



## Research Article

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# Break-Even Point and its Impact on Profit Planning in Educational Institutions: A Study Conducted in Lima, Peru, 2022

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## Abstract

The break-even point is a technique for analyzing the relationship between costs, volumes and profits in organizations, which allows their managers to know quickly and economically the minimum units or amounts that their companies must sell in order not to generate losses, thus allowing them to plan their profits. Due to the pandemic caused by the Sars-Cov-2 (COVID-19 virus), virtual teaching became popular, which served as an opportunity for many teachers to start teaching courses; with time, these entrepreneurs paid attention to the importance of the break-even point for making decisions related to the opening of new sections of existing courses, or the implementation of new study programs. The objective of this study was to determine the impact of the break-even point in profit planning in educational institutions in Lima, 2022. The hypothesis was: the break-even point has an impact on profit planning in educational institutions in Lima, 2022. Through a quantitative approach study, applied type, explanatory level, non-experimental and cross-sectional design, data was collected from 91 entrepreneurs who carried out teaching activities on virtual platforms. The results obtained confirmed the influence of the break-even point calculation on profit planning in this context, modeling it with the following formula:  $\text{profit planning} = 0.101 + 0.979 \times \text{break-even point}$ .

**Keywords:** Break-even point; profit planning; cost; volume; profit

## 1. Introduction

An integral part of financial decision making is profit planning (Alam, 2022; Baptista et al., 2014; Graham & Harris, 1999; Harris, 1992; Valle, 2020). This planning is carried out on the basis of several components of production: the choice of costing method, production costs and quantity produced, marketing costs and future revenues generated by the sale of the product (Ávalo Ortega et al., 2016; Getz, 1993). One of the techniques for analyzing the relationship between costs, volumes and profits is the break-even point (Cottafava et al., 2021; Neidhardt et al., 2022; Ofileanu & Bumbescu, 2014;

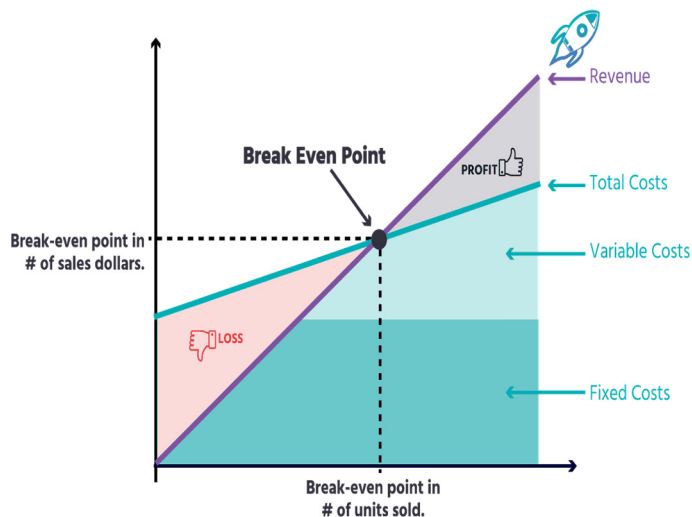
Syrůček et al., 2022).

The break-even point analysis is an important aid for any company (Alnasser et al., 2014; Porwal, 2021; Sintha, 2020). Thanks to the knowledge of the break-even point, managers can make decisions on issues such as the impact of a changing environment (changes in raw material costs, for example), or even help in deciding whether or not to accept an order for products at different prices than usual. Also through the comparison of two or more break-even analysis charts, different business strategies can be evaluated to show the difference in safety margin and profit margins (Martínez Medina et al., 2015; Pinto & Lerdon, 2021).

It becomes important to remember the simplest positive sides of break-even analysis from the company's point of view, which are the speed and low cost of its analysis and interpretation. In terms of time, the management will only need to obtain information on costs and sales in a certain period of time for the calculation of the break-even point (Shi et al., 2018). In terms of cost, its calculation does not require high-end processors or special computer programs, since it can be calculated using a manual calculator (Ahmed et al., 2018). Because of these two benefits of the break-even point, many companies operating in frequently changing environments use it with wide regularity (Calle Fernández & Tamayo Bustamante, 2009; Kato Maldonado, 2013).

The break-even point is commonly explained as the point at which the company's sales have generated enough revenue to cover all its fixed costs and expenses incurred in a given period (Fernández Bedoya, 2018; Rojas et al., 2017). At that point, all of the firm's additional revenues generate profits, as long as expenses and costs do not increase, and previous sales amounts do not decrease (Afif et al., 2021; Deliu, 2021; Potkany & Krajcirova, 2015).

Understanding the firm's break-even point is important for small business owners, who want to know how much they need to achieve in sales to make a profit (Hernández, 2011; Mazón et al., 2017; Singh et al., 2013). For a better understanding, Fig. 1 is presented (source: Deskera (Deskera Content Team, 2023)).



**Figure 1:** Graphical presentation of the break-even point.

The break-even point in units is calculated by dividing the total fixed costs by the remaining difference of the unit selling price minus the unit variable cost, as shown in the formula below (1).

$$\text{Breakeven point} = \frac{\text{Total fixed costs}}{\text{Unit selling price} - \text{unit variable cost}} \quad (1)$$

In addition, it is possible to calculate the break-even point in sales amount (for example, in USD\$). This is calculated by multiplying the break-even point in units previously calculated by the unit selling price; another way is by dividing the total fixed costs by the remaining difference of one minus the division of the unit variable cost by the unit selling price, shown in the formula below (2).

$$\text{Breakeven point in sales amount} = \frac{\frac{\text{Total fixed costs}}{\text{Unit selling price} - \text{unit variable cost}}}{1 - \frac{\text{unit variable cost}}{\text{Unit selling price}}} \quad (2)$$

Although many organizations can generate significant revenues from their sales, these revenues are not always sufficient to cover the various costs and expenses incurred during the same period in which sales are generated (Baral, 2016; Coromoto Morillo, 2007; Grijalva Salazar et al., 2020; Hernández, 2011; Mursalini, 2019; Yardin, 2002); in this case, the break-even point can help determine how much the expected revenues should amount to, contributing to profit planning (Ekasari Khanifah & Septiana, 2020; Mahmudah & Meirini, 2021; Maulidin et al., 2020; Naning Fatmawatie, 2021; Nurmala Fatmawati, 2018; Orlov & Rysanykh, 2021; Piontkovich, 2015; Putri et al., 2021; Rahim, 2020; Wijayanti et al., 2021).

In Lima, a previous study (Fernández Bedoya, 2018) concluded that break-even analysis has the positive effect of improving a series of internal processes in publishing companies, in addition to supporting correct financial decision-making.

Another recent study developed in Lima (Fernández Bedoya et al., 2021) identified that the break-even point can help the formalization of small companies, whose legal representatives understood that the expenses derived from formalization are offset by the income obtained from expanding their client base as a result of formalization.

In the case of the education sector, it is essential to know the break-even point for making decisions related to the opening of new sections of existing courses or the implementation of new study programs (Mensah & Werner, 2003).

The opening of a new virtual course in 2022, a year characterized by the health emergency caused by Sars-Cov-2, entails expenses related to the payment of teaching and support staff, acquisition and maintenance of computer system licenses, communications, and others.

In this sense, this study posed as a research question: is there an impact of the break-even point in the planning of profits in educational institutions in Lima, 2022?

This study is theoretically justified by generating new knowledge on the subject of break-even point, especially in the educational sector. According to Fernández (Fernández Bedoya, 2020), this type of justification is linked to the researcher's concern to deepen the theoretical approaches that deal with the problem being explained, in order to advance knowledge in a line of research.

The research objective was: to determine the impact of the break-even point in profit planning in educational institutions in Lima, 2022. Similarly, the hypothesis was: the break-even point impacts profit planning in educational institutions in Lima, 2022.

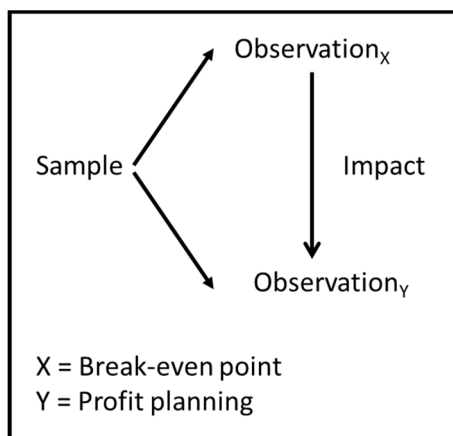
## 2. Materials and Methods

The research had a quantitative approach. In the words of Hernández and Mendoza (Hernández-Sampieri & Mendoza Torres, 2018), this approach is characterized by the use of mathematical sources for the fulfillment of objectives. In this case, hypothesis testing was performed through Pearson's chi-square test, linear regression and coefficient analysis.

As for the type of study, it was applied. Applied research seeks to solve a specific problem or approach, focusing on the search for and consolidation of knowledge for its application and, therefore, for the enrichment of cultural and scientific development, according to Concytec (Ley N° 30806, 2018).

Similarly, the level was explanatory, with a non-experimental and cross-sectional design (Lafuente Ibáñez & Marín Egoscozábal, 2008; Rodríguez & Pérez, 2017). Two variables were identified,

with possible cause and effect association, which were studied at a single moment without any manipulation (see Fig. 2).



**Figure 2:** Study design.

The study sample consisted of 81 teachers, who found in the pandemic caused by the Sars-Cov-2 virus (Covid-19) the opportunity to generate additional income through entrepreneurship. This venture was allusive to teaching and training using virtual methodologies in different subjects: language teaching, school and university reinforcement, statistical analysis, teacher training, marketing, among others.

The data was collected in January 2022 through a questionnaire developed by the author, with high levels of validity and reliability. It is important to note that the instrument had 38 items in total (20 for measuring the use of the break-even point and 18 for profit planning).

The statistical analysis was carried out using IBM SPSS Statistics version 26, where the Pearson chi-square test was performed to rule out the independence of the variables, linear regression and coefficient analysis to find and quantify influences.

### 3. Results

First, a contingency table was considered convenient. Its purpose is to show broadly the distribution of the ordered frequencies (at high, medium and low levels). Table I shows that the vast majority of respondents present high levels in break-even point and profit planning, which allows the researcher to theorize the non-independence of variables.

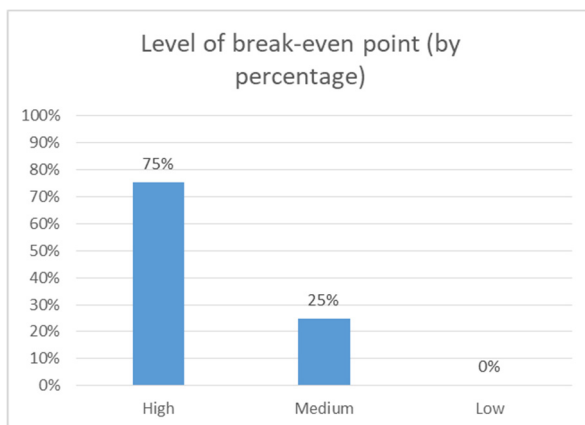
**Table 1:** Contingency table: break-even point and profit planning

		Profit planning			Total
		High	Medium	Low	
Break-even point	High	60	1	0	61
	Medium	3	16	1	20
	Low	0	0	0	0
Total		63	17	1	81

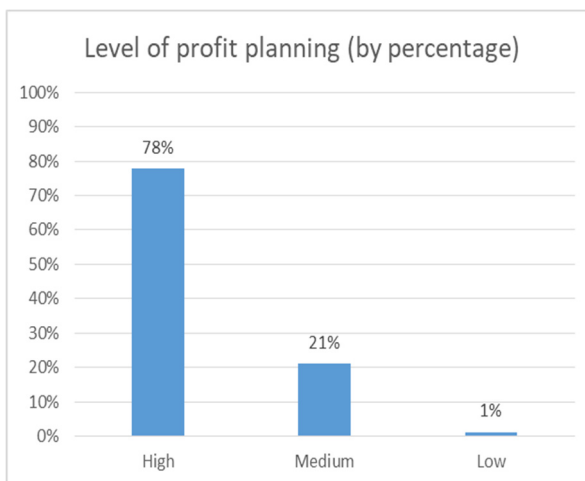
As shown in Table I, there are 60 subjects who considered that they have high perceptions of break-even and profit planning, while 16 subjects have medium level perceptions of both variables, and

there are 3 cases of subjects who have medium level of break-even and high level of profit planning, among other minor results.

Subsequently, we proceeded to present the descriptive results in individual figures for each of the study variables (see Fig. 3 and 4).



**Figure 3:** Level of breakeven point (by percentage).



**Figure 4:** Level of profit planning (by percentage).

As shown in Fig. 3, the level of break-even perception is high for 75% of the sample, medium for 25%, and low for 0%. On the other hand, according to Fig. 4, the level of profit planning is high in 78% of the cases, medium in 21% and low in 1%.

Then, Pearson's chi-square test was used to statistically reject the independence of variables. Table II shows the results of this test, obtaining a bilateral asymptotic significance coefficient of 0.00, allowing to statistically reject the independence of variables.

**Table 2:** Pearson's chi-square test: break-even point and profit planning

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	60.573	2	.000
Likelihood ratio	58.816	2	.000
Valid cases	81		

Next, using the linear regression test, the correlation coefficient ( $r = 0.930$ ) and the coefficient of determination ( $r^2 = 0.865$ ) were calculated, as shown in Table III.

**Table 3:** Linear regression: break-even point and profit planning

Model	R	R Square	Adjusted R Square	Std. Error of Estimate
1	.930	.865	.863	.28723

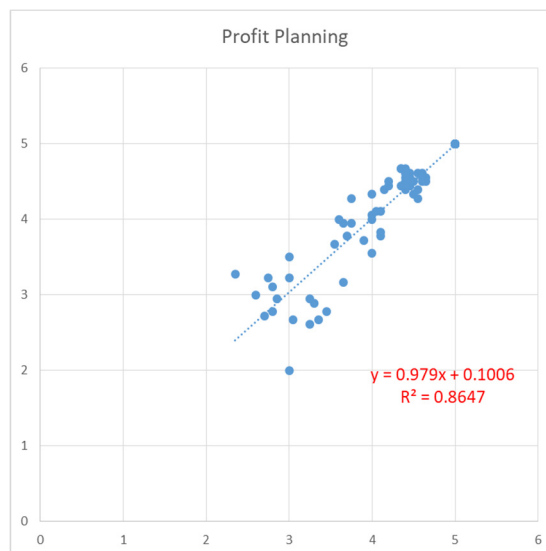
Finally, it was possible by means of the coefficient analysis (see Table IV) to theorize a function that allows estimating the extent to which the break-even point affects profit planning in this context.

**Table 4:** Coefficient analysis: break-even point and profit planning

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. error	Beta		
1	(Constant)	.101	.185		.544	.588
	Break-even point	.979	.044	.930	22.474	.000

The calculated constant was 0.101, while the calculated coefficient (for break-even point) was 0.979, with a 0.000 significance. In this sense, the model that emerges to theorize the impact is as shown in equation (3) and Fig. 5:

$$\text{Profit planning} = 0.101 + 0.979 \times \text{Breakeven point} \quad (3)$$



**Figure 5:** Scatter plot with calculated equations.

#### 4. Discussion

The discussion section serves as a critical component of this study, allowing for the interpretation of results, comparison with existing literature, and exploration of practical implications. The study investigated the impact of the break-even point on profit planning within the educational sector during the COVID-19 pandemic. The comprehensive analysis of findings, along with their broader implications, is detailed below.

The results of this study reveal a strong correlation between the break-even point and profit planning within the educational sector. Through statistical analyses, including Pearson's chi-square test, linear regression, and coefficient analysis, it became evident that variations in the break-even point significantly influence profit planning strategies among educators. The high levels of perception observed among respondents regarding both the break-even point and profit planning underscore the relevance and awareness of financial principles within the educational community.

The findings of this study are consistent with prior research emphasizing the importance of break-even analysis in various industries (Cottafava et al., 2021; Neidhardt et al., 2022; Ofileanu & Bumbescu, 2014; Syrůček et al., 2022). Moreover, the study aligns with theoretical frameworks proposed by (Hernández (2011); Mazón et al., (2017); and Singh et al. (2013). By incorporating established methodologies and building upon existing literature, this study contributes to the growing body of knowledge surrounding financial decision-making processes in educational settings.

This study has practical consequences for educational institutions around the world, particularly those dealing with financial concerns compounded by the COVID-19 epidemic. Understanding the relationship between the break-even point and profit planning enables educational leaders to make informed decisions about resource allocation, budgeting, and revenue creation. Furthermore, the findings emphasize the need of including financial literacy and strategic planning into educational curricula, ensuring that future generations of educators have the necessary financial management skills.

While this study contains useful information, numerous limitations must be addressed. The sample size of 81 instructors may not adequately represent the diversity of educational stakeholders or account for regional differences in financial practices. Furthermore, the emphasis on the impact of the break-even point on profit planning may obscure other factors driving financial decision-making in educational institutions.

Future research endeavours could address these limitations by conducting longitudinal studies encompassing larger and more diverse samples. Furthermore, exploring additional financial metrics, such as net present value and return on investment, could provide a more comprehensive understanding of financial decision-making processes within the educational sector. Additionally, investigating the efficacy of financial management interventions and educational programs aimed at enhancing financial literacy among educators could yield valuable insights into improving financial practices and sustainability within educational institutions.

#### 5. Conclusions

It is concluded that the break-even point has a significant impact on profit planning. To reach this conclusion, a contingency table (high associated results), Pearson's chi-square test (bilateral asymptotic).

A model was built to understand to what extent the break-even point affects profit planning (profit planning =  $0.101 + 0.979 \times \text{break-even point}$ ).

It was possible to generate new knowledge on the subject of the break-even point, identifying how it affects profit planning in the education sector during the health emergency caused by the Sars-Cov-2 virus, complementing previous studies.

The business break-even point is an important tool, since it allows knowing the level of sales at which a company reaches profitability. That is, it is the point at which revenues and costs are equal,

and the company is neither making nor losing money.

Knowing the break-even point makes it possible to plan and make informed decisions about managerial operations, such as pricing, cost control, and determining the amount of production needed to achieve profitability.

Finally, the break-even point also serves as a support for the identification of factors that could affect business profitability, in order to take measures to improve it.

## 6. Recommendations

We recommend decision makers in companies (not only in the education sector) to consider the break-even analysis as a decisive tool to be reviewed for the opening, continuation, and even abandonment of businesses, since it will allow them to know the sales point they will need to reach in order not to obtain losses and from which they will obtain profits.

While it is true that this study demonstrated the impact of the break-even point on profit planning in the educational sector, further research is required in other primary, secondary and tertiary sectors to determine whether there is also an impact of the break-even point on profit planning, and to quantify it, generating academic discussion.

We invite other researchers to continue with the closing of knowledge gaps related to this topic, which demands diverse information due to the current context of COVID-19. This is due to the fact that companies are currently in search of a smart economic reactivation, they are aware of the administrative and financial techniques to apply, but lack proven experience of their use in pandemic contexts.

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