Economic Formulas for Sales Forecasting

This guide provides a comprehensive list of economic formulas used in sales analysis and forecasting. These formulas are implemented in our sales forecasting script to ensure accurate calculations regardless of how your data is structured.

Basic Sales Formulas

Formula	Description	Calculation
Total Sales	The revenue generated from selling products or services	Quantity × Unit Price
Revenue	The total income from sales before any deductions	Sum of all sales
Gross Sales	The total amount of sales before discounts or returns	Sum of all sales before deductions
Net Sales	Sales after discounts, returns, and allowances	Gross Sales - Returns - Discounts - Allowances

Discount Formulas

Formula	Description	Calculation
Discount Amount	The monetary value of a discount	Original Price × Discount Rate
Sale Price	The price after discount	Original Price - Discount Amount
Original Price	The price before discount	Sale Price / (1 - Discount Rate)
Discount Rate	The percentage of discount	(Original Price - Sale Price) / Original Price
Discount Percentage	The percentage of discount	(Discount Amount / Original Price) × 100

Markup Formulas

Formula	Description	Calculation
Markup Amount	The amount added to the cost to determine selling price	Selling Price - Cost
Markup Percentage	The percentage markup over cost	(Markup Amount / Cost) × 100
Selling Price	The price including markup	Cost × (1 + Markup Percentage)
Cost	The original cost of goods	Selling Price / (1 + Markup Percentage)

Margin Formulas

Formula	Description	Calculation
Gross Margin	The difference between revenue and COGS	Revenue - COGS
Gross Margin Percentage	The percentage of revenue that is gross margin	(Gross Margin / Revenue) × 100
Net Margin	The percentage of revenue that is profit after all expenses	(Net Profit / Revenue) × 100
Contribution Margin	The revenue remaining after variable costs	Revenue - Variable Costs
Contribution Margin Ratio	The percentage of revenue available to cover fixed costs	(Contribution Margin / Revenue) × 100

Profit Formulas

Formula	Description	Calculation
Gross Profit	The profit before deducting operating expenses	Revenue - COGS
Operating Profit	Profit after operating expenses but before interest and taxes	Gross Profit - Operating Expenses
Net Profit	Profit after all expenses, including taxes and interest	Operating Profit - Interest - Taxes
Profit Margin	The percentage of revenue that is profit	(Net Profit / Revenue) × 100
EBITDA	Earnings before interest, taxes, depreciation, and amortization	Revenue - Expenses (excluding interest, taxes, depreciation, amortization)

Tax Formulas

Formula	Description	Calculation
Price Including Tax	The final price with tax included	Price Excluding Tax × (1 + Tax Rate)
Price Excluding Tax	The price before tax	Price Including Tax / (1 + Tax Rate)
Tax Amount	The amount of tax	Price Excluding Tax × Tax Rate
Effective Tax Rate	The actual tax rate paid	Total Tax Paid / Total Taxable Income

ROI Formulas

Formula	Description	Calculation
Return on Investment (ROI)	The return relative to the investment	(Net Profit / Cost of Investment) × 100
Payback Period	Time required to recover the investment	Cost of Investment / Annual Cash Flow
Return on Ad Spend (ROAS)	The return from advertising expenditure	Revenue Generated from Ads / Advertising Cost
Customer Acquisition Cost (CAC)	The cost to acquire a new customer	Total Marketing & Sales Costs / Number of New Customers
Customer Lifetime Value (CLV)	The total value a customer brings over their lifetime	Average Purchase Value × Purchase Frequency × Customer Lifespan

Inventory Formulas

Formula	Description	Calculation
Inventory Turnover	How many times inventory is sold in a period	COGS / Average Inventory
Days Inventory Outstanding (DIO)	Average days it takes to sell inventory	365 / Inventory Turnover
Economic Order Quantity (EOQ)	Optimal order quantity	√(2 × Annual Demand × Order Cost / Holding Cost)
Reorder Point	The inventory level at which to reorder	Lead Time Demand + Safety Stock
Safety Stock	Extra inventory to prevent stockouts	Z-score × Standard Deviation of Demand × √Lead Time

Sales Performance Metrics

Formula	Description	Calculation
Average Transaction Value	Average value of each transaction	Total Revenue / Number of Transactions
Conversion Rate	Percentage of leads that become customers	(Number of Sales / Number of Leads) × 100
Sales Growth Rate	The rate of increase in sales over time	((Current Period Sales - Previous Period Sales) / Previous Period Sales) × 100
Market Share	Percentage of total market sales	(Company Sales / Total Market Sales) × 100
Sales per Employee	Revenue generated per employee	Total Revenue / Number of Employees

Growth Metrics

Formula	Description	Calculation
Compound Annual Growth Rate (CAGR)	Average annual growth rate over time	((Ending Value / Beginning Value)^(1/Number of Years)) - 1
Month-over-Month Growth	Growth rate from one month to the next	((Current Month - Previous Month) / Previous Month) × 100
Year-over-Year Growth	Growth rate compared to same period last year	((Current Year Period - Same Period Last Year) / Same Period Last Year) × 100
Exponential Growth Rate	Rate of continuous compounding growth	ln(Ending Value / Beginning Value) / Time Period

Price Elasticity Formulas

Formula	Description	Calculation
Price Elasticity of Demand	Responsiveness of quantity demanded to price changes	(% Change in Quantity Demanded) / (% Change in Price)
Cross-Price Elasticity	Effect of price change of one product on demand for another	(% Change in Quantity Demanded of A) / (% Change in Price of B)
Income Elasticity of Demand	Responsiveness of demand to income changes	(% Change in Quantity Demanded) / (% Change in Income)
Optimal Price	Price that maximizes profit based on elasticity	Price = Cost / (1 + 1/

Forecasting Formulas

Formula	Description	Calculation
Moving Average	Average of a sliding window of values	Sum of n periods / n
Weighted Moving Average	Moving average with assigned weights	Sum(Weight × Value) / Sum(Weights)
Exponential Smoothing	Weighted average with exponentially decreasing weights	α × Current Value + (1-α) × Previous Forecast
Trend Projection	Linear forecast based on historical trend	y = mx + b (where m is slope and b is y-intercept)
Seasonal Index	Factor representing seasonal variations	Value for Period / Average Value for All Periods

Break-even Analysis

Formula	Description	Calculation
Break-even Point (Units)	Units needed to sell to cover costs	Fixed Costs / (Price - Variable Cost per Unit)
Break-even Point (Revenue)	Revenue needed to cover costs	Fixed Costs / (1 - (Variable Costs / Revenue))
Contribution Margin	Amount each unit contributes to covering fixed costs	Price - Variable Cost per Unit
Margin of Safety	Amount sales can drop before reaching break-even	Current Sales - Break-even Sales

International Trade

Formula	Description	Calculation
Exchange Rate Adjusted Price	Price adjusted for currency exchange	Original Price × Exchange Rate
Landed Cost	Total cost including all import fees	Product Cost + Shipping + Insurance + Duties + Taxes
Effective Duty Rate	Actual duty rate paid on imports	Total Duties Paid / Total Value of Goods
Terms of Trade	Ratio of export prices to import prices	(Export Price Index / Import Price Index) × 100

Implemented in Our Script

Our sales forecasting script implements these formulas as appropriate based on the columns identified in your data. The primary formulas used include:

1. **For direct sales columns with discount values:**
   - Original Sales = Discounted Sales + Discount Amount

- Used when your data has both the final sales amount and the discount amount

2. **For direct sales columns with discount percentages:**
   - Original Sales = Discounted Sales / (1 - Discount Rate)
   - Used when your data has the final sales amount and discount percentage/rate
3. **For datasets with quantity and price:**
   - Base Sales = Quantity × Unit Price
   - Final Sales = Base Sales - Discount Amount (if discount value available)
   - Final Sales = Base Sales × (1 - Discount Rate) (if discount percentage available)

These calculations ensure that forecasting is based on consistent revenue figures, regardless of how discounts are represented in your dataset.