 30 kg of wood.

The energy consumed for manufacturing, based on the usage time, is of 0.6 MJ for the paper plate, versus 1 MJ for the porcelain one.

However, in terms of CO2 emissions, the comparison between the two kinds of plates is reversed again, in a spectacular way. The porcelain plates generates emissions of only 1.51 kg CO2 equivalent, while the equivalent 1,000 paper plates generate total emis-sions of 6.9 kg.

5. A thin can for carbonated beverages

The manufacturing of an aluminum thin can of 330 ml for carbonated beverages, requires 4 grams of raw material and an energy consumption of 0.687 MJ. It is entirely re-cyclable, but its mechanical manufacturing process requires a primary energy consumption of 0.33 MJ.

From its manufacturing to the moment it becomes waste, the thin can generates atmospheric emissions of 0.15 kg CO2 equivalent, 0.015 g of metal waste and 0.05 g of metal discharges in to interior waters.

6. A wet napkin

Using wet napkins at the equivalent effectiveness, generates three times more waste than using a spray or six times more than the use of a liquid detergent. On the other hand, a spray requires a primary energy consumption three times lower than a wet napkin. Instead, the wet napkin requires three times less water usage, compared with a spray.

However, obtaining a wet napkin requires a primary 0.5 MJ energy consumption, 5.6 grams of raw material and 0.85 liters of water. Using a wet napkin generates 3.69 g of reusable waste and 1.4 g of packaging material. Air emissions are 20 g CO2 equivalent.

7. A personal computer

Making the central unit of a computer requires a power consumption of 13,000 MJ raw energy, equivalent with 373 liters of oil. The air emissions of a computer, during its normal use time, are of 650 kg CO2 equivalent and 5 kg SO2 equivalent. Overall, obtain-ing a personal computer takes approximately 2,800 kg of raw materials.

After discharging, a personal computer generates 140 kg of municipal and indus-trial waste and 24 kg of hazardous waste. All this without taking into account the electricity consumption.

8. Acidic dairy (yogurt)

If this product case, the analysis is based on the energy consumption for milk col-lection from farms plus the one required for packaging and other ingredients transport (fruit sugar, brought from other regions). Moreover, obtaining yogurt generates residues that must be also shipped to other regions than the one of consumption of the final product. After production, the product has to be transported in refrigeration conditions (refrigeration accounts for 16% of total transport energy

consumption) to loading platforms from where it is shipped to stores.

As a balance, the production of a kilogram of yogurt requires an energy consump-tion of 39 grams of oil equivalent (GOE), while its logistic movement requires an energy consumption three times greater, of which the largest share is the last link, its sale in the stores. So, to keep a kilogram of yogurt on freezer shelves (before being bought) an energy consumption of 90-95 geo is required (consumption which is all the greater as the store is smaller). If one kilogram of yogurt is purchased from a hypermarket, the consumer uses as much energy to get to store as it was required to produce that quantity of yogurt

9. "Jeans" garments

For non-food goods, exemplified in the research by the "jeans" garments, trans-port, from the raw material to the stores, generates the highest energy consumption.

The cotton harvest somewhere in Uzbekistan (for example) is transported by rail over a distance of 1,600 km to the port of Abbas (Iran), then by boat over a distance of 1,985 km to Mumbai (India). From there the cotton is transported by train to the cotton mills in Nagpur (India). Processed yarns and fabrics are transported by road, on a distance of 3,200 km, to the garment factories in Dhaka (Bangladesh).

The finished garments are transported by train, on a distance of 485 km to the port of Dhaka from where they are brought to the French port of Le Havre, via Singapore, after a "journey" of 17,000 km. In the end, the garments are carried by barges and trucks to warehouses, where they will be taken with pickup trucks in various stores.

Overall, the transport is performed on a total distance of about 25,000 km. The en-ergy balance is 200 GOE (grams of oil equivalent) per kilometer and per unit of product. If the cotton would have been brought from Egypt, transport related energy consumption would have been of 70 gep. To the total transport energy consumption is added a 74 to 90 GOE of energy consumption for introducing and arranging the products in the store, and a 9 to 38 GOE consumed by consumer to get to the store and buy the product. That without taking into account any retouching done by the consumer after purchasing the product.

CONCLUSIONS

The impact such common objects can have on the environment must make us more aware of the way in which we use them. Also, it signals us that even trough the sim-plest of our actions, we contribute to the way our planet will look in the future.

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