The Driving Forces behind the Transformation of Consumption Behavior of Lighting: An Empirical Study on the Lighting Industry of Bangladesh

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Abstract

Lighting industry of Bangladesh is a developing one among many other grooming industries. This is a very prospective industry which is gradually transforming into large manufacturing sector from just assembly based import trend. Moreover, the consumption pattern and the consciousness of the consumers are also pushing the overall trend to this new trend. The main purpose of this paper is to identify the driving forces of the transformation of consumption behavior of this lighting industry.

The research is done based on empirical findings through exploratory study to investigate some factual underlying factors. To do so global trend and innovation along with local industry trend have been sought and analyzed. Initially, in depth studies of consumption behavior which are the central basis for superior customer value are studied along with the literature on consumption behavior analysis to proceed further in order to conceptualize the aspects of complementarity-in-use of products. For doing that cultural, social, and familial environments affect the formation and development of individual beliefs, personal values, consumption values in a socio-cultural environment, a set of values which usually represents widely shared beliefs about what is desirable are analyzed.

The managerial implications derived from the paper can be divided into many categories such as Macro, enterprise, consumers and Micro level. For example, in Bangladesh, the insufficiency of the power generation has led the government and all other stakeholders into taking steps to promote and convince the consumers for using more energy efficient lighting solutions. Side by side, different private and non-government organizations (NGO) should come up with a more plausible and pragmatic solutions to spread the latest innovation of technology to each corner of Bangladesh for reaping the maximum benefit. The usage of energy efficient solution will lead to more electricity savings which can be used to other productive sectors to contribute in the national GDP. In this regard, the commercial entrepreneurs should also come up to facilitate and make these products available to the ultimate consumer level. Finally, removing the aforementioned barriers to smoothen the transformations are also important for example reducing the initial high price of new technologies by investing and reducing the tariff structure and educating the target consumer groups to habituate them into using the new technology of lighting solutions. These suggestions based on the outcome of the study to address future challenges and assess the future opportunities in the lighting sector for different parties and stakeholders.

In Bangladesh, the driving forces behind the transformation of lighting consumption are many in numbers. From GLS Bulb to CFL (Energy Saving lamps) and from CFL to the next generation lighting- LED have proved one thing very clearly that ultimate consciousness of the consumers is developing gradually. As a result, the supporting lighting industry, manufacturing facility, raw materials collection and the government policies are shaped in this way. The global practice of green energy revolution and emission of less Carbon Di-Oxide (CO₂) emission are also assisting this transformation directly and indirectly. China is the main source of raw materials in the manufacturing of all kinds of lamps manufacturers in Bangladesh. Therefore, as in the next five years or so, the production of traditional lighting (GLS and CFL) will be curtailed and will be replaced by the LED lamps. So, within the next few years, the overall lighting consumption scenario in Bangladesh will shift towards a whole new pattern.

Keywords: Consumer Behavior, CFL, GLS, LED, Marketing, NGO, FGD.
1.0 Introduction

1.1 Research Background

Lighting industry of Bangladesh is a developing one among many other grooming industries. This is a very prospective industry which is gradually transforming into large manufacturing sector from just assembly based import trend. Moreover, the consumption pattern and the consciousness of the consumers are also pushing the overall trend to this new trend. The main purpose of this paper is to identify the driving forces of the transformation of consumption behavior of this lighting industry. The development of lighting industry in Bangladesh was speeded up in the late 80’s when Philips was the leader in domestic and industrial sector. During that decade, mostly the marketing was done on the import basis and very few factories marketed through local production. In the first half of the 90’s decade, the transformation from the yellowish light (GLS-General lighting system/incandescent bulb) to the white light (tube light-T8 and T5) was initiated. This transformation was not quite smooth as the cost of the new solution was not the same. Still, the huge vacuum and demand in the market motivated the import based traders to market and some manufacturers also invested in local production of tube light.

1.2 Research Content

This paper is intended to in depth understanding of the transformation of the lighting consumption behavior through empirical data from different local companies and government organizations. Moreover, the theoretical background of consumer behavior analysis along with the general factors are also sought to investigate the real underlying factors in transformation of the lighting industry in Bangladesh. Besides, the overall global perspective of lighting transformation is also compared to that of Bangladesh. For doing that cultural, social, and familial environments affect the formation and development of individual beliefs, personal values, consumption values in a socio-cultural environment, a set of values which usually represents widely shared beliefs about what is desirable are analyzed. Furthermore, empirical data propelling the shifting of demand consciously and subconsciously have been compared to that of the barriers to the smooth shifting.

1.3 Contribution of the research

The existing theoretical framework of the consumer behavior and the data of transformation of the lighting industry in Bangladesh have been compared. Afterwards, the extension to the real fact from the theoretical background is sought. Therefore, to establish the theoretical perspective in the lighting industry on the transformation taking place in the lighting industry. In order to monitor the ongoing transformation of the lighting industry through interviews (consumer survey and expert opinion), secondary data analysis were done. This paper recommends some policy suggestions based on the outcome of the study to address future challenges and assess the future opportunities in the lighting sector for different parties and stakeholders.

1.4 Research Method

The method of the research is basically exploratory in nature where the overall industrial trend in Bangladesh along with the transformation of consumer behavior in the consumption of lighting is sought. Research question which is addressed in this study have been answered through a systematic process of identification of data requirement, sources of data and method of analysis, and possible outcome of the analysis. The study made use of both the information available from secondary sources and data and information generated from primary survey. Information generated in the study cover three relevant and interrelated levels: macro, sectorial and enterprise levels. Afterwards, depth interviews, expert opinions and focus group discussions (FGD) were done with the industry people who are professional researchers, engineers, suppliers etc. These data contributed to extract the empirical data from the relevant interest groups about the industry.
2.0 Literature Review

The theoretical background describing the consumer theory and behavior that includes cultural, social, and familiar environments affecting the formation and development of individual beliefs, personal values, consumption values in a socio-cultural environment, a set of values which usually represents widely shared beliefs about what is desirable are analyzed. In this regard, the typology that includes eight generic product benefits: functional, social, affective, epistemic, aesthetic, hedonic, situational, and holistic and how these factors affect the shifting of consumer demand are investigated.

2.1 Consumer Behavior Theory

Various prominent researchers have sorted out that in depth studies of consumption behavior are the central basis for superior customer value for consumers (Day 1990; Boyd and Levy 1963; Treacy and Wiersema 1993; Normann and Ramirez 1993). The significance of an inclusive study of customers' consumption behavior in developing effective marketing strategies was first indicated by Boyd and Levy (1963). They noted that marketing planning should be developed and implemented in terms of the customer's needs and consumption demands. Also, the main component of an operational marketing plan is to consider in terms of the "consumption system" in which the product plays a part. Beneath this systematic view of consumption are at least two thoughts critical to customer value inquiry. First, this systematic view looks beyond the purchase behavior of buyers to the use behavior of consumers: "Whatever reasons people have for buying a particular product are rooted in how they use that product, and how well it serves the use to which they put it" (Boyd and Levy 1963, p. 130).

2.2 International perspective

For industrialization, urbanization, economic growth and uplifting the quality of life in society, electricity is a vital factor. The urbanization and industrialization opportunities in Bangladesh are rapidly developing. Here, the main source of electricity generation is water-dam project in hill-tracks area. Besides, coal and crude oil is compelling Bangladesh to search for other renewable source of energy like solar, wind power, etc. Moreover, Bangladesh is constrained with technical know how, requisite technology and capital crunch for this change over of power generation to renewable energy. In this situation, the government is trying to manage the load-shedding as much as they can.

2.3 Next generation light: Light Emitting Diodes (LED)

To meet the future energy demands and reduce the greenhouse gas emissions, it is very important to conserve electrical energy. According to International Association for Energy-Efficient Lighting (IAEEL), total world consumption for the lighting is 2000TWh of electricity and results into 2900 million metric tons of CO\(_2\) emission per year. At present, in most part of the world, incandescent bulbs are used for general purpose lighting. Incandescent bulb consumes five times more power to produce same light than LED and it has very less life as compared to LEDs. In coming years due to general purpose use in lighting, significant increase is expected in LED based solid state lighting [R Sing et al., 2008].

3.0 Methodology

3.1 Research Type

The type of the research is basically exploratory research where the overall industrial trend in Bangladesh along with the transformation of consumer behavior in the consumption of lighting is sought. In this way, the relevant literatures, databases analysis and market studies were reviewed to envision the global scenario. Afterwards, depth interviews, expert opinions, consumer surveys and focus group discussions were done with the industry people who are professional researchers, engineers, suppliers etc.

3.2 Data collection method and procedure

The data collection was done through both the primary and secondary sources such as consumer survey questionnaire, import data from National Board of Revenue (NBR) of Bangladesh,
market research and survey, online databases, expert opinions, focus group discussion (FGD) etc. Two sets of questionnaires are developed for two separate groups and have been attached in the appendix. There were two independent qualitative and quantitative study. The quantitative study with a semi-structured questionnaire included F2F study with D2D and open-ended questionnaires used to gather information from respondents in quantitative study. Target Group of Respondents are Contractors / Developers who are experienced in the construction industry for more than 3 years, user or purchase decision maker of construction electrical equipment; Traders (Dealers/distributors/retailers/wholesalers); Individual household, Individual Electricians

### 3.2.1 Sample Distribution

<table>
<thead>
<tr>
<th>Target Groups</th>
<th>Division 1 (Dhaka)</th>
<th>Division-2 (Chittagong)</th>
<th>Division-3 (Sylhet)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractors / Developers</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>Traders (Dealers/distributors/retailers/wholesalers)</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>Individual buyers (household)</td>
<td>25</td>
<td>15</td>
<td>15</td>
<td>55</td>
</tr>
<tr>
<td>Individual Electricians</td>
<td>25</td>
<td>15</td>
<td>15</td>
<td>55</td>
</tr>
<tr>
<td>Total</td>
<td><strong>90</strong></td>
<td><strong>50</strong></td>
<td><strong>50</strong></td>
<td><strong>190</strong></td>
</tr>
</tbody>
</table>

The areas have been selected considering the major market of the country. Furthermore, the company in-house databases and information from Super Star Group, Transtec, Energypac, Philips etc. are also collected for the analysis of the industry trend.

### 4.0 INDUSTRY ANALYSIS

In chapter four a comprehensive analysis of the lighting industry of Bangladesh, different lightings’ features, competitors and sector wise consumption pattern of the lighting industry in Bangladesh is presented. Starting from the general or traditional lighting systems to the latest innovation such as LED, the features, market size and sector wise consumption are shown. Side by side, the major countries from which the raw materials and finished items for respective items are imported are also enlisted and analyzed.

#### 4.1 Common Lighting products used in Bangladesh

In Bangladesh, the most commonly used lighting items are General lighting Service (GLS)/Incandescent lamp, Tube Light (T8 and T5), Compact Fluorescent Lamp(CFL)(Energy Saving Lamp), Light Emitting Diode (LED)(Bulb and tube), Street Lightings, Decorative lightings etc. Among these lightings, the traditional items are GLS and Tube lights. However, the CFL bulbs consume lesser energy and improved technology than the GLS. Therefore, it has been widely adopted all over the country. At present, due to the global energy crisis and national electricity shortage, govt. is encouraging different parties to use more energy efficient options to reduce the waste of electricity. In this way, the wide scale use of energy saving lamp has been possible. But, LED is the most energy efficient lighting among all at present. All over the world, it is considered as the next generation lighting.

#### 4.2 Market Size and competitors share of CFL, Tube lights and LED lights in Bangladesh

In Bangladesh the raw materials of CFL lamp is mostly imported from China (99.47%). Besides, the other countries include Cameroon, India, Singapore, Taiwan, etc. The grand total of the value of the imported materials are about 26,178,351.77 BDT. So, it is quite obvious that, there lies a direct relationship with Chinese suppliers for the lighting raw materials. Therefore, any strategic decision made in the production and supplier level in China has a significant influence in shaping the lighting industry in Bangladesh. For example, the decisions like after 2017, the restriction of producing CFL
and its raw materials and the encouragement of LED production will certainly increase the cost of raw materials of CFL bulbs.

4.3 Competitors’ analysis

The lighting industry of Bangladesh consists of a complex web of different parties. Here, most of the parties are mainly trade based who import raw materials or components mainly from China and have very minimum or no branding activities. On the other side, very few giant companies who hold some manufacturing facilities have some distribution channels all over the country. Some of those include the corporate and institutional channels along with the local and district wise outlets. Super Star Group, Energypac, Transtec, Philips are the main popular brands in Bangladesh who have a very strong brand image. Apart from the Philips, the other four have manufacturing facilities in Bangladesh. Although, Philips has a very strong brand image, it has lost the leading position long ago.

5.0 FACTORS BEHIND THE DEMAND SHIFTING

On the basis of the above research, this chapter does empirical research on the real factors or driving forces that actually are affecting in transforming the consumption pattern of the consumers and the shape of lighting industry in Bangladesh.

5.1 Government Initiatives

As an underdeveloped nation, Bangladesh is always feeling the pressure of demanding electricity for supporting the expanding industrialization and urbanization. Through the course of time, general consumers as well as the industrial and institutional buyers consumption of lighting and other electronic devices has increased in a significant amount. Moreover, the tariff rate for importing the finished product and the components has been made lower. To refer, the government has a zero percent (0%) tariff on the import of CFL components. With the innovation of technology, all over the world, LED lamps are taking place of the traditional lighting system such as CFL and incandescent lamps (bulbs and tube lights).

5.2 Financial and logistic support from International Organizations

In Bangladesh, different multinational and international organizations are jointly working to combat the challenge of energy crisis and towards a sustainable environment. Therefore, the widespread use of LED and energy saving lights is getting more popularity.

5.3 Private Organizations’ initiatives

5.3.1 Private awards and promotion

A number of global and local awards is given each year to encourage the environment friendly and green products specially LED and energy saving items to reduce the carbon emission in the environment. Some of the mentionable are described below:

The Global LEAP Awards off-grid LED appliance competition seeks to identify and promote the world's highest quality, most energy-efficient, and affordable off-grid LED lighting appliances. Winning products will be recognized at a well-publicized international ceremony, will be given use of an Awards logo, and will be featured in a widely-distributed Outstanding Off-Grid Products procurement guide for bulk purchasers like governments, social enterprises, and wholesale distributors. HSBC – The Daily Star Climate Awards is an initiative that seeks to recognize organizations and individuals actively working towards preserving environment and managing the risk of climate change with their business practice, socially-driven initiatives or valuable knowledge sharing practices. Climate Awards initiated from 2010 to recognize the efforts towards green implementation. From then onwards, it continued for three years consecutively.

5.3.2 Local Media promotion

The local media of Bangladesh are also assisting in promoting the energy efficient solutions in Bangladesh. In order to do so the television commercials, radio commercials, newspapers, Public relation programs, posters, electricity bill and Non-government organizations (NGO) are being used
for using more energy efficient usage of lights. The remote off-grid areas of Bangladesh where the
government has failed to ensure electricity coverage, are being covered by many private and NGOs
and motivated the local people to the benefits and features of LED and Energy saving lights

5.4 Electricity crisis and higher electricity bill

Day by day the electricity bill is being raised in order to meet the higher cost of production. The
main source of electricity production is natural gas and water dam power generation. The resource
of natural gas is limited and side by side the urbanization and industrialization is pushing the govt. for
a wider on-grid and off-grid electricity coverage. So to manage these problems, load-shedding
management has been a long practice in Bangladesh. However, nowadays, the new energy saving CFL
lights and the LED lights consume very minimum electricity.

5.5 Dependency on China (Production shifting)

Till now, the main source of raw materials, components and finished product suppliers is China.
About 99% of the total import materials are imported from China. Moreover, the technical support,
capital machineries and assembly machineries required in the lighting industry are also sourced from
China. Therefore, any strategic decision made in this production by Chinese Government, is surely and
directly going to affect the production and consumption pattern in Bangladesh. For example, from
2017, Chinese Government is going to reduce the production facilities of CFL and shift focus in the
production of LED lights.

5.6 Environmental Concern

Energy-related carbon dioxide emissions—those emissions produced through the combustion
of liquid fuels, natural gas, and coal—account for much of the world's anthropogenic greenhouse gas
emissions. As a result, energy consumption is an important component of the global climate change
debate. Within the context of the promotion of the wide-spread use of energy saving lamps such as
compact fluorescent lamps, and the upcoming phase-out of incandescent lamps, the Commission
mandated SCENIHR in April 2008 to look into the claims of light sensitive citizens' associations such
as Right to Light, Spectrum Alliance and Lupus UK that the symptoms of some diseases are, or could
be, aggravated in the presence of energy saving lamps (mainly compact fluorescent lamps).

5.7 Factors affecting the consumers decisions

5.7.1 Survey Questionnaire (for Consumers Groups)

In order to reveal the micro-perspective of the factors affecting the consumers decision making
into the energy efficient lighting solution, a questionnaire has been developed and surveyed
accordingly. The summary of the findings are as follows:

However, the summary of the factors are elaborated in below:
### Questions for consumer group

<table>
<thead>
<tr>
<th>Sl</th>
<th>Questions</th>
<th>FIVE POINT LIKERT SCALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What is level of your awareness from different Government mediums (How much have you heard) about efficient ways of lighting solution in your house?</td>
<td>3% 24% 47% 16% 10%</td>
</tr>
<tr>
<td>2</td>
<td>What is level of your awareness from different private mediums (How much have you heard) about efficient ways of lighting solution in your house?</td>
<td>0% 3% 20% 67% 10%</td>
</tr>
<tr>
<td>3</td>
<td>What is the impact of the recent price hike of the electricity bill?</td>
<td>0% 2% 8% 27% 63%</td>
</tr>
<tr>
<td>4</td>
<td>How much conversion to more energy efficient system from traditional lighting have you made in your house over last 5 years?</td>
<td>12% 37% 39% 7% 5%</td>
</tr>
<tr>
<td>5</td>
<td>How much do you know or feel environmental pollution aspect of traditional lighting?</td>
<td>5% 35% 40% 15% 5%</td>
</tr>
<tr>
<td>6</td>
<td>How much do you know health hazard aspect of traditional lighting?</td>
<td>4% 15% 33% 32% 16%</td>
</tr>
<tr>
<td>7</td>
<td>What is your feeling of lighting illumination from the new lighting systems (CFL and LED)?</td>
<td>53% 29% 18% 0% 0%</td>
</tr>
<tr>
<td>8</td>
<td>What is your feeling about the price of adopting new lighting system in your house and office?</td>
<td>0% 5% 17% 32% 46%</td>
</tr>
<tr>
<td>9</td>
<td>How much ready are you for adopting the new lighting solution in your premises?</td>
<td>25% 45% 20% 10% 0%</td>
</tr>
</tbody>
</table>

### 6.0 BARRIERS TO THE TRANSFORMATION

#### 6.1 Consumption habit in Bangladesh

One of the main challenges of this transformation is the existing consumption pattern or behavior. In Bangladesh, many of the consumers who reside by the rural areas are not well aware of the technical features or benefits of the new technologies. More than 50% of the total population of the country lives in the rural area who have a very limited purchasing capacity. Moreover, the per capita income is 899.298 USD US.

#### 6.2 Initial High Price

The new technology is initially offered at a higher price. Therefore, when the consumers compare the existing solutions, they initially tend to get demotivated into the conversion of new solution. However, in course of time, when larger production will be possible, the raw material and product development cost will decline and already began to decline. For example, the initial cost of production of energy saving lamp (CFL) has declined manifold in course of time due large scale of production. Similarly, the newest technology in lighting-LED is also highly priced as the initial cost of production is higher.

#### 6.3 Government level bureaucracy

The spontaneous support of the government is very important and crucial for such a large scale demand shifting. In Bangladesh, although the government is trying to introduce the new energy efficient solutions for lighting, the initiatives should be made proactive. For both the private investors and consumers, there are some serious negligence or bureaucracy is still affecting the overall smooth transformation.
6.4 Lack of strong awareness campaign
The awareness campaigns from both the government and the different private and local parties should be made stronger to convince and educate about the advantages of more energy efficient solutions of lighting in home and work places. The survey conducted at both levels (consumers and B2B groups) suggests that the awareness campaigns are needed to be made stronger and more effective to remove the other barriers and made the transformation smoother. In this regard, the local Non-governmental organizations (NGOs) can play a vital role to launch massive public campaigns along with the governmental organizations.

7.0 Conclusion and prospect

7.1 Conclusion
The increased demand of electricity in Bangladesh both in industry and household has propelled the transformation of consumption into more efficient usage of lighting. Besides, the scarcity of natural resources, increased price of petroleum, expansion of industries and improvement of life standard have altogether made the government and other stakeholders more conscious and encouraged into using energy efficient lighting solutions. In this regard, the Zero Energy Building concept has gained quite popularity over the last years. Many countries have already established ZEBs as their future building energy target.

7.2 Managerial implication
At present, the managerial implications can be divided into many categories such as Macro, enterprise, consumers and Micro level. Firstly, in Bangladesh, the insufficiency of the power generation has led the government and all other stakeholders into taking steps to promote and convince the consumers for using more energy efficient lighting solutions. In this way, the prevailing barriers are required to be removed by more proactive initiatives such as enacting Building Code 2008, Bangladesh that clearly enforces the clause of using clear energy usage at a minimum percentage from the off-grid sources like solar and so on. Secondly, different private and non-governmental organizations (NGO) should come up with a more plausible and pragmatic solutions to spread the latest innovation of technology to each corner of Bangladesh for reaping the maximum benefit. Thirdly, both the policy making and the execution from the government level and private initiatives are equally significant into the smooth transformation of the energy efficient and next generation lighting consumption in a massive scale. Fourthly, the usage of energy efficient solution will lead to more electricity savings which can be used to other product sectors to contribute in the national GDP. Fifthly, the commercial entrepreneurs should also come up to facilitate and make these products available to the ultimate consumer level. Therefore, both the import based trading and manufacturing facility establishment policies should be made easier by pushing the policy makers as much as possible side by side. Finally, removing the aforementioned barriers to smoothen the transformations are also important for example reducing the initial high price of new technologies by investing and reducing the tariff structure and educating the target consumer groups to habituate them into using the new technology of lighting solutions.