Marketing Mix of Product Life Cycle (MMPLC) and Business Performance (BP) for Sarong of Royal Handloom Weaving Factory (RHWF)

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Abstract - This study aims at finding out the impact of marketing mix of product life cycle on business performance and estimating the influence of marketing mix of product life cycle on business performance. Kotler (2000) introduced a 4 stage PLC for consumer products. This same model is also adopted by researcher. But, this study is different from the Kotler's model. This study considers marketing mix and business performance during the different stages of PLC. Researcher uses a single case of Royal Hand Loom Weaving Factory as sample size. Data were collected during the period of 2012 and 2013 using records of production, sales and dealers of the Weaving Factory. Collected data were presented by plots and analyzed by estimation methods. Data were fed into Minitab and Excel for presentation and analysis. Results showed that product mix and distribution mix affect/influences positively business performance. It found that marketing mix of product life cycle influences i.e. increases business performance. Results revealed that influence i.e. increase of marketing mix of product life cycle on business performance can be estimated accurately. The three measures are used to compare the fits obtained by using different methods. For all these three measures, smoothing constant model has the lowest value than moving average and linear trend methods. Since smoothing constant model has the smallest values in all three measures researcher selects smoothing constant as the best fitting model for forecasting profitability.

Index Terms — Business Performance, Marketing Mix, Product Life Cycle

I. INTRODUCTION

Royal Handloom Weaving Factory is located in Maruthamunai, Ampara District, Eastern Province of Sri Lanka. It introduced a new sarong brand in its weaving centre. Production and sales record revealed that monthly production, sales and dealers were slow in the earliest periods. Monthly production, sales and dealers were growing in latter part of the periods. Owner of this factory redesigns his sarong items time to time for maintaining sales and profit in terms of new designs and new colours. Production & sales and dealers represent product and place (distribution) that are 2Ps of the 4ps of marketing mix. Business performance is the sales and profit. Kotler (2000) defined that marketing mix consists of product, price, place (distribution) and promotion (advertisement, personal selling, sales promotion and public relation) as 4Ps that play vital roles in different stages of product life cycle that consists of introduction, growth, maturity and decline. Carl and Carl (1984) studied about the stage of the product life cycle in relation to business strategy and business performance. They empirically examined differences in strategic variables between stages of the product life cycle as well as differences among the determinants of high performance across stages of the PLC.

A. Statement of the Problem

Asiedu and Gu (1998) studied about product life cycle cost analysis. This study attempts to improve the design of products and reduce design changes, cost, and time to market, concurrent engineering or life cycle engineering has emerged as an effective approach to addressing these issues in today's competitive global market. Study revealed that product lifecycle involves over 70% of the total life cycle cost of a product at the early design stage. Designers are in a position to substantially reduce the life cycle cost of the products they design by giving due consideration to life cycle cost. Product design involves two aspects of marketing mix such as product and price. When a firm misdesigns its products price is up which may affect the sales and profitability of a product. David and John (1979) studied about product life cycle research. The most common product life cycle pattern is the classical, bell-shaped curve, but it is not the sole shape. The application of various forecasting techniques across the product life cycle has met with merely moderate success. They stated that very little researches have been conducted either on how different characteristics of the firm influence the product
life cycle or on the actual use of various product life cycle-strategy theories by business planners. It can be argued that the product life cycle has several marketing strategies for business performance which are important to business planners. Previous researches were found in different contexts during different time periods. So, this study is in the context of marketing mix of different stages of product life cycle has impact on business performance during 2012 & 2013. Researcher uses one selected weaving factory called Royal Handloom in Maruthamunai, Ampara District, Eastern Province of Sri Lanka (SL) that manufactures a new brand of sarong.

B. Research Issue, Questions and Objectives

Review of literature expresses that the research issue lies on two concepts such as marketing mix of product life cycle and business performance. These two concepts are related to compose a research question. Researcher is interested in questioning “whether marketing mix of product life cycle influences business performance”? and can such influence of marketing mix of product life cycle on business performance be estimated accurately?. He set “to find the impact of marketing mix of product life cycle on business performance” and to estimate the influence of marketing mix of product life cycle on business performance accurately as research objectives.

C. Rationales for this Study

This study is done for several reasons. First, this study is important to know different marketing strategies in different stages. Second, findings of this study can assist to know production, sales, dealer and sales trend during the life cycle period. Third, firm can know changing marketing needs for the sake of customer. For instance, Ronald and Tibben (2002) stated that the product life cycle has been a valuable source of insight about the changing needs of marketing and logistics over the life of a product. They studied how reverse logistics is impacted by changes in sales over the product’s life cycle. Fourth, firm can know its manufacturing and design costs in different stages. Study carried out by Asiedu and Gu (1998) with regard to product life cycle cost analysis revealed that product lifecycle involves over 70% of the total life cycle cost of a product at the early design stage. Designers are in a position to substantially reduce the life cycle cost of the products they design by giving due consideration to life cycle cost.

D. Product Life Cycle at a Glance

Different authors have defined product life cycle concept in different ways. But, mostly accepted definition stems from Kotler. Kotler (2000) stated that the Product Life Cycle (PLC) as a way to manage product to maximize business success. According to Philip Kotler, “The product life cycle is an attempt to recognize distinct stages in the sales history of the product”. Usually, there are four stages of PLC. Every product moves through these stages. As products moves from lifecycle phase to lifecycle phase, the elements of the marketing mix used to promote them change. The duration of each lifecycle phase can be controlled to a certain extent. This is particularly true in maturity phase. This is the most important one to extend from a financial point of view because this is the period when the product is at its most profitable. At the introductory stage, customers become aware and familiar with sarong with the help of promotion (advertisement). Customers try for limited sarongs. Typically, prices of sarongs are high because of the initial manufacturing cost. There are few dealers for distribution. At the growth stage, customers build their brand preference. Sarongs are redesigned to create differentiation, and promotion. Customers are more aware and trying for many sarongs. Customers try to repeat their purchases. Manufacturing costs are covered and competition increases, prices fall. Rising consumer demand and increased sales force effort widen distribution. At the maturity stage, customers maintain brand loyalty, and promotion defend the brand stimulating repeat purchase by maintain brand awareness and values. Competition may decrease price and profit margins, while distribution will peak in line with sales. Innovation to extend the maturity stage or, preferable, inject growth. This may take the form of innovative promotion campaigns, product improvements, and extensions and technological innovation. Ways of increasing usage and reducing repeat purchase period of the product are also sought. At the decline stage, customers become disloyal to the brand that is channeled elsewhere in the company. Product development cease, the product line depth is reduced to the bare minimum of brands and the promotional expenditure cut. Distribution cost is analysed with a view to selecting only the most profitable outlets.

II. REVIEW OF LITERATURE

Jovane, Alting, Armillotta, Eversheim, Feldmann, Seliger and Roth (1993) studied about a key issue in product life cycle. They stated that incoming environmental legislation is expected to impose recycling activities on industrial and consumer product manufacturers. Disassembly of used products is needed in order to make recycling economically viable in the current state of the art of reprocessing technology, thus avoiding the future high disposal costs. This study gives an overview of disassembly research at universities, research centers and industrial companies, pointing out ongoing topics and trends for future activities. Among them, major attention has been paid to basic technological development, product design (design for disassembly), process design (selection of disassembly strategy and automation level) and system design (configuration of manual and automated disassembly facilities, design of disassembly tools). It is also shown how the emerging life cycle concept can be fully exploited to develop suitable ways of dealing with information related to environmental protection and resource optimization. Peter and Gerard (2004) studied about cascades, diffusion and turning points in the product life cycle. On average, across 30 product categories, they found that new consumer durables have a typical pattern of rapid growth of 45% per year over 8 years; that this period of growth is followed by a slowdown when
sales decline by 15% and stay below those of the previous peak for 5 years; that slowdown occurs at 34% population penetration and about 50% of ultimate market penetration; that products with large sales increases at takeoff tend to have larger sales declines at slowdown; that leisure-enhancing products tend to have higher growth rates and shorter growth stages than non-leisure-enhancing products. Time-saving products tend to have lower growth rates and longer growth stages than non-time-saving products; that lower probability of slowdown is associated with steeper price reductions, lower penetration, and higher economic growth and that a hazard model can provide reasonable predictions of the slowdown as early as the takeoff.

Venkatraman and Ramanujam (1986) studied about measurement of business performance in strategy research on a comparative basis. A two-dimensional classificatory scheme highlighting ten different approaches to the measurement of business performance in strategy research is developed. The first dimension concerns the use of financial versus broader operational criteria, while the second focuses on two alternate data sources (primary versus secondary). The scheme permits the classification of an exhaustive coverage of measurement approaches and is useful for discussing their relative merits and demerits. Sai (2000) studied about knowledge transfer in Intraorganizational networks in relation to effects of network position and absorptive capacity on business unit innovation and performance. Drawing on a network perspective on organizational learning, this study argues that organizational units can produce more innovations and enjoy better performance if they occupy central network positions that provide access to new knowledge developed by other units. This effect, however, depends on units’ absorptive capacity, or ability to successfully replicate new knowledge. Data from 24 business units in a petrochemical company and 36 business units in a food-manufacturing company show that the interaction between absorptive capacity and network position has significant, positive effects on business unit innovation and performance.

Bontis, Keow and Richardson (2000) studied about intellectual capital and business performance in Malaysian industries. This study investigates the three elements of intellectual capital, i.e. human capital, structural capital, and customer capital, and their inter-relationships within two industry sectors in Malaysia. The study was conducted using a psychometrically validated questionnaire which was originally administered in Canada. The main conclusions from this particular study are that: human capital is important regardless of industry type; human capital has a greater influence on how a business should be structured in non-service industries compared to service industries; customer capital has a significant influence over structural capital irrespective of industry; and finally, the development of structural capital has a positive relationship with business performance regardless of industry. The final specified models in this study show a robust explanation of business performance variance within the Malaysian context which bodes well for future research in alternative contexts.

III. CONCEPTUALISATION AND OPERATIONALISATION

Profitability is achieved by production, sales and distribution (dealer). It is shown in figure 1.

![Figure 1: Conceptual model](Source: Literature review, 2012)

Operationalisation is done using conceptualization. Table 1 shows the operationalisation of concepts.

<table>
<thead>
<tr>
<th>Concept</th>
<th>Variable</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing mix</td>
<td>Production (product)</td>
<td>Units produced</td>
</tr>
<tr>
<td></td>
<td>Sales (product)</td>
<td>Units sold</td>
</tr>
<tr>
<td></td>
<td>Distribution (place)</td>
<td>Dealers</td>
</tr>
<tr>
<td>Business performance</td>
<td>Profitability</td>
<td>Profit</td>
</tr>
</tbody>
</table>

(Source: Literature review)

IV. METHODOLOGY

A. Procedure

Kotler (2000) introduced a 4 stage PLC for consumer products. This same model is also adopted by researcher. But, this study is different from the Kotler’s model. This study considers marketing mix and business performance during the different stages of PLC.

B. Population and Sample Size

Ismail (2011) stated that there are 210 weaving factories in Maruthamunai. He used a formulae of sample size and found that 10 weaving factories have to be taken as sample size. Since this study is a case study type a single case of Royal Hand Loom Weaving Factory as sample size.
C. Data Collection
Data were found and kept during the period of January 2011 to December, 2012. These data were collected during the period of 2012 and 2013. Data with respect to production, sales and dealers were collected from the source documents maintained by owner of weaving centre. Collected data are presented in table 2.

Table 2: Data Collection

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Units produced/ month</th>
<th>Units sold/ month</th>
<th>Dealer</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>January</td>
<td>10</td>
<td>0</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>February</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>March</td>
<td>10</td>
<td>1</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>10</td>
<td>7</td>
<td>1</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td>July</td>
<td>10</td>
<td>10</td>
<td>2</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>15</td>
<td>12</td>
<td>2</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>September</td>
<td>20</td>
<td>18</td>
<td>2</td>
<td>1800</td>
<td></td>
</tr>
<tr>
<td>October</td>
<td>25</td>
<td>20</td>
<td>2</td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>25</td>
<td>25</td>
<td>2</td>
<td>2500</td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>30</td>
<td>30</td>
<td>3</td>
<td>3000</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>January</td>
<td>35</td>
<td>35</td>
<td>3</td>
<td>3500</td>
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<tr>
<td>February</td>
<td>45</td>
<td>44</td>
<td>3</td>
<td>4400</td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>55</td>
<td>55</td>
<td>4</td>
<td>5500</td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>70</td>
<td>67</td>
<td>4</td>
<td>6700</td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>75</td>
<td>74</td>
<td>4</td>
<td>7400</td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>80</td>
<td>78</td>
<td>4</td>
<td>7800</td>
<td></td>
</tr>
<tr>
<td>July</td>
<td>85</td>
<td>80</td>
<td>5</td>
<td>8000</td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>85</td>
<td>81</td>
<td>5</td>
<td>8100</td>
<td></td>
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<tr>
<td>September</td>
<td>95</td>
<td>90</td>
<td>5</td>
<td>9000</td>
<td></td>
</tr>
<tr>
<td>October</td>
<td>100</td>
<td>90</td>
<td>5</td>
<td>9000</td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>105</td>
<td>105</td>
<td>5</td>
<td>10500</td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>115</td>
<td>115</td>
<td>5</td>
<td>11500</td>
<td></td>
</tr>
</tbody>
</table>

D. Data Presentation and Analysis
Collected data were presented by plots and analyzed by estimation methods. Data were fed into Minitab and Excel for presentation and analysis. Data in regard to production, sales and dealers are presented in time series plot as shown in figure 2.

Figure 2: Time series plot

The respondents randomly surveyed using accidental random sampling technique had the completed their purchase in the below mentioned hyper stores

Table:2 Distribution of respondents

<table>
<thead>
<tr>
<th>Shop</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shop 1</td>
<td>88</td>
<td>67</td>
<td>31</td>
<td>9</td>
<td>5</td>
</tr>
</tbody>
</table>

V. RESULTS AND DISCUSSION OF FINDINGS
Time series plot shows four stages for the sarong brand stated by Kotler (1999). There was a slow sale of product mix of this sarong brand during this January to July, 2011. From August, 2011 to January 2012, sales of sarong brand were growing. From February, 2012 to August, 2012, there was a peak and matured sales for sarong brand. Sales of sarong start to decline during August, 2012 to September, 2012. Marketing mix variable i.e. product (production and sales) of newly introduced sarong brand rises step by step from January, 2011 to December, 2012. Product life cycle for this sarong brand was 21 months starting from January, 2011 to September, 2012. Owner of Royal Hand Loom Weaving Factory starts to redesign his sarongs by new colours and new designs. After redesigning the sarongs, sales start to rise again after September, 2012. Distribution (place) of marketing mix rises in a very slow pace. Pace of distribution mix is so slow than that of product mix for sarong brand.

Business performance is measured by profitability. Product mix and distribution mix affect i.e. positively influences business performance i.e. profitability. Moving average plot, smoothing plot and linear trend plot shows the increase in

(Source: secondary data, 2011 & 2012)
profitability during the January, 2011 to September, 2012. Then, product is rejuvenated. Profit starts to rise again due to increased sales by way of redesigned sarongs. Redesigned sarong can generate profit continuously for next two years i.e. up to 2015. There would also be an additional redesign at the end of two years i.e at the end of 2015. It is proved that sarong products (weaving products) need redesigned items in every two years to maintain its profit or business performance. If one fails to do so he or she has to lose his or her profit. Past profitability is depicted in figures 3, 4 and 5.

Forecast for January, 2015 indicates that there would be 10500 rupees with a lower and upper boundary of 9230 and 11769 as profit under moving average method.

Figure 3: Moving average plot for profit

![Moving Average Plot for Profit](image)

(Source: Secondary data)

Figure 4: Smoothing Plot for Profit

![Smoothing Plot for Profit](image)

(Source: Secondary data)
Forecast for January, 2015 indicates that there would be 11582 rupees with a lower and upper boundary of 10684 and 12480 as profit under single exponential smoothing for profit.

**Figure 5: Trend Analysis for Profit**

![Trend Analysis Plot for Profit](image)

Forecast for January, 2015 indicates that there would be 10882 as profit under trend analysis plot for profit.

**A. Estimation of Forecast of Profitability**

Researcher uses three methods such as moving average, smoothing and linear trend methods. Measures of accuracy for these three methods have been calculated using three measures such as MAPE, MAD and MSD. They are mean absolute percentage error (MAPE), mean absolute deviation (MAD) and mean squared deviation (MSD). MAPE expresses accuracy as a percentage of the error. Because this number is a percentage, it is easier to understand than the other statistics. Three methods have 22, 17 & 59 as MAPE. It means the forecast is off by 22, 17 & 59% on average. MAD expresses accuracy in the same units as the data which help conceptualize the amount of error. Outliers have less of an affect on MAD than on MSD. Three methods have the value of 500, 367 & 569 as MAD. MSD is a commonly-used measure of accuracy of fitted time series values. Outliers have more influence on MSD than MAD. Three methods have the value of 419565, 280764 & 598576 as MSD. Objective of this research is to find out the influence of marketing mix on business performance (profitability). Researcher wishes to find a good prediction model out these three methods. Results of all these three methods are shown in table 3.

<table>
<thead>
<tr>
<th>Method</th>
<th>MAPE</th>
<th>MAD</th>
<th>MSD</th>
<th>Model selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moving average</td>
<td>22</td>
<td>500</td>
<td>419565</td>
<td></td>
</tr>
<tr>
<td>Smoothing constant</td>
<td>17</td>
<td>367</td>
<td>280764</td>
<td>√</td>
</tr>
<tr>
<td>Linear trend</td>
<td>59</td>
<td>659</td>
<td>598576</td>
<td></td>
</tr>
</tbody>
</table>

(Source: Results of secondary data, 2011 & 2012)

**VI. FINDINGS AND CONCLUSIONS**

Research found that marketing mix of product life cycle influences i.e. increases business performance. Results revealed that influence i.e. increase of marketing mix of product life cycle on business performance can be estimated accurately. The three measures are used to compare the fits obtained by using different methods. For all these three measures, smoothing constant model has the lowest value than moving average and linear trend methods. Since smoothing constant model has the smallest values in all three measures.
researcher selects smoothing constant as the best fitting model for forecasting profitability.

VII. LIMITATIONS AND POTENTIAL OPPORTUNITIES FOR FUTURE VENUES

According to Ismail (2011), there could be 10 weaving factories as sample size. Since this study is a case study type a single case of Royal Hand Loom Weaving Factory as sample size. There are some other villages which run weaving factories in Ampara District, Eastern Province of Sri Lanka. There are number of weaving products such as sarees, hankercies, etc. Case study is limited by generalization of findings. This study considers consumer items and excludes industrial items. This study considers production and sales unit wise whereas dealers are in numbers. Profit is measured in terms of rupees. It is difficult to forecast production, sales, dealers and profitability with accuracy. Real environment may cause estimation wrong.

VIII. POLICY IMPLICATIONS

Subsidized yarn can be delivered to weaving factory owners for maintaining its continuous production and sales. This study proves that marketing mix of PLC of sarong increases profitability. Weaving industry is one of the self- employed sectors that need the attention of Ministry of Small Industrial Development.

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REFERENCES