Financial and Cost-Volume-Profit Models in Developing a Hotel

ABSTRACT

Companies in search of profit will create a financial model, modeling that is done correctly will help entrepreneurs in making decisions that must be implemented as a result of changes in parameters. One of the financial models in question is Cost Volume Profit (CVP). When making short-term decisions, CVP calculations are required so that the desired budget or profit target can be determined. The research aims to carry out a CVP analysis of changes in selling price per unit, sales volume, variable costs per unit, and fixed product costs in planning the construction of a hotel. The research is descriptive using a literature review and calculation analysis approach. The research results show that: (1) CVP modeling carried out by entrepreneurs can be said to be risky because if the project is carried out it could experience losses in pessimistic conditions (worst-case scenario), although in optimistic conditions (best-case scenario) this project can experience profits Very large, and (2) income performance through the Theory of Constraint shows that there is a profit during the investment period. From the modeling carried out, entrepreneurs can make decisions for the benefit of the company.

Keywords: Cost volume profit; product cost; hotel construction.

1. INTRODUCTION

Population growth in Indonesia continues to grow, so the need for residential facilities continues to increase, one of which is real estate. Of the various types of real estate, some of them are apartments or hotels. Apartments and hotels are a necessity for living in cities. The large number of real estate developers building hotel buildings drives the need for hotel management financing calculations. Therefore, in this research, we will discuss how to model financing for developing a hotel by a developer.

In calculating hotel payments, some costs must be incurred. These costs are fixed costs, which are costs that do not depend on production volume and variable costs, namely costs that change according to production levels. Hotels tend to have high fixed costs due to the level of investment required. This must produce above-normal profits in good times, the existence of variable costs will also make the rate of return smaller. Even though the profit is higher than the break event point, if there is a high loss it will result in a significant reduction in returns. Much attention is focused on the CVP (Cost Volume Profit) model because failure to cover fixed costs in the long term can cause company losses. Atiqah [1] stated that Cost-Volume-Profit (CVP) analysis is a very useful tool for planning and decision-making.

The research aims to discuss the basics of CVP modeling and generate the basic model for decision-making.

2. METHODS

The type of research used is descriptive research. Descriptive research is research into problems in the form of current facts from a population [2]. The research was carried out using a literature review approach and analysis of calculations.

3. RESULTS AND DISCUSSION

3.1 Basic Cost Volume Profit Model

The financial model requires analysis of the relationship between the company's manufacturing and financial activities, such as the ratio of variable costs to sales, inventory, and the proportion of products sold. Model relationships within a company include; organization costs and revenue which can calculate product profits. The model is used by companies to study impacts to review results before an action is taken. Financial modeling can help train untrained employees and increase their knowledge of how their actions can impact financial results. Targets in modeling finance in a company: (a) Usefulness for decision making, (b) Accurate and reliable simulation of

supporting factors, and (c) Flexible and responsive analysis

The basis of the financial model is Cost-Volume-Profit (CPV) which reflects the effects caused by changes in company activities, such as sales volume, expenses, or income. CVP analysis focuses on various factors that influence changes in profit components [3]. The application of CVP analysis for management decision-making [4] is to determine that the company does not suffer losses or profits equal to zero, determine the units that must be sold or how many sales so that the company achieves the desired operating profit target, choose alternative scenarios advertising policies, automation of factory machines, increasing the selling price of products or services, etc., with a choice of scenarios that can provide maximum profit, analyzing sensitivity to the risk of uncertainty in selling prices, costs and markets and analyzing the margin of safety and leverage. According to Kamaruddin [5], the assumptions for using CVP analysis include: (a) The concept of cost variability is acceptable, therefore costs must be realistically classified as variable and fixed; (b) Relevant ranges at all stages of analysis must be determined; (c) the selling price per unit does not change if there is a volume change; (d) Only one type of product is sold (single product); (e) If the analysis is used for various products or combinations of products (product mix), the sales mix must be fixed or constant; (f) Management policy regarding company operations does not change materially in the short term; (g) The general price level is stable in the short term; (h) Synchronization between sales and production, which means inventory levels must be constant or zero; and (i) Efficiency and productivity do not experience changes, especially in the short term.

The steps in generating a model include: (a) Obtain information, collect all facts, assumptions, and estimates including selling price, and target profit; (b) Modeling relationships between parameters, knowing and describing relationships in model parameters. Changing the model parameters should also change the results, or more precisely how a parameter can affect the financial model; and (c) Separate parameters and formulas, to facilitate analysis, formulas in the analysis section do not contain numerical values.

The first basic model in developing a hotel according to CPV theory is identifying cost drivers that are likely to occur. The model includes the price of land and construction (lobby, basement, and supporting construction) which includes fixed costs, the number of rooms offered which includes variable cost income and outcomes.

3.2 CVP and Break Event Points

Break Event Point is the point when revenue equals total costs and profit equals zero (Blocher, et al [6]. Hotel developers try to find out how many rooms must be provided at a minimum so that income equals expenditure (break event point). Hotels that are planned, are built on 420 m^2 of land with a basic building coefficient of 330 m2. The investment period is 10 years with a MARR of 10%, so the annual depreciation amount is 6,145. Costs incurred are IDR 1.26 billion (land), IDR 4.29 billion (construction), and IDR 400 million (permitting), so the total costs that must be incurred are IDR 5.95 billion. The hotel rooms offered measure 4.2 m x 3.2 m at IDR 400,000 /room/day. Costs incurred are for water and electricity of IDR 100,000/room/day. Hotel developers try to find out how many rooms must be provided at a minimum so that income equals expenditure (break-even point). For hotel construction, the BEV analysis is as follows:

[P/A;10%;10] = 6.145
Fixed cost = 1260 + 4290 + 400
= IDR 5950 Million
Income = 0.4 x 30 days x 12 months x 6.145 x n
= IDR 884,8177 n Million Outcome = 0.1 x 30 x 12 x 6,145 x n
= IDR 221,2044 n Million Fixed cost = Income – Outcome
5950 = 884.8177 n – 221.2044 n
663.6132 n = 5950
n = 8.97 ~ 9 room units

3.3 CVP and Target Income

Breaking even is not a bad thing, but hardly a satisfactory outcome for most businesses. Instead, a manager may be more interested in learning the necessary sales level to achieve a targeted profit. The approach to solving this problem is to treat the target income like an added increment of fixed costs. In other words, the margin must cover the fixed costs and the desired profit [7]. Target income is a continuation stage of the basic model, where a company must be able to exceed the fixed costs and profits it wants to achieve. In the previous model, it was known that 9 room units were needed to cover fixed costs, then the hotel developer wanted a profit of IDR 5

billion during the investment period. The number of rooms required to achieve the profit target is as follows:

Fixed cost + Target income = Income – Outcome
5950 + 5000
= 884.8177 n – 221.2044 n
663.6132 n = 10950
n = 16.5 ~ 17 room units

3.4 Tax Modeling

Tax if viewed from the definition is a mandatory contribution by society to a country based on applicable regulations. Income taxes, both individual and corporate, are a potential source of revenue for countries, especially developing countries [8]. Therefore, profit-seeking companies are required to pay taxes during their periodic profits, meaning that the income target must be set high enough to meet profit requirements and cover company taxes. The relationship between a company's pre-tax income and after-tax income can be described as follows:

After-tax income = before-tax income – income tax
= before tax income – (before tax income x t)
= before tax income x (1 – t)

The previous hotel financial modeling assumed that the available rooms were always full every day, so the developer assumed the hotel occupancy rate was 40% every day and the amount of income tax that had to be paid was 20% (Table 1). The modeling calculations to obtain the number of rooms that must be provided are as follows:

Before-tax income = after-tax income : (1 – t)
= 5000 : (1 – 20%)
=IDR 6250 Million Contribution margin = Income – Outcome
= 884.8177 – 221.2044
= IDR 663.6132 Million
Target volume = [Fixed cost + Target before tax] : [Contribution margin per room]
= [5950 + 6250] : [663.6132]
= 18.3842 ~ 19 room units

Table 1. Profit model with taxes

Profit Planning Model with Taxes	
Revenue input data	
Max room (unit)	102
Rent price/day (IDR … Million)	0.4
Percentage of rent fill assumption	40%
Annual depreciation during investment	6.144567106
Annual break-even point	
Cost input data	
Operation room/day (IDR … Million)	0.1
Furniture cost (IDR … Million)	35
Total employee salary/month (IDR … Million)	100
Land + construction (IDR … Million)	5950
Tax	20%
After-tax target income	5000
Contribution margin	628.6132
Fixed cost	
Land + construction cost	5950

Profit Planning Model with Taxes	
Salary cost	7373.480527
Total non-unit level cost	13323.48053
Divided by contribution margin	628.6132
Break-even volume in unit	22

Target profit analysis

Total non-unit level cost	13323.48053
Target profit before tax	6250
Target contribution margin	19573.48053
Divided by contribution margin	628.6132
Target volume in unit	32
Planned profit analysis	
Rent revenues	36100.56066
Land + construction cost	5950
Salary cost	7373.480527
Operational unit-level cost	9025.140165
Facility cost	3570
Total operating cost	25918.62069
Before-tax profit	10181.93997
Less taxes at an average tax rate	2036.387994
Profit (loss) after tax	8145.551974
Target profit after tax	5000
Excess (deficiency) of profit	3145.551974

3.5 Modeling Multiple Products

The limitation in previous modeling was that the model only presented one type of product, whereas it required effort and energy to be able to model more complex products. Buhne et al. [9] describe the problems related to the use of a single-feature model and propose the use of a centralized variability model, which is later elaborated and described as the Orthogonal Variability Model. Buhne et al. [10] discuss various approaches and describe a way to model different product lines as part of the Orthogonal Variability Model. In their approach, a solution is presented for modeling variations across different product types. Many companies have multiple cost and revenue drivers, with that in mind namely as follows: (a) Cost driver activities, activity-based costing directs developers to identify decisions about activities carried out at the unit, batch, product, customer, and facility levels. The model must reflect the effects of all cost-driving activities; (b) For Revenue driver activities, knowing revenue drivers is as important as knowing cost drivers.

Several integrations of multiple cost drivers into profit planning modeling include (1) Unit-level activities, performed on each product or service unit; (2) Batch-level activities, providing benefits to multiple units with the same results at the same time; (3) Product-level activities, needed to support a specific product or service. Examples: new product design, improving the quality of existing products, product advertising, and product monitoring processes; (4) Customer-level activities, carried out to meet customer needs. Or placing personnel to meet customer needs, and (5) Facility-level activities, required by companies to produce goods and services.

The developer wants the room types offered to be not only 4.2 m x 3.2 m but also to add a 4.2 m x 4.2 m type. Supporting costs for room units are in the form of furniture, with furniture costs for type 1 amounting to IDR 35 million/room and for type 2 IDR 40 million/room. The number of floors that can be planned is 7 including the lobby, where each floor has a ratio of type 1 (4.2 m x 3.2 m) to type 2 (4.2 m x 4.2 m). of 15: 2, so the total planned rooms are 102 units. To provide better service to customers, service is provided by employees for customer convenience. The hotel developer also provides pick-up facilities from the airport or terminal if necessary with an estimated monthly fuel & maintenance expenditure of IDR 3.5 million/month and 2 cars with a total of IDR 400 million. The financial model with 2 types of room units can be seen in Table 2.

3.6 Sensitivity Analysis

All decisions about the future are made without knowing the actual outcome. Decisions cannot be turned into perfectly executed actions, and external factors may occur that do not match expectations. Developers' financial planning

models alone cannot reduce risk, but they can help them understand the causes and extent of risk. They can then take actions that are most likely to produce good outcomes, for example by ruling out actions that are too risky. One common method of assessing risk is sensitivity analysis. Senastri [11] states Sensitivity analysis, also referred to as what-if analysis, is a mathematical tool used in scientific and financial modeling to study how uncertainty in a model affects the overall uncertainty of that model. The main benefits of using sensitivity analysis are better decision-making, more reliable predictions, highlighting areas for improvement, and providing a higher level of credibility.

This system tests financial planning models for changes in outcomes (e.g., profits) caused by changes in any model parameter (e.g., hotel ticket sales). First, determine the most probable value of each parameter (“baseline” value). Next, determine the possible range of each parameter. An analyst can determine these values and ranges by considering historical data, or, in the case of new operations, similar experiences, test cases, or the analysts' best estimates. The next step is to change the parameters up and then to the lower range while keeping the other parameters at their most likely values. The application of the Sensitivity Analysis Model to hotel cost management can be seen in Table 3.

3.7 Scenario Analysis

Many managers assess risk using scenario analysis for decision-making, which creates a combination of parameter changes. Scenario analysis is the process of estimating the expected value of a portfolio after a certain period, assuming specific changes in the value of portfolio securities or key factors, such as changes in interest rates. Scenario analysis is usually used to estimate changes in portfolio value in response to unfavorable events and can be used to test theoretical worst-case scenarios [12]. In this analysis, best-case, worst-case, and most likely cases are usually created for review by the manager. The best-case scenario is a combination of the highest price, the highest number of units, the lowest cost, and the lowest cost-driving activities. Meanwhile, the worst-case scenario is a combination of the lowest price, lowest number of units, highest cost, and lowest cost-driving activities. Analyzing cases like this often requires a joint assessment from cross-functional teams because so many business interactions are involved. The results from Table 4 show that the difference between the best-case scenario and the worst-case scenario is very large. This hotel development project can generate very large profits in optimistic conditions (best-case scenario), while the developer can also experience losses if this project is in pessimistic conditions (worst-case scenario). So the characteristics of this management are very risky.

3.8 Theory of Constraints

Eliyahu Goldratt (1980) quoted by Fadhillah [13] introduced the Theory of Constraint (ToC) approach in the field of management. Theory of Constraint is a term that refers to theories in the business world and is directly related to the process of achieving profits by identifying the obstacles that are usually experienced by a company. The main aim of this theoretical concept is to achieve a company's targets by generating maximum profits. The way to do this is to overcome every existing risk factor or obstacle. So it can be stated that TOC theory focuses more on aspects of increasing sales and profits that must be obtained by a business to maintain its operations.

TOC aims to improve the company's productivity and service processes by measuring production capacity, identifying process constraints, using process constraints effectively, and coordinating other processes with bottlenecks. Steps that can be taken are as follows: (a) Identify appropriate value measurements, (b) Identify bottleneck organizations, (c) Use bottlenecks correctly to sell profitable products, (d) Synchronize all processes at bottlenecks, (e) Increase capacity bottleneck or production input from outside, and (f) Return to the initial stage.

From the perspective of each period, units rented, operating costs, room furniture, and travel facilities can be part of the results. Operational costs are directly related to the number of rooms rented, so operational costs of IDR 0.1 million for type 1 rooms and IDR 0.2 million for type 2 rooms are part of the performance. Meanwhile, furniture costs are incurred once every period because furniture costs may not be replaced shortly. Likewise, if the developer plans to add hotel guest facilities with pick-up transportation, it is estimated that it will cost IDR 3.5 million every month. After investigating the differences between expenditure

and resource use, the elements of cost per period can be measured which can be seen in Table 5.

Table 2. Profit planning model with multiple product

Profit planning model with multiple products	
Revenue input data	
Max room (unit)	102
Rent Price/Day	
type 1 (IDR ... Million)	0.4
type 2 (IDR … Million)	0.65
Percentage of Rent Fill Assumption	
type 1	40%
type 2	20%
Percentage Total Room Sharing	
type 1	88%
type 2	12%
Annual Depreciation During Investment	6.144567106

Table 3. Sensitivity analysis model

Input Data		Range			Profit			Elasticity
Total Room		102	110	100	6934.0258	8355.1448	6578.746	2.61309493
Rent Price/Day	Type I (IDR..Million)	0.40	0,42	0,38	6934.0258	8208.1632	5659.8884	3.6750294
	Type 2 (IDR..Million)	0,65	0,70	0,62	6934.0258	7146.382	6806.6121	0.39812819
Percentage Rent Hill	Type 1	40%	45%	35%	6934.0258	9323.0335	4545.0181	2.75627205
	Type 2	20%	30%	15%	6934.0258	7889.6289	6456.2243	0.27562721
Percentage Room	Type 1	88%	94%	81%	6934.0258	7295.5898	6527.2663	0.7409859
	Type 2	12%	6%	19%	6934.0258	7295.5898	6527.2663	0.09879812
Operation Room/Day	Type 1 (IDR…Million)	0,10	0,15	0,08	6934.0258	3748.6822	8208.1632	0.91875735
	Type 2 (IDR…Million)	0,20	0,25	0,15	6934.0258	6721.6696	7146.382	0.12250098
Furniture Cost	Type 1 (IDR…Million)	35	40	32	6934.0258	6574.0258	7150.0258	0.36342524
	Type 2 (IDR…Million)	40	50	37	6934.0258	6838.0258	6962.8258	0.05537908
Total employee salary/month (IDR … Million)		100	104	96	6934.0258	6698.0744	7169.9772	0.85070125
Land + construction (IDR … Million)		5950	6160	5866	6934.0258	6766.0258	7001.2258	0.6864699
Travel facility/month (IDR … Million)		3.5	3.7	3.3	6934.0258	6922.2282	6945.8234	0.02977454
Transportation (IDR … Million)		400	420	380	6934.0258	6918.0258	6950.0258	0.04614924
Interest		10%	11%	8%	6934.0258	6314.113	8307.0040	0.89401565
Average tax ratio 20%		25%	20%	15%	6934.0258	6500.6492	7367.4024	0.25

Table 4. Scenario analysis model

Input Data	Best- case	Worst- case	Most likely
Total room	110	100	102
Rent price/day (IDR.. Million)			
Type 1	0.42	0.38	0.4
Type 2	0.7	0.62	0.65
Percentage rent fill			
Type 1	45%	35%	40%
Type 2	30%	15%	20%
Percentage room			
Type 1	81%	94%	88%
Type 2	19%	6%	12%
Unit-level cost/day (IDR…million)			
Type 1	0.08	0.15	0.1
Type 2	0.15	0.25	0.2
Batch-level cost (IDR…Million)			
Type 1	32	40	35
Type 2	37	50	40
Product-level cost (IDR …Million)	5866	6160	5950
Customer-level cost (IDR… Million)	7730.01	7349.76	7373.48
Facility cost (IDR … Million)	645.72	681.48	658.07
Interest rate ratio	8%	11%	10%
Average tax ratio	15%	25%	20%
Scenario profit (IDR)	19879.84	-1105.70	6934.03

Table 5. Periodic throughput

Throughput Element	Unit of Activity	Throughput Price or Cost per Unit of Activity (IDR … Million)	Capacity (IDR … Million)		Planned Usage (IDR …Million)	
Room type 1	Units rented, Qa	0.4	199084	/Period	40%	/Period
Room type 2	Units rented, Qb	0.65	26545	/Period	20%	/Period
Operation cost	Units rented (Qa + Qb)	0,1;0,2	225629	/Period	38.4	/Period
Furniture Room type 1	Units, G	35	1	/Period	1	/Period
Furniture Room type 2	Units, C	40	1	/Period	1	/Period
Travel facility	/month, Gp	3.5	259	/Period	259	/Period

Total periodic performance is performance per event multiplied by the number of events minus other periodic expenses. Hotel work performance throughout the investment period can be measured by the following equation:

= (IDR 0.4 x Qa) + (IDR 0.65 x Qb) - {(IDR 0.1x90) + (IDR 0.2 x 12)} - (IDR 35 x G) - (IDR 40 x C) - (IDR 3.5 x Gp)
= (IDR 0.4 Million x 199084 x 40%) + (IDR 0.65 Million x 26545x 20%) - {(IDR 0.1 Million x 90) + (IDR 0.2 Million x 12)} - (IDR 35 Million x 1) - (IDR 40 Million x 1) - (IDR 3.5 Million x 259)
= IDR 34.311.390.000.

Seasonal Throughput

So it can be seen that the hotel's performance in one investment period is IDR 34,311,390,000.

4. CONCLUSION AND SUGGESTIONS

4.1 Conclusion

CVP modeling carried out by entrepreneurs can be said to be risky because if the project is carried out it could experience losses in pessimistic conditions (worst-case scenario), even though in optimistic conditions (best-case scenario) this project can experience very large profits.Income performance through the Theory of Constraint shows that there is a profit during the investment period. From the modeling carried out, entrepreneurs can make decisions for the benefit of the company.

4.2 Suggestion

In this modeling, researchers can only display several activity-based costing analyses in the financial modeling of a hotel. Auditorium/hall rental, food inventory, building maintenance, and advertising have not been included in this modeling, so for subsequent activities, other researchers can continue with financial modeling so that they can be used as reference material for decision-making on development activities.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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