# ANALYSIS OF THE EFFECT OF PROMOTION ON SALES

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## ABSTRACT

*This thesis aims to study the impacts of the sale promotional campaigns on the sales volume, and to compare the sales volume in the months following those months when sales promotional campaigns are launched. As the focus company has never studied the impacts of its sales promotion programs, while continuing to launch the promotion, the firm has had to bear a great deal of sales promotion burden. The studied company imports consumer goods from abroad and distributes the products to its local customers. The study is limited to the data about those sales carried out through various channels from January 2012 to December 2016. This thesis studies coffee products distributed through the modern trade channel. This product group is chosen because it is the group for which the firm regularly launches its sales promotions, with offered discounts divided into three levels. The author has used the Autoregressive Integrated Moving Average Model (ARIMA) and the SPSS statistic program as the means for the analysis*

*Although the study results show that the promotions at all levels of intensity increase sales volumes, some promotion programs result in lower net revenue after taking into account the discounted prices and additional expenses associated with promotion activities. Care should be exercised in launching promotion programs.*

***Keywords**: Promotion; ARIMA model, Time series analysis*

**บทคัดย่อ**

งานวิจัยนี้มีวัตถุประสงค์ในการศึกษาผลของการส่งเสริมการขายที่มีต่อยอดขาย และยังศึกษาผลกระทบของยอดขายในเดือนหลังจากที่มีการทำการส่งเสริมการขาย เนื่องจากทางบริษัทไม่เคยทำการศึกษาผลกระทบและยังมีการทำการส่งเสริมการขายอย่างต่อเนื่อง ทางบริษัทจึงต้องสูญเสียค่าใช้จ่ายในการทำการส่งเสริมการขายเป็นอย่างมาก ซึ่งข้อมูลที่นำมาศึกษาเป็นของบริษัทที่ประกอบธุรกิจการนำเข้าสินค้าอุปโภค-บริโภคจากต่างประเทศมาจัดจำหน่ายให้กับลูกค้าภายในประเทศผ่านช่องทางต่าง ๆ ตั้งแต่เดือนมกราคม ปี พ.ศ. 2555 ถึงเดือนธันวาคม ปี พ.ศ. 2559 กลุ่มผลิตภัณฑ์ที่เลือกนำมาวิจัย คือกลุ่มผลิตภัณฑ์กาแฟ ผ่านช่องทางการจัดจำหน่ายโมเดิร์นเทรด เนื่องจากเป็นผลิตภัณฑ์ที่มีการทำการส่งเสริมการขายเป็นประจำ และมีการแบ่งการทำการส่งเสริมการขายโดยการให้ส่วนลดเป็น 3 ระดับ โดยผู้วิจัยใช้แบบจำลอง Autoregressive Integrated Moving Average Model (ARIMA) ในการวิเคราะห์ และใช้โปรแกรม SPSS เป็นเครื่องมือในการช่วยวิเคราะห์ ผลของการวิจัยพบว่าการทำการส่งเสริมการขายในแต่ละระดับส่งผลที่ให้ยอดขายของสินค้าเพิ่มขึ้น แต่เมื่อพิจารณาค่าใช้จ่ายในการทำการส่งเสริมการขายเพิ่มเติม พบว่า สินค้าบางชนิด เมื่อหักค่าใช้จ่ายแล้ว การทำการส่งเสริมการขายไม่คุ้มค่ากับค่าใช้จ่ายที่เกิดขึ้น หรือ การทำการส่งเสริมการขายในบางระดับทำ

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ให้เกิดกำไรมากขึ้น ดังนั้น การทำการส่งเสริมการขายจึงต้องพิจารณาปัจจัยอื่น ๆ นอกเหนือจากยอดขายที่เพิ่มขึ้นเพียงอย่างเดียว

# INTRODUCTION

The company used for this case study is an importer and distributer of consumer goods. The studied company is a well-known importer of products from all over the world. Its products are distributed through a number of sales channels, which cover both the modern trade and traditional trade channels across Thailand.

Among its other products, the firm's coffee products have generated the biggest sales, and this product line is currently entailing the largest volume of promotional campaigns. The company has continued to launch its promotional campaigns for this product group, and the promotion activities have been carried out very frequently. The firm allocated a marketing budget at 13% of the total sales. The marketing budget allocation for the firm's beverage products accounted for 13.60% of the total sales. Apparently, the firm had to bear the burden of a great deal of marketing expense. The most frequent promotional program was in the form of discounts. The discounts were offered in different levels. The existing promotional activities have an impact on the projection of customers' demand and the number of products in the inventory as it is crucial that the inventory size is sufficient for the firm's promotional programs.

In the past, the firm did have any clear promotional plans. The past promotional programs were carried out under the agreements made between the firm's sales department and the customers, and the promotions also depended on the marketing department which planned for promotion campaigns aimed at boosting sales of certain products. Both parties were committed only to boosting sales but they did not study the actual outcome of the existing promotional plans. In other words, there was a lack of study on major issues: whether the increase in sales was really made possible by the promotional programs; whether the increase in sales really generated profit; the impact of the volume of promotional programs on the volume of customers' orders, and the overall impact on sales. The firm's coffee product line (i.e., coffee powder) distributed through the modern trade channel was used in this case study as this production line was the firm's core product whose steady promotional campaigns were in place throughout the year. The study was conducted for the sales period starting January 2012 to December 2016. Four product types were studied as follows:

1. Product A, distributed through Channel 108
2. Product B, distributed through Channels 101 and 108
3. Product C, distributed through Channels 104 and 107
4. Product D, distributed through Channels 104, 107 and 108

***Objectives***

1. To study the firm's past promotional campaigns

2. To study the impact of promotional campaigns on sales and the subsequent sales performance in the months following the months when promotional campaigns were launched
3. To propose the findings so that the firm can apply such findings to its actual business conditions

## RESEARCH METHODOLOGY

The Autoregressive Integrated Moving Average Model (ARIMA) for the analysis of Box-Jenkins time series (Box-Jenkins 1976) is a statistic method to figure out a forecasting model. This technique requires the relation from the past data to construct a model of behavior, and this data is used for a forecasting model of future behavior. This is a very effective technique for short-term forecasting. The model used for the analysis of Box-Jenkins is called ARIMA model (which stands for Autoregressive Integrated Moving Average. The ARIMA Model is based on the assumption that the current observation is the linear function of the observation and the past random errors.

This Box-Jenkins method is different from other forecasting methods. For other forecasting methods, a constructor must identify the relation pattern before pursuing further analysis. In particular, when the time series do not entail any particular trends of seasonal patterns, it is difficult to determine an appropriate model or carry out a regression analysis. Hence, a relation pattern between independent variables and dependent variables must be determined first. Unlike other methods, the Box-Jenkins forecasting method can solve the aforementioned issue as it does not require any fixed patterns before pursuing further analysis. Instead, a pattern will be established during the analysis.

The past observation in the model is defined as autoregressive (AR) and the random forecast error in the model is known as moving average (MA). A time series which needs to be differenced to be made stationary is said to be an "integrated" version of a stationary series
or I. The ARIMA model is often written to indicate the values of p for AR, d for the number of differences needed for stationary, and q for MA. It is classified as an "ARIMA (p,d,q)" model; q = 0 is AR(p); p = 0 is MA(q). The Box-Jenkins forecasting method is divided into three major steps: i) determination of the model; ii) forecast of parameter of the model; and iii) examination of the model.

The data used in this research was the secondary data from the firm importing consumer goods that kept data about customers' orders for sales through the modern trade channel from January 2012 to December 2016. The collected data included monthly sales (unit: one unit consists of 12 pieces), monthly promotional campaigns, the number of participating modern trade stores, etc.. Given the fact that the firm already offered 10% discount without the authority's approval, thus this discount program was deemed as a non-pro program. Of all four studied products, the promotional scales are shown in the following Table:

**Table 1: The Promotional Scales**

| | |
|---|---|
| Non-pro (1-10) | 0 |
| 11-20% | 1 |
| 21-30% | 2 |
| 31-40 | 3 |

The details of sales through the modern trade channel which were analyzed monthly, and the details of monthly promotional information, are as follows:
Following the collection of the data about sales and relevant promotional campaigns, the next steps were:

1. Use the time series (sales) to plot a graph in order to study general characteristic elements of the time series
2. Analyze the initial data by means of the ARIMA model through the SPSS program. The ARIMA model analysis entails the following steps:
    - Determine values in the program:

Dependent variables were the past (monthly) sales.

Independent variables were the levels of promotional programs; 1 represented the duration when promotional campaigns were in place while 0 represented the duration when no promotional programs were launched. Additional variables were the months following the promotional campaigns, which were represented by 1.

- Examine the stationary of the time series.
- Define the ARIMA model (p, q, d) by comparing the characteristics of autocorrelation function (ACF) and partial autocorrelation function (PACF) of the observation.
- Examine the appropriateness of the model.
- Analyze the findings.

## FINDINGS

***Results***

To produce the initial finding of the analysis of the impacts of promotional campaigns on the sales by means of the ARIMA model through the SPSS program, the researcher studied and analyzed the four products by plotting a graph and examining the ACF in order to study the general characteristic elements of the time series. In case the data tended to point to a particular trend or seasonal pattern, it would have been necessary to study the difference No. 1. After having examined the graph and ACF, the research found that the data was stationary, therefore searching for the difference 1 was not required and no lags were beyond the confidence interval. In addition, the figure moved toward zero rapidly.

**Figure 1: ACF and PACF obtained from the Analysis**

This example is from the SPSS analysis for Product A distributed through the modern trade Channel 108.

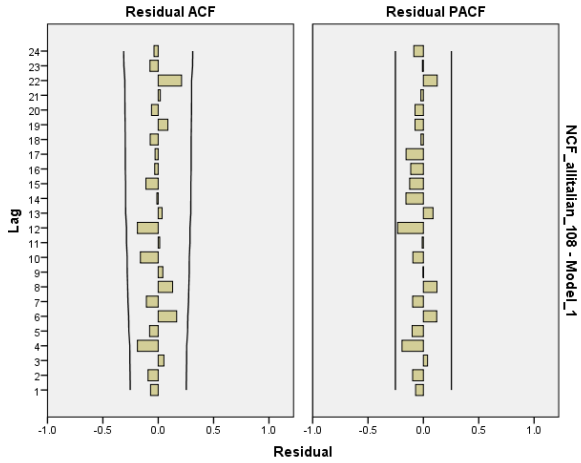


**Figure 2 : Estimated ARIMA Model Parameter (0,0,0)**

**ARIMA Model Parameters**

| | | | | | Estimate | SE | t | Sig. |
|---|---|---|---|---|---|---|---|---|
| product_A-Model_1 | product_A | No Transformation | Constant | | 9.993 | 1.672 | 5.978 | .000 |
| | pro1 | No Transformation | Numerator | Lag 0 | 7.275 | 3.191 | 2.280 | .026 |
| | pro2 | No Transformation | Numerator | Lag 0 | 49.007 | 10.306 | 4.755 | .000 |
| | postpro | No Transformation | Numerator | Lag 0 | -1.656 | 3.965 | -.418 | .678 |

The product shown in the above Figure saw promotional campaigns at two levels, Level 1 and 2. As there were no promotional programs for Level 3, this was not factored in the model.

The Figure above suggests that the promotional campaign Level 1 and 2 influenced the sales figures.

If the promotional campaign on Level 1 were to be launched, it would boost sales by 7.2 units, accounting for 58.33% of the five-year sales average.

If the promotional campaigns on Level 2 were to be launched, it would boost sales by 49 units, accounting for 408.33% of the five-year sales average.

When considering the Sig, it was found that the promotional campaigns represented the significant level of 0.05 (Sig < 0.05)

'Postpro' represented the subsequent months following the months when the promotional campaigns were launched. The results suggest that the sales in the following months dropped by 1.7 units, accounting for 14.17% of five-year sales average. However, the Sig. showed at sig.>0.05, which means that the sales in the months following the months when promotional programs were in place were not impacted by the promotion.

**Table 2: Table Summarizing the Analysis Results of the Four Studied Products**

| Product | ARIMA Model | Results |
|---|---|---|
| Product A distributed through Channel 108 | ARIMA (0,0,0) | 1. The promotional campaign Level 2 (pro2) had the biggest impact on the sales as it could boost the sales by 49 units (at the Level of Significance of 0.05)<br>2. The sales in the months following the month when the promotional campaigns were in place seemed not to have been impacted by the sales in the prior months. |
| Product B distributed through Channel 101 | ARIMA (0,0,0) | 1.The promotional campaign Level 2 (pro2) had the biggest impact on the sales as it could boost the sales by 39.34 units (at the Level of Significance of 0.05)<br>2.The sales in the month following the months when the promotional campaigns were in place seemed not to have been impacted by the sales in the prior months. |
| Product B distributed through Channel 106 | ARIMA (0,0,0) | 1.The promotional campaign Level 3 (pro3) had the biggest impact on the sales as it could boost the sales by 356.20 units (at the Level of Significance of 0.05).<br>2.The sales in the months following the month when the promotional campaigns were in place seemed not to have been impacted by the sales in the prior months. |
| Product C distributed through Channel 104 | ARIMA (0,0,0) | 1. The promotional campaign Level 3 (pro3) had the biggest impact on the sales as it could boost the sales by 122.88 units (at the Level of Significance of 0.05).<br>2. The sales in the months following the month when the promotional campaigns were in place seemed not to have been impacted by the sales in the prior months. |

**Table 2: Table Summarizing the Analysis Results of the Four Studied Products (Cont.)**

| Product | ARIMA Model | Results |
|---|---|---|
| Product C distributed through Channel 107 | ARIMA (0,0,0) | 1. The promotional campaign Level 3 (pro3) had the biggest impact on the sales as it could boost the sales by 55.15 units (at the Level of Significance of 0.05)<br>2. The sales in the months following the month when the promotional campaigns were in place seemed not to have been impacted by the sales in the prior months. |
| Product D distributed through Channel 104 | ARIMA (0,0,0) | 1. The promotional campaign Level 3 (pro3) had the biggest impact on the sales as it could boost the sales by 163.16 units (at the Level of Significance of 0.05).<br>2. The sales in the months following the month when the promotional campaigns were in place seemed not to have been impacted by the sales in the prior months. |
| Product D distributed through Channel 107 | ARIMA (0,0,0) | 1. The promotional campaign Level 3 (pro3) had the biggest impact on the sales as it could boost the sales by 173.75 units (at the Level of Significance of 0.05).<br>2. The sales in the months following the month when the promotional campaigns were in place seemed not to have been impacted by the sales in the prior months. |
| Product D distributed through Channel 108 | ARIMA (0,0,0) | 1. The promotional campaign Level 3 (pro3) had the biggest impact on the sales as it could boost the sales by 9.38 units (at the Level of Significance of 0.05).<br>2. The sales in the months following the month when the promotional campaigns were in place seemed not to have been impacted by the sales in the prior months. |

## CONCLUSION

The analysis on the impacts of promotional campaigns suggests that the sales promotional campaign Level 3 had the biggest impact on the sales performance, followed by the promotional campaign Level 2 which showed significant impact. To elaborate, the sales promotional campaigns led to the accelerations of sales and the campaigns also boosted customers' spending. While the promotion seemed not to have pushed down the subsequent sales in the months following the months when the promotions were in place, the result seen in some product items was at the confidence level of 90%, not 95%. This level was rather acceptable. The increase in sales on the back of the promotional campaigns was additionally calculated in a form of the return from the promotional campaigns by comparing the revenue generated by the promotional campaigns Level 1, 2 and 3, with the non-promotional campaign as a comparison base. The details are as follows:

The following formula was used: (the sales arising from to the promotional campaigns x the product prices during the promotional period) – (the sales arising from the non-promotional campaign x the product prices during the time when the non-promotional campaign was launched).

The estimated costs for each promotion level are explained below:
Promotion Level 1 requires an estimated cost of Bt100,000.
Promotion Level 2 requires an estimated cost of Bt150,000.
Promotion Level 3 requires an estimated cost of Bt200,000.

**Table 3 : Revenues Earned after Deducting Promotional Expenses**

(Unit: Baht)

| **Product** | **Promotion Level 1** | **Promotion Level 2** | **Promotion Level 3** |
|---|---|---|---|
| Product A distributed through Channel 108 | -62,597.55 | 91,114.44 | - |
| Product B distributed through Channel 101 | -40,996.01 | -40,005.36 | - |
| Product B distributed through Channel 106 | 3,090.54 | 19,657.10 | 517,882.85 |
| Product C distributed through Channel 104 | - | 225,247.13 | 100,810.24 |
| Product C distributed through Channel 107 | 15,176.06 | -75,080.67 | -79,638.87 |
| Product D distributed through Channel 104 | 42,983.22 | 13,788.33 | 137,898.14 |

**Table 3 : Revenues Earned After Deducting Promotional Expenses (Cont.)**

(Unit: Baht)

| Product | Promotion Level 1 | Promotion Level 2 | Promotion Level 3 |
|---|---|---|---|
| Product D distributed through Channel 107 | -49,945.77 | 107,533.32 | 184,423.61 |
| Product D distributed through Channel 108 | -83,928.88 | -125,231.52 | - |

Based on the net additional sales boost by the promotional programs after deducting related promotional expenses, the study suggested that spending additional expenses on promotions for some products did not prove worthwhile. The details are discussed below:

1. Product A distributed through Channel 108

Promotion Level 1 did not prove worthwhile because the promotional program on this Level was conducted often but the sales volume did not improve much. Hence, it was not worth spending additional promotional expenses.

2. Product B distributed through Channel 108

Two levels of promotions on this product were not worth it when considering the actual promotional expenses. As this product already generated high sales volume in general, promotional programs did not help much in terms of boosting sales volume. In other words, the sales volume during promotions did not differ much from the volume recorded during the time when no promotional programs were launched.

3. Product B distributed through Channel 106

All three levels of promotions for this product generated some profit after expenses deduction. In particular, the promotion Level 3 yielded a significant increase in sales income as other additional programs, in addition to a typical discount program, were also launched.

4. Product C distributed through Channel 104

During 2012 and 2013, no promotional program was initiated for this program while a great deal of promotions were launched during 2016. This promotional pattern resulted in a significant increase in sales volume because the promotion did not take place often.

5. Product C distributed through Channel 107

The promotion Level 1 for this product generated some profit after deducting relevant expenses. On the other hand, the promotions Level 2 and 3 resulted in declines in sales income, respectively. This shows that the additional expenses from promotion programs result in lower net sales income.

6. Product D distributed through Channel 104

This is another product for which all three promotional levels were put in place and generated profit. Also, there were other promotional programs apart from a typical

discount program as seen from the sales income boosted by promotion Level 3, which increased significantly.

7. Product D distributed through Channel 107
Promotion Level 1 did not prove worthwhile because the promotional program on this Level was conducted often but the sales volume did not improve much. Hence, it was not spending additional promotional expenses. Therefore, spending on additional promotion expenses was not worthwhile.

8. Product D distributed through Channel 108
Two promotion levels on this product were not worthwhile when additional expenses were taken into consideration because this product normally did not generate much sales volume. The promotional programs could not boost much sales volume. In addition, the product prices during promotions fell remarkably versus normal prices; therefore, it was not worth investing in the promotions.

***Research limitations***

1. This study analyzed historical sales data only on a five-year horizon because the studied firm did not keep its past sales data. Given this data limitation, the analysis on the firm's sales pattern was rather limited.

2. Given that data required for the analysis had to be regular and consistent, hence, the data of some products could not be analyzed because some products were distributed through a number of modern trade channels and orders for some product items were already canceled.

3. There may have been some other factors that would have impacted the sales volume while promotional campaigns were launched.

4. The ARIMA model used in this study can be carried out for only one product at a time because different products with different characteristic data may require different ARIMA models. This takes a great deal of time for analysis in the case where many products are to be studied.

***Suggestion***

This research is rather limited to certain areas. In other words, there may be additional factors that would have an impact on the sales while the promotional campaigns are launched. The data used for the analysis was collected only from a five-year horizon because the studied firm did not keep the data on its past promotional campaigns. This situation may lead to some limitation in terms of analysis of the characteristic elements of sales. If the research had been conducted with more extensive data, the findings would have proved more apparent. As the data for analysis must be steady for a certain period of time, therefore, the data on some product items was unable to be analyzed. Also, some products were available in a number of modern trade distributors and some orders were also discontinued, so the data on such products could not be analyzed. It should also be noted that the ARIMA model used in this study can be carried out for only one product at a time because different products with different characteristic data may require different ARIMA models. This takes a great deal of time for analysis in the case where many products are to be studied.

As for future research, if there is more past data, the analysis will yield clearer results. While this study is based on the ARIMA model for data analysis, other forms of analysis may also be applied for future studies for comparative purposes and more actual results.

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