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# Break-Even Analysis of Square Textile Limited: An Empirical Study

**Dr. Md. Rouf Biswas, Jobayra Afsana & Sk. Mahrufur Rahman**

## Abstract

Break-even point is the point at which company brings the same amount of money need to cover expenses and run the business. At this point, business does not have a profit and it also does not have a loss. The main objective of this paper is to analysis the break-even point of Square Textile Limited during the financial year 2015-2016 to 2019-2020. Data have been collected from both primary and secondary sources. Mainly secondary data have been used to analyze the break-even of the company. Various statistical tools like mean, standard deviation, coefficient of variation (CV), variance, compound annual growth rate (CAGR), index number, correlation analysis and test of hypothesis have been used to analyze the collected data. Various component of break-even point like cost, revenue and contribution margin also have been analyzed in details. Finally, some recommendations have been made on the basis of analysis and findings.

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About Author (s)

**Dr. Md. Rouf Biswas** (corresponding author)**,** Associate Professor, Department of Business Administration, North Western University, Khulna, Bangladesh.

**Jobayra Afsana,** Assistant Professor, Department of Business Administration, North Western University, Khulna, Bangladesh.

**Sk. Mahrufur Rahman,** Assistant Professor, Department of Business Administration, North Western University, Khulna, Bangladesh.

## 1.Introduction

Break-even analysis tells us exactly what we need to do to reach at the break-even and make a profit from our investment. It is also a powerful tool that is used by management to plan and to make decision regarding costs, units sold, prices, and so much more. Making a profit is one of the main objectives of every business. For achieving the goal or objective of the company, management must assemble all units of the company. For evaluating the risk in variety of business activities like innovation of production, adding or dropping product from the product line, management uses break-even analysis technique. Many business units don't know that how many units should be made or sales for making return of their investment. In this case, break-even analysis is the way to find out the required numbers of units that needs to make returns the investment. Production costs can be categorized into "variable" (costs that change when the production volume changes) and "fixed" (costs not directly related to the volume of production). Company always compared these two costs with their sales revenue to determine the level of sales volume, sales value or production at which the business makes neither a profit nor a loss (the break-even point). Company wants to determine the break-even point for a product when they plan to introduce it to the market. This helps to determine the selling price, total cost (both variable and fixed cost) and the number of total units requires to sale to reach at the break-even point. With the help of the break-even analysis, companies can get help regarding these various issues and can become profitable for their new introduced products or services in the market. Break-even analysis is also a tool for management planning, decision making, controlling and coordinating of various activities to achieve the organizational goals. CVP analysis can be a valuable tool in identifying the extent and magnitude of the economic trouble a company is facing and helping pinpoint the necessary solution (Hansen & Mowen, 2006)

The objectives of the study are to show the break-even point of the company for the study period, to focus the contribution margin of the mills, to analyze the margin of safety of the company and to show the relationships between various variables regarding break-even point.

## 2. Review of Related Literature

Alnasser et al. (2014) figured out the effect of using break-even point in planning, controlling, and in the decision-making process, in the Jordanian industrial companies. They found out that, most of the industrial companies are using break-even analysis for planning, leading, controlling and decision-making process. They have found that in Jordanian industrial companies, the relationship between break-even point and successful planning and decision making is statistically significant. Statistical tools like mean, standard deviation and test of hypothesis have used in their study. They had recommended that in order to get maximum advantages from break-even analysis company should extend their knowledge of it. Fatmawati et al. (2018) made a research and stated that the calculation of the break-even point in the cultivation of oyster mushrooms is more important. The main objective of that paper was to determine how the break-even point (BEP) analysis is important tool for profit planning purpose. They used both primary and secondary data for their study. They suggested that every business needs to carry out a cost calculation using the break-even point analysis. They also suggested for using margin of safety analysis method to plan profits and targets. Jamaludin (2019) conducted a research on balance sheet and income statement of CV Bata Cikarang Indonesia. The author has shown the break-even point both in units and in amount. Researcher has suggested that in order to become a benchmark in producing and marketing red bricks, the leader of the company should make concentration on BEP both in units and in rupiah. Author also suggested that the companies should increase sales so that their profit will increase.

Akmese et al. (2016) identified the use of cost volume profit analysis for controlling purposes. They tried to analysis the impact of the volume factor upon revenue and costs of previous periods and use of marginal profit as basis for setting menu prices in restaurants and bars. They gave recommendation regarding their finding that the hotel managers should use CVP analysis along with other management accounting tools in order to enhance their decision efficiency. Jakupi et al. (2017) found that CVP analysis is a valuable tool in identifying the extent and magnitude of economic problem faced by the company. They have mentioned that the break-even analysis helps to locate the solution needed. Into their paper they have realized the application of the theoretical concepts of the CVP analysis. To show the profitability point on unit, they have used the method of operating income and contribution margin method. They have shown sales mix and CVP analysis, changes in CVP variables and sensitivity analysis into their paper. Tui et al. (2017) made a research and expressed that the costs data, production data and price data affects the heavy equipment's operation. Author also expressed that by using break-even point, company analyzed their production data and through incremental analysis company made decision on leasing or purchasing. Dewi et al. (2018) conducted a research on cost-volume-profit (CVP) analysis of tour package at PT Tour East Indonesia, Denpasar. The objectives of the study were to determine the number of tour package to reach at the break-even point, to earn a target profit and to analyze the margin of safety. As a result the company does not suffer for loss. Authors had collected data through interviews, observation and documentation methods. In order to analyze contribution margin, target profit, break-even point and margin of safety they had used descriptive quantitative methods including least square. Finally they indicated that CVP analysis helps the manager to understand the relationship among cost, volume and profit.

## 3. Materials and Method

When a researcher systematically design a study to find out the reliable result with addressing the research objectives then it is called research methodology. Through well-defined research methodology we can discover sound findings of the research. Research types like qualitative or quantitative depends on the aim or objectives of the research.

### 3.1 Sources of Data

Primary and secondary sources have been selected to collect data. Mainly secondary data have been used for analysis. The both sources are given below:

Primary Sources: Structured Questionnaires

Secondary Sources: Annual Financial Statements

### 3.2 Collection of Data

Primary data have been collected through structured questionnaire. Secondary data have been collected from audited financial statements.

### 3.3 Period of the Study

The study covered 05 financial years from 2015-2016 to 2019-2020

### 3.4 Analysis of the Data

Various statistical tools have been used to analyze the collected data. These include mean, standard deviation, coefficient of variation (CV), compound annual growth rate (CAGR), index number, correlation analysis and test of hypothesis.

## 4. Theoretical and Conceptual Framework

### 4.1 Contribution Margin

Contribution margin can be defined as the amount after deducting variable expenses from sales revenue. It can be stated both in total and per unit basis. With the contribution margin, company can cover their fixed expenses and earn profit. Contribution margin measures the

profitability of a product or service. It helps the company to determine the selling price of a product or service. A positive contribution margin is a good indicator for a company because through this CM a profit may be occurred. The negative contribution margin is not a good indicator for a company because through this CM a loss will be happened.

Contribution margin can be expressed as per unit, in total, and as a ratio. We can use the following formula to calculate contribution margin in different ways:

$$\text{Total Contribution Margin (CM)} = \text{Total Sales} - \text{Total Variable Costs}$$

Contribution Margin per Unit (CMPU) = Selling price per unit – Variable expenses per unit.

**4.2 Contribution Margin (CM) ratio**

When we express contribution margin as a percentage instead of Tk. per unit then it is called contribution margin ratio.

$$\text{Contribution Margin(CM)Ratio} = \frac{\text{Total Contribution Margin}}{\text{Total Sales}} * 100 \quad \text{or}$$

$$\text{Profit Volume (P/V)Ratio} = \frac{\text{Total Contribution Margin}}{\text{Total Sales}} * 100$$

**4.3 Break-Even Point**

Break-even point is a point in which total revenues and total expenses are equal. Break-even analysis is used to determine the numbers of units or total amount (in Tk.) needed to cover both variable and fixed costs i.e. total costs.

Break-even point can be calculated on the following ways:

(i) $\text{Break} - \text{Even Point (in units)} = \frac{\text{Fixed Costs (FC)}}{\text{Contribution Marging Per Unit}}$

(ii) $\text{Break} - \text{Even Point (in sales Tk.)} = \frac{\text{Fixed Costs (FC)}}{\text{Contribution Marging Ratio}}$

(Garrison, Noreen & Brewer, 2010)

(iii) $\text{Cash Break} - \text{Even Point (in units)} = \frac{\text{Fixed Costs (FC)} - \text{Non Cash Expense}}{\text{Contribution Marging Per Unit}}$

(iv) $\text{Cash Break} - \text{Even Point (in sales Tk.)} = \frac{\text{Fixed Costs (FC)} - \text{Non Cash Expense}}{\text{Contribution Marging Ratio}}$

(Compiled from http://www.universalteacherpublications.com/univ/ebooks/accounts/Ch8/page3.htm)

**4.4 Weakness of break-even analysis**

Although break-even analysis can play vital role for planning and decision making purpose of the company yet it has some limitations which are given below:

(i) It is assumed that sales prices are constant at all levels of output but the selling prices are not constant at different levels of output.

(ii) It is also predicted that fixed cost will always be constant but fixed costs do vary when output changes i.e. fixed cost is constant to a certain level of activity not all level of activities.

(iii) In general it is observed that each and every business have inventory i.e. unsold inventory at the end of specific period but at the time of break-even analysis, it is assumed that production and sales are always equal.

(iv) Variable cost per unit is not always constant. When we purchase more units then we can get a discount and at that time per unit cost will be reduced.

(v) If there is more than one product involved i.e. product mix is existed then it may be difficult to allocate the fixed costs and calculation of break-even point may be difficult.

**4.5 Target Profit**

Target profit is the amount that company expects to earn during a specific period. This amount of profit is updated on the basis of regular progress of company's activities. Target profit analysis tells the management that the number of units to be sold to earn this profit.

Management makes a strategy to achieve this target profit. On the basis of this target profit, company sets their selling price and tries to minimize the cost so that they can achieve this amount of profit.

## 5. Result and Discussion

**Table # 1: Break-Even Analysis Based on Actual Figures**

| Particulars | Financial Year | | | | | Mean | Standard Deviation | CV | CAGR |
|---|---|---|---|---|---|---|---|---|---|
| | 2015-2016 | 2016-2017 | 2017-2018 | 2018-2019 | 2019-2020 | | | | |
| Actual Revenue (in lac Tk.) | 82505 | 77597 | 94171 | 105748 | 103793 | 92763 | 12525 | 14% | 2% |
| Actual Variable Expenses (in lac Tk.) | 68107 | 66935 | 81014 | 89955 | 91022 | 79407 | 11532 | 15% | 2% |
| Actual Fixed Expenses (in lac Tk.) | 6992 | 6548 | 8587 | 11503 | 12238 | 9173 | 2589 | 28% | 5% |
| Contribution Margin (CM) (in lac Tk.) | 14398 | 10662 | 13156 | 15793 | 12771 | 13356 | 1915 | 14% | (1%) |
| CM Ratio | 17% | 14% | 14% | 15% | 12% | 14% | 0.02 | 13% | (3%) |
| Actual Production (in lac Kgs) | 200 | 202 | 229 | 336 | 389 | 271 | 86 | 32% | 6% |
| Actual Sales (in lac kgs) | 201 | 200 | 228 | 336 | 384 | 270 | 85 | 31% | 6% |
| CM Per Kg (in Tk.) | 72 | 53 | 58 | 47 | 33 | 53 | 14 | 27% | (6%) |
| Variable cost per Kg (in Tk.) | 340 | 331 | 353 | 268 | 234 | 305 | 52 | 17% | (3%) |
| BEP (in lac Kgs) | 98 | 123 | 149 | 245 | 368 | 196 | 111 | 56% | 12% |
| BEP (in Lac Tk) | 24273 | 30833 | 41556 | 64796 | 91086 | 50509 | 27415 | 54% | 12% |

Source: Annual Reports

Table # 1 shows the break-even position in units and in Taka on the basis of actual figures of Square Textile Limited for the study period. The table reflects the average actual production 271 lac kgs and average actual sales 270 lac kgs. The average actual BEP was 196 lac kgs during the study period. As compared the average break-even sales with the average actual sales the mills was reached the BEP during the study period. The mill has earned revenue over the break-even point. It indicates that the concern is earning profit for each year during the study period. The mills had reached break-even sales in 20015-2016 (201 lac kgs as compared to the break-even sales 98 lac kgs), in 2016-2017 (200lackgs as compared to the break-even sales 123 lac kgs),, in 2017-2018 (228 lac kgs as compared to the break-even sales 149 lac kgs),, in 2018-2019((336lac kgs as compared to the break-even sales 245 lac kgs) and in 2019-2020 (384 lac kgs as compared to the break-even sales 368 lac kgs). The table also showed the highest stable position regarding CM ratio.)(CV 13%) and more fluctuation position regarding BEP (in lac kgs) (CV 56%). In standard deviation, highest deviation has shown in BEP (in Lac Tk) 27415 and lowest deviation has shown in CM Ratio 0.02.In case of growth rate highest growth rate was 12% both in BEP ( In lac kgs) and BEP (in lac Tk.) and lowest growth rate (6%) regarding unit CM. The company has shown negative growth rate in case of contribution margin (CM) (in lac Tk.), CM ratio, CM per kg (in Tk.) and variable cost per Kg (in Tk.). The other cases the company has shown positive growth rate.

Table # 2 reflects the cash break-even position in units and in Taka on the basis of actual figures of Square Textile Limited for the study period. The table reflects the average actual production 271 lac kgs and average actual sales 270 lac kgs. The average actual cash BEP was 105 lac kgs during the study period. As compared the average break-even sales with the average actual sales the mills was reached the cash BEP during the study period. The mill has earned revenue

over the cash break-even point. It indicates that the concern is earning profit for each year during the study period.

**Table # 2: Cash Break-Even Analysis Based on Actual Figures**

| Particulars | Financial Year | | | | | Mean | Standard Deviation | CV | CAGR |
|---|---|---|---|---|---|---|---|---|---|
| | 2015-2016 | 2016-2017 | 2017-2018 | 2018-2019 | 2019-2020 | | | | |
| Actual Revenue (in lac Tk.) | 82505 | 77597 | 94171 | 105748 | 103793 | 92763 | 12525 | 14% | 2% |
| Total Actual Variable Expenses (in lac Tk.) | 68107 | 66935 | 81014 | 89955 | 91022 | 79407 | 11532 | 15% | 2% |
| Total Actual Fixed Expenses (in lac Tk.) | 3798 | 3133 | 4494 | 6491 | 6504 | 4884 | 1549 | 32% | 5% |
| Contribution Margin (CM) (in lac Tk.) | 14398 | 10662 | 13156 | 15793 | 12771 | 13356 | 1915 | 14% | (1%) |
| CM Ratio | 17% | 14% | 14% | 15% | 12% | 14% | 0.02 | 13% | (3%) |
| Actual Production (in lac Kgs) | 200 | 202 | 229 | 336 | 389 | 271 | 86 | 32% | 6% |
| Actual Sales (in lac kgs) | 201 | 200 | 228 | 336 | 384 | 270 | 85 | 31% | 6% |
| CM Per Kg (in Tk.) | 72 | 53 | 58 | 47 | 33 | 53 | 14 | 27% | (6%) |
| Variable cost per Kg (in Tk.) | 340 | 331 | 353 | 268 | 234 | 305 | 52 | 17% | (3%) |
| Cash BEP (in lac Kgs) | 53 | 59 | 78 | 138 | 195 | 105 | 61 | 58% | 11% |
| Cash BEP (in Lac Tk) | 13186 | 14752 | 21750 | 36561 | 48406 | 26931 | 15150 | 56% | 11% |

Source: Annual Reports

The mills had reached cash break-even sales in 20015-2016 (201;lac kgs as compared to the cash break-even sales 53 lac kgs), in 2016-2017 (200 lac kgs as compared to the cash break-even sales 59 lac kgs),, in 2017-2018 (228 lac kgs as compared to the cash break-even sales 78 lac kgs),, in 2018-2019 ((336 lac kgs as compared to the cash break-even sales 138 lac kgs) and in 2019-2020 ((384 lac kgs as compared to the cash break-even sales 195 lac kgs). The table also showed the highest stable position regarding CM ratio.) (CV 13%) and more fluctuation position regarding BEP (in lac kgs) (CV 58%). In standard deviation, highest deviation has shown in BEP (in Lac Tk) 15150 and lowest deviation has shown in CM Ratio 0.02. In case of growth rate highest growth rate was 11% both in BEP (In lac kgs) and BEP (in lac Tk.) and lowest growth rate (6%) regarding unit CM. The company has shown negative growth rate in case of contribution margin (CM) (in lac Tk.), CM ratio, CM per kg (in Tk.) and variable cost per Kg (in Tk.). The other cases the company has shown positive growth rate.

Table # 3 demonstrates the comparative contribution margin and margin of safety (M/S) on the basis of actual figures of the company. The average contribution margin of the company on the basis of actual figures was 13356lacsTkand the average margin of safety (M/S) of the mills was 42254lacs Tk. The company has shown margin of safety 58232 lacs Tk. during 2015-2016, 46765 lacs Tk during 2016-2017, 52615 lacs Tk. during 2017-2018, 40952 lacs Tk. during 2018-2019 and 12707lacs Tk. during 2019-2020. The company has shown positive margin of safety in each year it indicates that the company is earning revenue over the break-even point. It is good sign for the company. In case of compound annual growth rate, it was also found that margin of safety (M/S) has shown negative growth rate (12%). Contribution margin has also shown the negative growth rate (1%). In case of index number average index was 100 in contribution margin and 80 was in margin of safety. The average index was below 100 in margin of safety. During the financial year 2016-2017 and 2019-2020 in case of index number the company was below 100 in both contribution margin and margin of safety i.e., these two years the company was in below position than the previous year. The remaining years the company was highest position than the previous tear.

**Table # 3: Contribution Margin and Margin of Safety (M/S) on the basis of Actual Figures**

| Financial Year | Contribution Margin | Margin of Safety | Contribution Margin | Margin of Safety |
|---|---|---|---|---|
| | Figure in Lac Taka | | Index taking base as previous year | |
| 2015-2016 | 14398 | 58232 | 100.00 | 100.00 |
| 2016-2017 | 10662 | 46765 | 74.05 | 80.31 |
| 2017-2018 | 13156 | 52615 | 123.39 | 112.51 |
| 2018-2019 | 15793 | 40952 | 120.05 | 77.83 |
| 2019-2020 | 12771 | 12707 | 80.86 | 31.03 |
| | | | | |
| Mean | 13356 | 42254 | 100 | 80 |
| SD | 1915 | 17732 | | |
| CV | 14% | 42% | | |
| Maximum Level | 15793 | 58232 | | |
| Minimum level | 10662 | 12707 | | |
| CAGR | (1%_ | (12%) | | |

Source: Annual Reports

**Table # 4: Correlation between Actual Sales (in Lac Kgs) and Break-Even Sales (in Lac Kgs)**

| | | Actual Sales (in Lac Kgs) | Break-Even Sales (in Lac Kgs) |
|---|---|---|---|
| Actual Sales (in Lac Kgs) | Pearson Correlation | 1 | .913* |
| | Sig. (2-tailed) | | .031 |
| | N | 5 | 5 |
| Break-Even Sales (in Lac Kgs) | Pearson Correlation | .913* | 1 |
| | Sig. (2-tailed) | .031 | |
| | N | 5 | 5 |

*. Correlation is significant at the 0.05 level (2-tailed).

Table # 4 indicates that the relationship between two variables i.e. between actual sales (in lac kgs) and break-even sales (in lac kgs). There is a high degree of positive correlation between two variables i.e. between actual sales (in lac kgs) and break-even sales (in lac kgs). This means in one variable are strongly correlated with changes in another variable. Company has shown Pearson's r is 0.913 so, we can conclude that there is a high degree of positive relationship between actual sales (in lac kgs) and break-even sales (in lac kgs). Since there is a positive relationship between actual sales (in lac kgs) and break-even sales (in lac kgs) so, when the number of total sales increases then the amount of total BEP also increases. Here Sig. (2-tailed) is 0.031 which is less than 0.05, this means increase or decrease in totals sales do significantly relate to increases or decreases in total BEP.

Table # 5 focuses the relationship between two variables i.e. between actual production (in lac kgs) and break-even sales (in lac kgs) There is a high degree of positive correlation between two variables i.e. between actual production (in lac kgs and break-even sales (in lac kgs). This means in one variable are strongly correlated with changes in another variable. Company has shown Pearson's r is 0.982 so, we can conclude that there is a high degree positive correlation between actual production (in lac kgs and break-even sales (in lac kgs). Since there is a positive relationship between actual production (in lac kgs and break-even sales (in lac kgs) so, when the amount of total production increases then the amount of total BEP also increases.

**Table # 5: Correlation between Actual Production (in Lac Kgs) and Break-Even Sales (in Lac Kgs)**

| | | Actual Production (in Lac Kgs) | Break-Even Sales (in Lac Kgs) |
|---|---|---|---|
| Actual Production (in Lac Kgs) | Pearson Correlation | 1 | .982** |
| | Sig. (2-tailed) | | .003 |
| | N | 5 | 5 |
| Break-Even Sales (in Lac Kgs) | Pearson Correlation | .982** | 1 |
| | Sig. (2-tailed) | .003 | |
| | N | 5 | 5 |

**. Correlation is significant at the 0.01 level (2-tailed).

Here Sig. (2-tailed) is 0.003 which is less than 0.05, this means increase or decrease in totals sales do significantly relate to increases or decreases in total BEP.

***H₀:1* There is a no significant difference between break-even sales and actual sales of the company.**

**Table # 6: ANOVA [There is a no significant difference between break-even sales and actual sales of the company.]**

| Model | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Regression | 1.601 | 1 | 1.601 | 14.24 | .005 |
| Residual | .899 | 8 | .112 | | |
| Total | 2.500 | 9 | | | |

Table # 6 indicates that the calculated value of F (14.24) is greater than the critical value or table value of F (5.32) with (1,8) degree of freedom at 5 percent significance level. So, the null hypothesis is rejected. Here the sig, value is .005 which less than the alpha i.e. 05 so, null hypothesis is also rejected. We can conclude that there is a significant difference between break-even sales and actual sales of the company.

***H₀:2*There is a significant negative correlation between break-even analysis and profitability of the company.**

**Table # 7: ANOVA [There is a significant negative correlation between break-even analysis and profitability of the company.]**

| Model | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Regression | 1.562 | 1 | 1.562 | 13.33 | .006 |
| Residual | .938 | 8 | .117 | | |
| Total | 2.500 | 9 | | | |

Table **# 7** shows that the calculated value of F (13.33) is greater than the critical value or table value of F (5.32) with (1,8) degree of freedom at 5 percent significance level. So, the null hypothesis is rejected. Here the sig, value is .005 which less than the alpha i.e. 05 so, null hypothesis is also rejected. We can conclude that there is a significant positive correlation between break-even analysis and profitability of the company.

## Conclusion and Recommendation

The study revealed the actual sales of square textile limited is always over the break-even sales. It is the positive indicator for the company. The relationship between sales revenue and total

costs are not always linear. Market analysis is also important in addition to the break-even analysis and it will be more helpful for the decision-making purpose of the company, so the company should carry-out market analysis with break-even analysis. Relationship among sales, expenses, profit (loss) and production has also been highlighted in the paper. With the break-even analysis company can figure out the changes in variable cost, selling price and quantity sold that can impact the overall profitability of the business. Company should extend the knowledge of break-even analysis and apply it in all place of the business in order to get maximum advantages out of it. Company also needs to carry out a cost calculation through both the break-even point analysis and margin of safety analysis methods to plan profits and targets. Through this calculation, company can determine the profits they want to earn and can increase the sales volume and profits going forward. The current research has explained the break-even point of Square Textile Limited which is not explained in any research in before. The weaknesses and strengths of the Square Textile need to be identified in order to provide appropriate directions of reform and restructuring for the growth and development of this concern.

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