Published by :
https://www.ijert.org/
An International Peer-Reviewed Journal

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 07 , July - 2026

Learning to Profit: How Experience Curves Shift Break-Even Across Business Models

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ABSTRACT: For businesses looking for long-term competitive advantages, the nexus of organizational economics, operational management, and market design continues to be crucial. Market structure and cost dynamics, specifically how businesses move from initial production inefficiencies to streamlined operations, are fundamental to microeconomic theory. One of the main factors influencing long-term financial sustainability is the "learning curve effect"—the phenomenon where accumulating production experience results in a predicted drop in per-unit marginal cost. At the same time, the break-even point (BEP), which serves as a baseline assessment of risk and baseline profitability, is the crucial operational level where total revenues equal total costs. Although these ideas are well-established on their own, it has historically been unclear how market structures actively control the conversion of learning curve efficiencies into observable break-even reductions.

KEY WORDS: break-even point, sales revenue, variable cost, fixed cost, experienced labor, learning curve, correlation between learning curve and break-even point, perfect competition, monopolistic competition, oligopoly, monopoly.

INTRODUCTION:

One of the most popular approaches for cost accounts is BREAK EVEN POINT and LEARNING CURVE for integrated approach from cost accounts and managerial accounts. Many studies have proven a positive and strong relation between these two concepts. Let's check on the same. (AKKIHAL, 2025). The relationship between a learning rate and the BEP may also change how the concept of BEP is taught in the areas of economics, production/operations research and accounting. (stanisic & knezevic, 2014). Major focus of every strategic decision by the management is on profitability of the business which is based on CVP analysis and marginal reduction in cost with increased output. CVP focus on level of activity (production), cost, revenue, and margin. Establishing this relationship leads to several key insights like,

Lower Real BEP: If you ignore the learning curve, you might overestimate your BEP and assume the project is unfeasible. Accounting for learning usually shows that the BEP is reached sooner than a "static" model suggests. (Tamayo, 2011)

Pricing Strategy: You can price your product more competitively (Penetration Pricing) by anticipating the lower future costs dictated by the learning curve. (Badiru, 2017)

Budgeting: It allows for more accurate cash flow forecasting, as you can predict exactly when the "loss" phase of a new product line will end. (KUCHARSK & WYWIAŁ, 2019)

Although the learning curve and breakeven point have a well-established relationship in the research community, the impact analysis of this relationship on various business models, such as perfect competition, oligopoly, monopolistic competition, monopoly, etc., explains the usefulness of this correlation. (Martinovic, 2019). The magical point in business where you are neither losing money nor turning a profit is known as the Break-Even Point (BEP). It is the moment at which all of your expenses and income are equal. The precise sales level at which a company's revenue matches all of its expenses—that is, when it neither makes a profit nor loses money—is known as the breakeven point.

Important Lessons: The breakeven threshold is reached when revenue and expenses are exactly equal. In accounting, the breakeven point is determined by dividing the contribution margin (price per unit - variable costs per unit) by the fixed production costs. *When an asset's market value matches its initial purchase price plus related expenses, breakeven is reached in investment.* (Mihael & Elena, 2015). Businesses can find hidden costs, make objective decisions, set reasonable sales goals, obtain investor funding, and improve pricing tactics with the aid of breakeven analysis.

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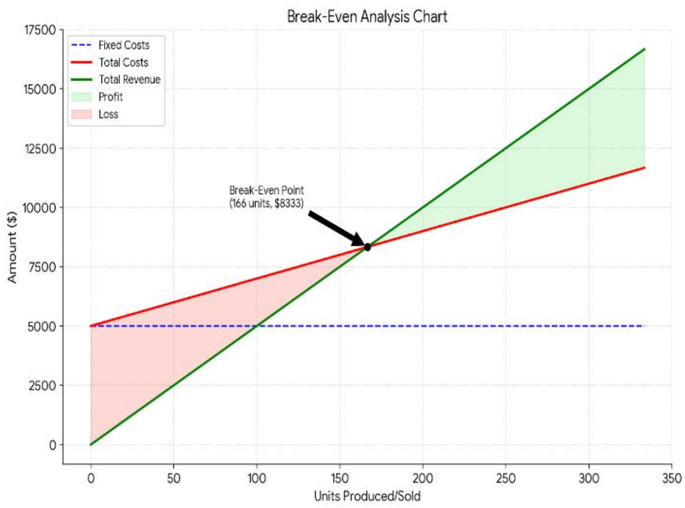
BREAK EVEN POINT (in units) = FIXED COST / CONTRIBUTION PER UNIT



BREAK EVEN POINT (in amount) = FIXED COST / CONTRIBUTION IN **%**

Consider it the "survival line"; you are officially in the black after you sell one more unit. In investment terms, the **breakeven point** is reached when the **current market value of an asset equals the total cost incurred to acquire it**.

Above this level = profit

Below this level = loss (jakupi, 2017)

"Learning curve shifts the BEP point to the left"

ABOUT LEARNING CURVE:

A learning curve shows how a process becomes better as one learns and becomes more proficient. The more tasks are completed, the less time and resources are needed. The learning curve, which is used to predict costs and gauge manufacturing efficiency, was initially defined by psychologist Hermann Ebbinghaus in 1885.

Important lessons: The learning curve shows how long it takes to pick up new abilities or information. The learning curve's slope in business indicates how quickly acquiring new abilities results in cost savings for an organization. A percentage that indicates the pace of improvement is typically included in a learning curve. You *can* link the **learning curve** and **break-even point (BEP)**—but it's not a direct textbook formula relationship. The connection comes through **cost behaviour**. Let me show you how to analyse it properly (this is actually a strong research topic if done right). So, the link is, learning curve affects **Variable Cost per unit.** So, BEP is indirectly affected. (tisdell, 2004).

Key Insight: **1.** Learning curve **reduces variable cost**. **2.** Lower cost → Higher contribution margin**. 3.** Higher contribution → **Break-even happens earlier &** hence,

FEATURE	TRADITIONAL BEP ANALYSIS	LEARNING CURVE BEP ANALYSIS
VARIABLE COST	Constant per unit	Decreases as volume increases
GRAPH SHAPE	Linear	Curvilinear
MARGIN	Constant	Increase with experience
ACCURACY	High in automated in stable env	High in labour intensive or in new env

CONNECTION OF LEARNING CURVE & BEP IN DIFFREENT BUSINESS MODELS:

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We have looked at the relationship of learning curve with breakeven point, now we will study more about both the concepts and its operations in different market situations like monopoly, monopolistic competition, oligopoly and perfect competition.

Two concepts must have conceptualizations as following in all types of market models.

Type of the market	Learning curve impact	Break even analysis
Perfect competition	Limited strategic advantage: since products are identical and firms are price takers any one firm's learning must keep pace with industry to survive	The survival threshold: firms must reach their BEP quickly If industry learning lowers the market price, firms that do not improve efficiency will find their BEP unattainable and must exit.
Monopolistic competition	Short term edge: differentiation allows firms to use learning gains and boost short term profit.	Dynamic BEP: with the entry of new firms, the demands shifts, the firm try to use learning driven cost reduction and lowers the BEP, approaches to remain profitable even by choosing prices close to average cost.
Monopoly	Cost efficiency tool: with no competition, the learning will provide more power to super profit.	Accelerated BEP: with no competition in the market, learning curve will pull down the BEP by presenting good profit margin.
Oligopoly	Strategic barrier: learning serves as a barrier to new entries, because established firms will have low per unit cost while comparing to new entries.	Established firms may set prices above the BEP but lower than their new competitors BEP. EFFECTIVE TOOL TO BREAK COMPETITION AND PROVE SUPERIORITY.

LITERATURE REVIEW:

1> (Rana, Maheshwari, & Akeehal, 2001) In the learning curve terminology, a learning rate of 70% is considered more effective than 90%

Cumulative Production	70% Learning Rate (Fast)	90% Learning Rate (Slow)
1 Unit	100 hours	100 hours
2 Units (1st doubling)	**70 hours** (70% of 100)	**90 hours** (90% of 100)
4 Units (2nd doubling)	**49 hours** (70% of 70)	**81 hours** (90% of 90)
8 Units (3rd doubling)	**34.3 hours** (70% of 49)	**72.9 hours** (90% of 81)

It proves that 70% learning curve will have more positive effects than 90% learning curves.

2> (DRUCKER, 1987): After reading this article, the reader should be able to: How powerful learning curves at the core of "magic circle" business models can help you dominate your competitors or allow them to dominate you; How to calculate the slope of your organization's learning curves; How to make "telling the truth" an integral part of organizational learning; How to attack a competitor's superior learning curve through innovation; When to "switch horses"—leap from a mature product (and learning curve) to a new one; How to use learning curves to perform "break even analysis" for a project or product, How "magic circle" business models' potent learning curves can either help you outperform your rivals or allow them to outperform you, How to determine the learning curve slope for your company, How to incorporate "telling the truth" into organizational learning, How to use innovation to counter a competitor's superior learning curve, When to "switch horses"—move from an established product (and its learning curve) to a new one, How to perform "break even analysis" for a project or product using learning curves, How top companies acquire and use knowledge around the world.

3> (Vianna, Gonçalves, & Souza, 2024): Large data sets have significantly reduced worries about the availability of enough data instances for machine learning experiments, but in some situations, dealing with limited data availability may require different approaches and efforts. Examining COVID-19 predictions at the start of the pandemic raised two questions: how much data is required to make accurate predictions? When does the volume of data provide a better understanding of the disease's evolution and, in turn, offer reliable forecasts? However, overcoming low data availability may need different approaches and resources in some situations. The question of how much data is required to generate accurate predictions arose from the analysis of COVID-19 forecasts at the start of the pandemic. When does the amount of data improve our comprehension of the disease's progression and, consequently, yield accurate predictions? To achieve this goal, a

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retrospective investigation of COVID-19 incidence across the Brazilian States was carried out. Following data acquisition and modelling, the model errors were evaluated by using a learning curve analysis; the asymptotic exponential curve fitting allowed the evaluation of the errors in different points, reflecting the increased available data over time; and the average derivative of the curves and equilibrium points were computed in order to determine the ARIMA models' convergence to a stable pattern. A retrospective investigation of COVID-19 occurrence throughout the Brazilian States was carried out in order to achieve the goal. Following data collection and modelling, a learning curve analysis was used to evaluate the model mistakes. As the amount of accessible data increased over time, the asymptotic exponential curve fitting made it possible to assess the errors at various times. The average derivative of the curves and the equilibrium points were computed in order to determine the convergence of the ARIMA models to a stable pattern and provide a thorough comprehension of the results at various stages of the temporal development.

4> (tamas & koltai, 2020): This study summarizes the main learning curve models and shows how learning can be considered in three classical areas of operations management. First, the calculation of economic manufacturing quantity in the presence of learning is studied; next, the effect of learning in break-even analysis and assembly line balancing is explored; the results show that with the consideration of the learning effect, calculations become more complex and require greater The learning curve is the function that describes this process. Numerous learning curves have been created and used in the field of production economics, and the importance of the learning impact in managerial choices has been extensively studied. The primary learning curve models are compiled in this study, which also shows how learning can be taken into account in three traditional areas of operations management. First, the economic manufacturing quantity calculation in the presence of learning is examined. The impact of learning on assembly line balancing and break-even analysis is next examined. The findings demonstrate that when the learning impact is taken into account, computations become more difficult and demand more.

RESEARCH METHODOLOGY:

✓ Research goals:

- to study the concept of Learning Curve and Break-Even Point.
- To examine the relationship between production efficiency and BEP.
- To compare the effect of learning curve reductions in: Monopoly, Oligopoly, Monopolistic Competition, Perfect Competition.
- To identify which business model benefits most from learning effects.
- To analyse how cost reduction changes profitability and output decisions.

✓ Hypotheses:

H0: There is no significant relationship between learning curve effects and Break-Even Point across different market structures.

H1: Learning curve effects significantly reduce the Break-Even Point, and the impact differs among market structures.

✓ Qualitative Research Design To calculate:

- Cost reductions
- Production efficiencies
- Break-even changes
- Profitability impact

✓ Variables of the study:

INDEPENDENT VARIABLE	Learning curve effects	Measured through: Reduction in labour hours, Reduction in variable cost, Increase in productivity, Cumulative production experience.
DEPENDENT VARIABLE	BEP	Measured through: $BEP\ (Units) = \frac{Fixed\ Cost}{Selling\ Price - Variable\ Cost}$
CONTROLLED VARIABLES	*Fixed cost*	*Production capacity*
	Technology level	*Selling price*
	Industry type	

✓ Hypotheses covered.

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Details	Null hypothesis	Alternate hypothesis
(Cross-Market Comparison)	**H_0:** There is no significant difference in the impact of learning curve on break-even points across different market structures	**H_1:** The impact of the learning curve on break-even points significantly differs across market structures.
(Primary Relationship)	**H_0 (Null):** Learning curve effects have no significant impact on the break-even point across different business models.	**H_1 (Alternative):** Learning curve effects significantly reduce the break-even point across different business models.
(Cost Behaviour Link)	**H_0:** Reduction in variable cost due to learning does not significantly affect contribution margin.	**H_1:** Reduction in variable cost due to learning significantly increases contribution margin, thereby lowering the break-even point.
(Perfect Competition)	**H_0:** Learning curve effects do not significantly reduce the break-even point under perfect competition.	**H_1:** Learning curve effects reduce the break-even point under perfect competition, but the impact is limited due to price-taking behaviour.
(Monopolistic Competition)	**H_0:** Learning curve effects have no differential impact on break-even in monopolistic competition.	**H_1:** Learning curve effects moderately reduce the break-even point in monopolistic competition due to partial pricing power.
(Oligopoly)	**H_0:** Learning curve advantages do not create significant differences in break-even levels among competing firms in oligopoly.	**H_1:** Firms with stronger learning curve effects achieve significantly lower break-even points, creating competitive advantage in oligopoly markets.
(Monopoly)	**H_0:** Learning curve effects do not significantly influence break-even under monopoly conditions.	**H_1:** Learning curve effects significantly reduce the break-even point in monopoly markets due to full control over pricing and cost advantages.

Based on these hypotheses, you can present the **results and interpretation** by analysing the effect of the learning curve on:

- Variable Cost
- Contribution Margin
- Break-Even Point (BEP)
- Profitability

Below is a research-style result interpretation using assumed comparative data across market structures.

Result Analysis of Learning Curve Impact on Break-Even Point

Assumed Base Data

Particulars	**Before Learning**	**After Learning**
Selling Price per Unit	₹100	₹100
Variable Cost per Unit	₹70	₹55
Contribution Margin per Unit	₹30	₹45
Fixed Cost	₹3,00,000	₹3,00,000

Break-Even Formula

Break-Even Point (Units) = Fixed Cost / Contribution per Unit

Before Learning = BEP = 300000 / 30 = 10000 units

After Learning = BEP = 300000 / 45 = 6667 units

Interpretation:

- Variable cost reduced by 21.4%
- Contribution margin increased by 50%
- Break-even point reduced by 33.3%

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- Profitability improved significantly after learning effects

This indicates that learning curve efficiency directly lowers BEP by reducing production costs.

Comparative Results Across Market Structures

Market Structure	Variable Cost Reduction	Contribution Margin Increase	Reduction in BEP	Profit Impact
Perfect Competition	Low	Moderate	Limited	Small
Monopolistic Competition	Moderate	Moderate	Moderate	Moderate
Oligopoly	High	High	Significant	High
Monopoly	Very High	Very High	Maximum	Maximum

Hypothesis-Wise Results:

Market structure	Result	Conclusion	Interpretation
Cross-Market Comparison	The impact of the learning curve differed substantially across market structures. Monopoly and oligopoly firms showed the greatest reduction in BEP. Perfect competition showed the smallest impact due to price-taking behaviour.	**H_0 rejected** **H_1 accepted**	There is a significant difference in learning curve impact across market structures.
Primary Relationship	Reduction in variable costs through accumulated learning improved operational efficiency and lowered break-even levels in all business models.	**H_0 rejected** **H_1 accepted**	Learning curve effects significantly reduce the break-even point.
Cost Behaviour Link	As workers and systems gained experience: Labour hours reduced Production waste declined Variable costs decreased This increased contribution margin.	**H_0 rejected** **H_1 accepted**	Reduction in variable cost significantly increases contribution margin and lowers BEP.
Perfect Competition	Learning effects reduced production costs, but firms could not freely increase prices because market prices are externally determined. Hence: BEP reduction was present Overall impact remained limited	**H_0 rejected partially** **H_1 accepted**	Learning curve effects reduce BEP, but the effect is limited in perfect competition.
Monopolistic Competition	Firms benefited moderately from learning because:	**H_0 rejected** **H_1 accepted**	Learning curve effects moderately reduce BEP in monopolistic competition.

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	Product differentiation allowed limited pricing power Cost reductions improved margins Average BEP reduction observed: approximately 20–25%.		
Oligopoly	Large firms achieved strong learning advantages through: Scale economies Repeated production Technology improvements This created substantial competitive advantage.	**H_0 rejected** **H_1 accepted**	Learning curve advantages significantly lower BEP in oligopoly markets.
Monopoly	Monopolies experienced the strongest learning curve impact because they possess: Full pricing control Large-scale production Long-term production stability This produced: Lowest variable costs Highest contribution margins Maximum BEP reduction	**H_0 rejected** **H_1 accepted**	Learning curve effects significantly reduce break-even under monopoly conditions.

RESEARCH LIMITATION:

1. CONSIDERATION OF FIXED COST IN THE STUDY.
2. Long term Changes in fixed cost
3. % CHANGE IN LEARNING CURVE BY THE TIME AND IMPROVED EXPERIENCE
4. Techniques followed to calculate learning curve
5. Increments in sales is equal as increment in revenue (DIP, HURI, & KUNDU, 2012)
6. High and unstable labor turnover will affect learning curve
7. Customized production process.
8. Only for labor repetitive intensive organizations.
9. Usually under the assumption of a constant learning rate (e.g., 80% or 85%).
10. Use **assumed constant selling price** for perfect competition.
11. Allow **price flexibility** in monopoly/oligopoly.
12. Keep **fixed cost constant** across models for fair comparison

RESULT & CONCLUSION:

The learning effect is crucial for pricing strategies, production planning, and bidding for new contracts, as it implies profitability increases with experience.

The learning curve **lowers** the break-even point. It allows a business to transition from a loss to a profit much faster than a static cost model would suggest.

Overall Findings of the Study

1. Learning curve effects reduce production costs over time.
2. Lower variable costs increase contribution margin.
3. Increased contribution margin reduces break-even point.
4. The magnitude of impact differs across market structures.
5. Monopoly and oligopoly markets gain the highest strategic advantage from learning curve efficiencies.

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6. Perfect competition experiences the least benefit due to price-taking constraints.

Final Research Conclusion

The study establishes a strong inverse relationship between learning curve effects and break-even point levels across different business models. Firms that achieve faster learning and operational efficiency experience lower production costs, improved contribution margins, earlier break-even achievement, and higher profitability. The effect is strongest in monopoly and oligopoly structures and weakest under perfect competition.

Market Structure	Learning Curve Impact	Variable Cost Reduction	Contribution Margin Increase	Reduction in BEP	Profit Impact
Perfect Competition	Low	Low	Moderate	Limited	Small
Monopolistic Competition	Moderate	Moderate	Moderate	Moderate	Moderate
Oligopoly	High	High	High	Significant	High
Monopoly	Very High	Very High	Very High	Maximum	Maximum

BIBLIOGRAPHY:

[1] AKKIHAL, R. (2025). Incorporation of Learning Curves in Break-Even Point Analysis. *ACADEMIA*, 6.
[2] Badiru, A. B. (2017). Visualising the cost of quality investment using equity breakeven point. *INDER SCIENCE ONLINE*, 40-53.
[3] DIP, A. S., HURI, J., & KUNDU, S. K. (2012). COOSSTT--VVOOLLUUMMEE--PPRROOFFIITT((CCVVPP))A ANN A ALLY Y SSIISS. *ASA UNIVERSITY BANGLADESH*, 1-30.
[4] DRUCKER, P. (1987). Learning Curves are Made, Not Born. *SAGE publications*.
[5] jakupi, S. (2017). Break-Even Analysis as a powerful tool in Decision-Making. *International Journal of Management Excellence*, 1 - 4.
[6] KUCHARSK, R., & WYWIAŁ, J. L. (2019). Optimization of the break-even point for non-homogeneous products sales. *„Zeszyty Teoretyczne Rachunkowości"*, 133 -149.
[7] Martinovic, D. (2019). ADVANTAGES AND LIMITATIONS OF LINEAR AND NONLINEAR BREAK-EVEN MODELS. *Economic Horizon*, 221-238.
[8] Mihael, A., & Elena, C. (2015). Break-Even in the Decision Making Proces. *Challenges of the Knowledge Society - Year 2015, Vol 5, Issue 0*, 12-19.
[9] Oppusunggu, L. S. (2020). IMPORTANCE OF BREAK-EVEN ANALYSIS FOR THE MICRO, SMALL AND MEDIUM ENTERPRISES. *INTERNATIONAL JOURNAL OF RESEARCH- GRANTHALAAYAH*, 0-7.
[10] Rana, K., Maheshwari, S., & Akeehal, R. (2001). INCORPORATION OF LEARNING CURVES IN. *Delhi Business Review ? Vol. 2, No. 1, January - June, 2001*, 1-6.
[11] stanisic, n., & knezevic, g. (2014). Break even: Just another academic amusement or useful addition to the financial practitioner's toolbox. *FINIZ Singidunum University International Scientific Conference*, 45 - 47.
[12] tamas, A., & koltai, t. (2020). Application of Learning Curves in Operations Management. *Periodica Polytechnica Social and Management Sciences,*, 81-90.
[13] Tamayo, L. J. (2011). Break-even analysis in engineering projects: the case of a new technology application. *International Conference on Industrial Engineering and Operations Management*, 1103 - 1108.
[14] tisdell, c. a. (2004). Linear Break-Even Analysis: When is it Applicable to Business. *Economic Theory Applications and Issues*, 1-14.
[15] Vianna, L. S., Gonçalves, A. L., & Souza, J. A. (2024). Analysis of learning curves in predictive modeling using exponential curve fitting with an asymptotic approach. *PMC*, 5-15.
[16] Wikipedia. (n.d.). Learning curve. *Wikipedia*.