Logistics in Yemen: Addressing the Weakness of Purchasing Power to Satisfy Needs: In Context of Supply Chain Design Optimization (Case of Yemen)

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Abstract - The purchasing power in Yemen is gradually decreasing due to the increase in products cost and required an instant solution to meet the demand of the consumers. increase in energy prices and continuous inflation of the national currency presents several challenges to manufacturer interested in competing in the local market, in order to keep up with the market they should make changes that make improvements in products etc. low-cost package, production, and transportation a top priority for product development. In this research study the author attempted to use quantitative and qualitative research method, plan and execute fieldwork, collecting data form products' local market, local factories (Arwa plastic industry), the ministry of industry & trade, etc. in Yemen, during fieldwork. During data collection and fieldwork, the author will visit the ministry of industry and trade to meet the representative to get the requested data of local industries and imports of raw materials for products packaging, then the author will visit capital city of Yemen (Sana'a) ,Taiz and Hodeida industrial zones to meet the representative of local factories to collect the data of products' packaging raw materials along with the local market, after that the author will visit a local plastic production factory (Arwa plastic industry ltd) to support the study of changing over from rigid heavy packaging to adaptable packaging . The author will also prepare a research questionnaire for manufacturer and customers to substantiate the research with evidence. Finally, the author will visit Yemen General Union of heavy Transport, to collect data of road freight. Finally, after collecting required data, the author will analyse and identify the extent of the manufacturer ability to switch from traditional heavy packaging's to the most convenient product in terms of weight, ease of manufacturing without the need for a lot of energy. After analysing data and identifying findings, the author found that if the manufacturer shift to flexible, lightweight products' packages can reduce fright and storage costs significantly as well as retail prices.

Keyword: Logistics, Products Packaging, Cost Optimization

1.0 Introduction

Yemen's low purchasing power, increase in energy prices and continuous inflation of the national currency presents a several challenges to manufacturer interested in competing in the local market, in order to keep up with the market they should make changes that make improvements in products etc. low-cost package, production, and transportation a top priority for product development. Canning food product, one of the most common packaging methods for many food products, requires a large capital investment in facilities for production, transportation, and storage.

Because the raw materials used for packaging need to be imported by USD from abroad, rising fuel costs, the collapse of the national currency against the US-dollar, combined with the heavy weight of traditional rigid packaging materials has made packed products increasingly less cost-effective in Yemen. Consumers in Yemen increasingly demand essential food products that have low cost, good-quality, due to the continued increase of transportation cost and expensive imports of raw materials, causing a decrease in their purchasing power, despite the quality, consumers often prefer inexpensive packed products to expensive rigid packed products.

The only solution that offers guarantee is a new packaging innovation, the plastic, a flexible, adaptable package that can withstand endure handling temperatures and join the benefits of traditional rigid packages. During the 1950s, the US Armed forces create the lightweight food package to supplant basic metal

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cans with lightweight, easy-to-use food containers for packaging battle proportions [1].

It's a dependable fact that the pattern in the packaging business has been moving from inflexible to adaptable packaging. Strolling through the supermarket a year back gives a totally extraordinary view today that has nothing to do with the item - it's the packaging! For a more accurate review, what does this tendency mean for flexible lightweight package vs. traditional rigid package and how does an exchanging packaging technique advantage both consumers and manufacturers.

2.0 Literature Review

Environmental matters are progressively considered by organizations, attributable to the noteworthy lawful and buyer issues being raised today. A research study considers the environmental restriction inherent in the design of a product family and its production network. The author proposed a mathematical model for optimizing costs in the face of carbon emissions limitations and for optimizing carbon discharges, given the need to restrain costs in the current financial atmosphere. The author provided a method, along with accompanying graphical illustrations, to empower the investigation of the three sections of the expense and carbon outflows issue, that is, production, transportation, and component, on three distinctive scholarly case analyses. Investigation of the models applied in the case studies outlines that, while optimizing carbon discharges is extremely expensive, diminishing them can be accomplished effectively [4].

Product configuration is regularly settled in the beginning times of the product development (PD) cycle. Contingent upon the kind of design chosen, product configuration, fabricating forms, and eventually, production network arrangement is largely altogether influenced. Thusly, it is imperative to coordinate item engineering choices with assembling and inventory network choices amid the beginning time of product improvement. In a research paper, the author presents a multi-target optimization structure for matching product design technique to production network plan. The author incorporates similarity between the inventory network partners into their model to guarantee the long-haul practicality of the production network. The author utilizes fluffy rationale to process the similarity compatibility index of a supplier. The author formulated the optimization as a weighted goal programming (GP) model with two targets: minimization of total supply chain costs, and maximization of aggregate supply chain similarity index. The author used a genetic algorithm to solve the GP model. He presents case examples for two different products to demonstrate the model's efficacy, and present several managerial implications that evolved from his study [3].

A research paper manages two noteworthy issues for industries; the item design and the inventory network structure. These issues are normally explained independently, however, as of late, approaches were proposed to handle these two issues together. In the research paper, the author analyses more unequivocally the connections between the standardization of products or components and the plan of the production network. To begin with, the author shows on a small model that there is an extraordinary interest to consider at the same time these two choices and that solving these associated issues independently could result in an imperfect or even an awful, choice. Finally, the author shows that costs and supply chain structure are exceedingly affected [9]. Another research paper studies the difficult issues of joint product family and supply chain design. A general model was presented that at the same time considers the development of the bill of materials and the structure of the supply chain network. For the bill of materials, the author considers the product, sub-assembly and component conceivable outcomes. For the supply chain network, the author considers on his study the facility and distribution centre location as well as the choice of suppliers. Also, he proposed a modal of a Mixed Integer Linear Program (MILP). He solved the MILP formulation optimally for medium-size distances. For bigger examples, two heuristics got from the MILP are planned. These strategies are computationally tested on different occurrences from a generator considered for this reason. The demonstrating of item substitution conceivable outcomes through item change allows the tackling of vast size occurrences that are presently sufficient for genuine issues [7].

In a research paper, the author studies the problem of simultaneous design of a product family and its supply chain (SC) network. The author was motivated by a genuine case in the computer industry; they investigate the impact of quality and price in SC demand. They also proposed two different models; the previous expands the organization's profit as for clients' needs on quality and price; the last is a bi-target programming, which considers two extraordinary client groups, for one

gathering quality, has the most quality need and at the other cost; the intermediate groups falls between these two [1].

Given the extensive product improvement lifecycle process, high cost, and low achievement rate, numerous organizations abstain from thinking about irregular development strategies, despite their expansion in recurrence and significance in numerous business sectors. Indeed, even with advances in production process and innovation, a significant number of the methods being used in product improvement are generally unaltered, and the meaning of spasmodic development itself does not have a basic segment. To address this issue, the Author built up an approach for generative customization to execute infrequent advancement. Utilizing the rising advancements of generative plan and specialist-based demonstrating, the author built up a procedure to make item developments and measure item advancements utilizing a complex adaptive system (CAS) modal. This has all the earmarks of being the primary model that represents a complex versatile system environment to quantify the accomplishment of spasmodic advancement in the improvement of a market balance representative modal [8].

3.0 Methodology

In Europe over 50% of goods are packaged in plastics, they weigh less than 20% of total

packaging on the market. Lightweight products' packaging implies lighter burdens or less truck expected to deliver a similar measure of items, diminishing transportation energy, diminish emanations and lower shipping costs. It additionally decreases the measure of waste created. (Plastics Europe – the Facts 2017).

In this research study the author attempted to use quantitative and qualitative research method, plan and execute fieldwork, collecting data form products' local market, local factories (Arwa plastic industry), the ministry of industry & trade, etc. in Yemen, during fieldwork. During data collection and fieldwork, the author will visit the ministry of industry and trade to meet the representative to get the requested data of local industries and imports of raw materials for products packaging, then the author will visit capital city of Yemen (Sana'a) ,Taiz and Hodeida industrial zones to meet the representative of local factories to collect the data of product packaging raw materials along with the local market, after that the author will visit a local plastic production factory (Arwa plastic industry ltd) to support the study of changing over from rigid heavy packaging to adaptable packaging . The author will also prepare a research questionnaire for manufacturer and customers to substantiate the research with evidence. Finally, the author will visit Yemen General Union of heavy Transport, to collect data of road freight.

Since Yemen is facing economic difficulties, Manufacturers will remain to profit by this move far from jars and another inflexible packaging if adopted. Adopting flexible, lightweight packages for the product can reduce fright and storage costs significantly, sparing, conceivably, a huge percentage on container truck and distribution centre space. The manageability advantages of lighter weight adaptable packaging will likewise become possibly the most important factor in web-based business. Changing over to adaptable packaging can decrease material costs, shipping expenses and straightforwardness strategic difficulties.

These remove cost from the inventory network for the retailer and the shipper and may, thus, bring down the retail cost for the purchaser.

4.0 Recommendations

Modern lightweight plastic packaging can be a great alternative to traditional rigid packaging. The purchasing power in Yemen is gradually decreasing due to increase in products cost and required an instant solution to meet the demand of the consumers.

This section will mention the increase of land freight, energy prices, as well as the collapse of the national currency over the past four years.
Then mention the impact of plastic packaging on, mass, energy, and gas emission compared to alternative materials.

Then analysed all collected data and identifying findings of the extent of the manufacturer ability to switch from traditional heavy packaging's to the most convenient product in terms of weight, ease of manufacturing without the need for a lot of energy, as well as recommendation for challenges that Manufacturer should consider when shifting their product line from rigid to flexible packages.

4.1 Targeted Food & Beverage Packaging

Food and beverages are starting to investigate moving to an adaptable option because of developing buyer acceptance. Customers welcome the comfort and convey ability of a plastic lightweight container, rather than a conventional container, glass jar or metal can. Offering purchasers an adaptable packaging replacement does not mean you are supplanting your inflexible packaging. The manufacturer of Food and beverages are beginning to perceive that the lightweight or adaptable shape can more readily address the changing needs of the buyer, making new advertising chances to decrease cost. Logistics, including transportation, heavyweight package, and warehousing of inflexible bundling all huge effect add up to cost, complex packaging process, and in addition ecological effect [6].

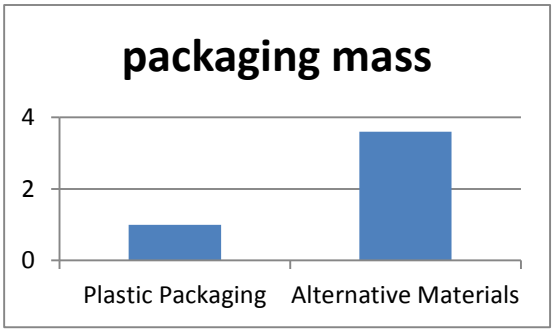

Figure 1: The Energy prices during the Year (2014-2018)

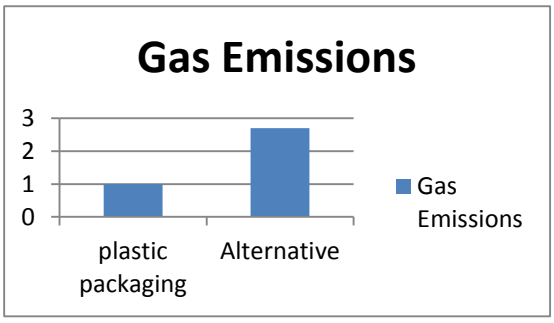

Figure 2: The deterioration of the national currency and its impact on the prices of imported raw materials (2014-2018)

If the USD exchange rate increased from YER 215 during the Year 2014 to YER 750 during the Year 2018, there would be an increase in imported raw materials by around 248%.

Source: The impact of plastic packaging on life cycle energy consumption and greenhouse gas emissions in Europe Executive Summary July 2011 Authors: Bernd Brandt Harald Pilz

The figure demonstrates if plastic packaging would be substituted by other materials, the respective packaging mass would on average increase by a factor 3.6
In Europe over 50% of goods are packaged in plastics, they weigh less than 20% of total packaging on the market. Lightweight packaging implies lighter loads or fewer trucks expected to deliver a similar measure of items, lessening transportation energy, diminish emanations and lower shipping costs. It additionally diminishes the measure of waste produced
Citation**:** Plastic Europe, Association of plastics manufacturer, the Fact-2017

4.2 Analysing data and identifying findings of two traditional and modern packaging

After collecting required data, finally we will analyze and identify the extent of the manufacturer ability to switch from traditional heavy packaging's to the most convenient product in terms of weight, ease of manufacturing without the need for a lot of energy, In addition to its lightweight suitable to provide less transport value and space because of the flexibility of the product As well as the extent to which the customer accepts the new product that suits his income and expectations, also preserving the environment from pollution.

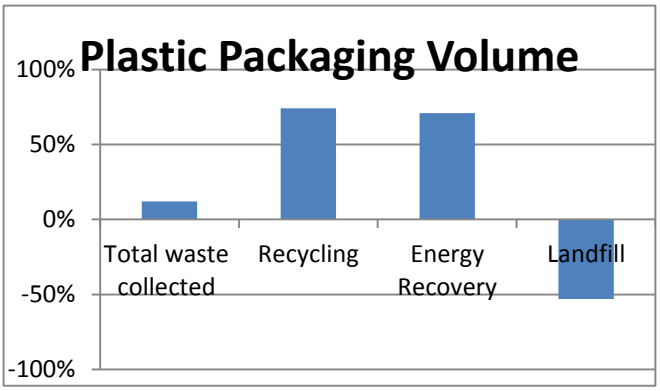

Figure 3: Plastic packaging percentage (waste, recycling, energy, and landfill)

Source: Plastic Europe, Association of plastics manufacturer, the Fact-2017 and conversion market and

strategy. Finally, this figure demonstrates the increase in the volume of plastic packaging waste collected for recycling in ten years from 2006-2016 by 74 percent and landfill decrease by 53 percent.

4.3 Recommendation for challenges that Manufacturer should consider when shifting their product line from rigid to flexible packages

The difficulties and challenges of shifting from traditional rigid packaging to modern flexible lightweight packaging should be considered.

1. The manufacturer should shift their packaging from old to a new gradually not total replacement of their old packaging in the short-term especially when major infrastructure is in place.
2. They should consider the benefit of the consumer who lost his purchasing power by providing a product that is less expensive than the previous product.
3. They should consider that the new package will have an impact on reducing materials, shipping cost, as well as the final product cost.
4. Most important, they should consider packages whose raw materials are available locally to avoid imports due to the collapse of the national currency against the dollar, which has a major impact on the rise in commodities cost, a great example is Turkey.

5.0 Conclusion

In conclusion, the consumer who lost his purchasing power can benefit from the shift of new packaging by providing a product that is less expensive than the previous product [2]

Retail prices can decrease by switching from traditional heavy packaging's to the most convenient product in terms of weight, ease of manufacturing without the need for a lot of energy, In addition to its lightweight suitable to provide less transport value and space because of the flexibility of the product As well as the extent to which the customer accepts the new product that suits his income and expectations, also preserving the environment from pollution.

Changing over to adaptable packaging can decrease material costs, shipping expenses and straightforwardness strategic difficulties. These remove cost from the inventory network for the retailer and the shipper and may, thus, bring down the retail cost for the purchaser. Since Yemen is facing economic difficulties, Manufacturers will remain to profit by this move far from jars and another inflexible packaging if adopted. Adopting flexible, lightweight packages for the product can reduce fright and storage costs significantly.

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