

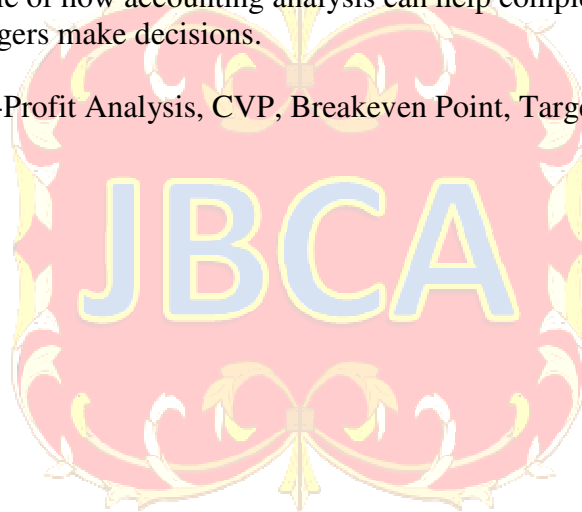
## **Air Land Transport, Inc.: Using CVP analysis when considering expansion into new markets**

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### **ABSTRACT**

Air Land Transport, Inc. (ALTI), a freight forwarding company with more than 50 locations throughout the United States, is considering expansion into a new market. As a first step in the decision-making process, ALTI's CEO has asked for estimates on sales volumes required from ALTI's multiple product lines required to achieve breakeven and to achieve a certain target operating income. The purpose of this case study is to familiarize introductory level managerial accounting students with how CVP analysis can be used to inform business decisions. This case can be used to provide real world context to the academic study of CVP analysis and as an example of how accounting analysis can help complement qualitative business information to help managers make decisions.

Keywords: Cost-Volume-Profit Analysis, CVP, Breakeven Point, Target Operating Income



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## INTRODUCTION

This case is designed to help undergraduate accounting students better understand how cost-volume-profit (CVP) analysis can be used to make real-world business decisions. According to Brewer et al. (2016), “Cost-volume-profit (CVP) analysis helps managers make many important business decisions such as what products and services to offer...”. In this case, an accounting analyst for a mid-sized logistics company is asked to determine whether a possible expansion into a new geographic market can achieve management’s required financial goals. Studying CVP analysis in a real-world context enhances student understanding of the topic and allows students to understand that CVP can be used to assist managers when making a wide array of business decisions.

## BACKGROUND

Air Land Transport, Inc. (ALTI), a mid-sized freight forwarding company, was founded in 1987 by Preston Smith. Over the course of three decades, Preston grew ALTI from a single office with just one employee and no clients, to a national company with more than 50 offices, 500 employees and \$250,000,000 in revenues. ALTI grew by specializing in the shipment of unusual, time-sensitive freight with special shipping requirements that major freight carriers couldn’t handle well in their large, monolithic shipping systems such as sensitive electronic equipment and high-value medical products. Freight forwarders, such as ALTI, don’t own the trucks and planes being used to transport shipments. Instead, they rely on specialized trucking and air transport companies that cater to large shippers like ALTI who can bundle together numerous small shipments into larger single shipments headed from one destination to another.

## POTENTIAL EXPANSION

Tad Phillips settled into his normal spot in the executive conference room at ALTI’s Denver headquarters. He had become very accustomed to the regular Monday morning meetings with ALTI’s executive team to review the prior week’s business activities. Tad had spent the past three years as an accounting analyst for ALTI after earning his accounting degree and spending four years as an Operations Assistant in ALTI’s Memphis office. His combination of operations experience and accounting knowledge had allowed Tad to quickly advance at ALTI, and he now found himself giving regular advice to ALTI’s top decision makers.

As the executive team began arriving, Tad noticed a new face to the weekly meeting - Rich Summers, head of Western Region Sales. He and Rich had worked closely the previous year on developing an aggressive pricing offer to fend off competition for the Factor Medical account, one of ALTI’s largest clients on the west coast. The meeting agenda didn’t mention anything about Rich or Factor Medical, so Tad was curious about Rich’s attendance at the meeting. Preston Smith, CEO of ALTI, began the meeting, “We’re going to deviate from our usual schedule this week. Rich Summers called me last night with some big news about the Factor Medical account. Factor is expanding into the eastern U.S. region and is going to open a new distribution hub in Nashville. Based on our established relationship, Rich has convinced Factor to give us the first opportunity to bid on being their exclusive shipper for all their overnight and two-day shipments. Factor has told Rich that if we give them great rates and can promise our

dependable service, they won't even take bids from anyone else. The catch is that they want to see our bid in three days."

The energy level in the room immediately jumped as the executives began to process the implications of this news. ALTI had seen their revenues reach \$250,000,000 in the previous year, and Factor Medical accounted for nearly 10% of that revenue. Charlene Rayman, ALTI's CFO, excitedly turned to Rich and asked, "Are they projecting the same level of business in their Nashville distribution center as their Los Angeles distribution center?" Rich gave a little smile and shook his head, "Not exactly. Factor projects that their Nashville shipments will only be about 10% of their Los Angeles shipments during the first few years, but they also think their eastern operations could surpass their western operations within a decade." Charlene, like everyone else in the room, started rapidly calculating estimates related to the possible new account.

"I want this new business as long as it makes us money, and Rich assures me that this one can make us a lot of money," Preston said plainly. "I'm not as confident as Rich about the profits available from the new Factor shipments, but they're a vital client for us. We need to give them a bid quickly, so we need to understand what we can and can't offer," Preston continued. Tad had done the financial analysis for the opening of nearly a dozen new offices since taking over as Accounting Analyst. He was very familiar with Preston's two rules on expanding into new cities – don't lose money in the first year, and make at least \$50,000 of operating income in the second year. Tad was also very familiar with how thinly ALTI had been forced to cut the profit margins on the Factor Medical account the prior year to fend off competition.

Preston turned to Tad, "Don't bother giving us a review of last week's activities, Tad. You and Rich need you to start modeling estimates on a new Nashville office immediately. Rich has already done a lot of background work which means you won't have to start from scratch. You two were vital to keeping Factor Medical last year, so we're expecting the same again. We'll all meet back here tomorrow morning to see what you've come up with."

As Tad walked back to his office to meet with Rich, his mind was racing with all the costs and estimates they would need to quickly put together. Rich walked into the office right behind Tad, "You look a little overwhelmed, Tad! Don't worry too much. We have a lot of great truck lines and air cargo options from Nashville, and they're all cheap. We'll make lots of money with this one."

"I appreciate the enthusiasm," Tad replied, "but I'll worry less when I see some analysis showing that this expansion will work for ALTI. You know the projected shipping volumes and how much we can charge Factor to ship from Nashville, so you come up with those two elements; and I'll come up with projections for costs of our new office and our shipping costs. Email everything you have so far, and let's get to work."

Tad's previous experience estimating costs of new offices allowed him to quickly put together a list of the typical elements and associated costs necessary to get up and running in Nashville (See Exhibit 1 - Appendix). He knew that some costs – rent, utilities, office supplies, and furniture/equipment rental – would be paid monthly, while all employee salaries would be paid weekly. He also knew that these costs were stable and didn't tend to change as long as operations remained within a normal range.

Tad also relied on his previous experience when choosing trucking and air cargo vendors to use from Nashville. Cost was always a major factor when choosing a trucking or air cargo vendor, but reliability couldn't be ignored either. ALTI had won many accounts because of their

reputation for getting important shipments delivered on-time, so Tad knew that a cheaper vendor wasn't always the best choice. ALTI would be shipping both overnight and two-day shipments to three different geographic zones for Factor Medical. Zone 1 would be for destinations within 300 miles of Nashville. This meant all Zone 1 shipments could be moved by one of ALTI's trucking vendors. Zone 2 shipments would be for destinations between 301 and 600 miles of Nashville, while Zone 3 shipments would be for and destination more than 600 miles. Two-day shipments to zones 2 and 3 could still be sent by truck line, but overnight shipments to these zones would have to be moved by one of ALTI's air cargo vendors. Tad decided to use cost estimates from some of ALTI's most reliable vendors, despite the fact that they didn't necessarily offer the lowest cost (See Exhibit 2 - Appendix).

Soon after Tad finished his cost estimates, Rich provided him with a proposed pricing list for Factor Medical (See Exhibit 3 -Appendix) and estimated monthly shipping volumes from Factor's Nashville distribution center (See Exhibit 4 - Appendix). Rich told Tad that pricing for Factor Medical would not change for the first two years, but that Factor expected a 15% increase in shipping volume in their second year of operations. Tad also knew that he could lock in prices with ALTI's Nashville trucking and air cargo vendors for two years, but that the costs of operating the new office would increase approximately 2% each year. With all of this data, Tad had everything he needed to determine whether ALTI could breakeven in their first year of operations in Nashville, and whether ALTI could make the required \$50,000 of operating income in year 2.

### **STUDENT ASSIGNMENT**

1. Determine the year 1 breakeven point in pounds for ALTI's proposed Nashville office. Based on that breakeven point, determine ALTI's margin of safety and profit/loss for year 1.
2. Determine the year 2 units required to meet management's desired income of \$50,000. Based on that required number of units, determine by how much ALTI will exceed or fall short of their target income.
3. Besides the analysis in Student Assignments 1 and 2, make a list of other financial and qualitative factors that Tad and ALTI's executive team should consider when deciding whether to expand into Nashville.
4. Based on the entire analysis, form a recommendation for ALTI's executive team about whether to expand into Nashville.

**APPENDIX**

Exhibit 1

Estimated Costs for Nashville Office		
Cost Item	Amount	Frequency
Rent on Office/Warehouse	\$3000	Monthly
Utilities	\$750	Monthly
Office Supplies	\$250	Monthly
General Manager Salary	\$1600	Weekly
Operations Supervisor Salaries	\$2500	Weekly
Operations Assistant Salaries	\$5000	Weekly
Furniture/Equipment Rental	\$300	Monthly

Exhibit 2

Estimated Shipping Costs from Nashville		
Overnight Shipments	Vendor	Cost per lb.
To Zone 1	Quick Trucking	.59
To Zone 2	Sky Freight	1.80
To Zone 3	Sky Freight	2.00
2-Day Shipments		
To Zone 1	Quick Trucking	.59
To Zone 2	Boomerang Trucking	.78
To Zone 3	Boomerang Trucking	.96

Exhibit 3

Proposed Pricing for Factor Medical	
Overnight Shipments	Price per lb.
To Zone 1	\$0.90
To Zone 2	\$2.01
To Zone 3	\$2.15
2-Day Shipments	
To Zone 1	\$0.85
To Zone 2	\$1.00
To Zone 3	\$1.15

## Exhibit 4

Estimated Monthly Shipping Volumes – Factor Medical	
Overnight Shipments (lbs.)	
To Zone 1	30,000
To Zone 2	25,000
To Zone 3	21,750
Total Overnight Shipments	76,750
2-Day Shipments (lbs.)	
To Zone 1	18,300
To Zone 2	28,250
To Zone 3	26,700
Total 2-Day Shipments	73,250
Total Shipments (Overnight and 2-Day)	150,000

**TEACHING NOTE**

TN1 – Instructors may want to begin discussion of the case by discussing the fact that, while servicing only one customer, the two shipment options and three zones create six different products. This scenario will require the use of a multi-product CVP analysis, meaning that students will have to compute sales mix percentages for each product, contribution margins per unit for each product, and a weighted-average contribution margin before they can answer any questions posed in the Student Assignment. Additionally, the fixed costs presented in the case will have to be annualized before they can be used in the CVP analysis. This teaching note begins with the calculation of sales mix percentages.

Calculation of Sales Mix Percentages		
Overnight Shipments	Lbs.	Sales Mix Percentage
To Zone 1	30,000	$(30,000/150,000) = .2000$
To Zone 2	25,000	$(25,000/150,000) = .1667$
To Zone 3	21,750	$(21,750/150,000) = .1450$
Total Overnight Shipments	76,750	
2-Day Shipments (lbs.)		
To Zone 1	18,300	$(18,300/150,000) = .1220$
To Zone 2	28,250	$(28,250/150,000) = .1883$
To Zone 3	26,700	$(26,700/150,000) = .1780$
Total 2-Day Shipments	73,250	
Total Shipments (Overnight and 2-Day)	150,000	

TN2 – Since each product has its own sales price and variable cost, each also has its own contribution margin per unit (per pound). Students should quickly realize that ALTI's costs associated with shipping each product are all variable in nature, which helps to simplify the calculation of contribution margins. This simplification makes the case easier for students to grasp given the six different products.

Calculation of Contribution Margins			
Product	Sales Price per lb.	Variable Cost per lb.	Contribution Margin per lb.
Overnight Zone 1	.92	.59	0.33
Overnight Zone 2	2.01	1.80	0.21
Overnight Zone 3	2.15	2.00	0.15
2-Day Zone 1	.85	.59	0.26
2-Day Zone 2	1.00	.78	0.22
2-Day Zone 3	1.15	.96	0.19

TN3 – The combination of sales mix percentages and individual product contribution margins per pound allow for the calculation of a weighted-average contribution margin that can be used in breakeven and target income analyses. Some instructors prefer to use a bundled contribution margin approach to multi-product CVP analysis. Such an approach, however, would be difficult in this case due to the relatively large number of products.

Calculation of Weighted Average Contribution Margin			
Product	Contribution Margin per lb. (\$)	Sales Mix Percentages (%)	Weighted CM (\$)
Overnight Zone 1	0.33	.2000	.0660
Overnight Zone 2	0.21	.1667	.0350
Overnight Zone 3	0.15	.1450	.0218
2-Day Zone 1	0.26	.1220	.0317
2-Day Zone 2	0.22	.1883	.0414
2-Day Zone 3	0.19	.1780	.0338
Weighted Average Contribution Margin			.2297

TN4 – With the computation of the weighted-average contribution margin, the denominator of the CVP breakeven formula has been identified. The instructor can lead a discussion about the total fixed costs of the Nashville operation which belong in the numerator of the formula. Students should be able to recognize that all of the costs associated with running the Nashville office behave like fixed costs. What they may not quickly recognize is that these costs need to be put into the same time basis (frequency) before they can be used. This teaching note opts to annualize all fixed costs since that represents the most direct solution to the assignment.

Computation of Annual Fixed Costs			
Cost Item	Frequency	Annualizing Calculation	Annual Amount
Rent on Office/Warehouse	Monthly	$(\$3,000 * 12)$	\$36,000
Utilities	Monthly	$(\$750 * 12)$	\$9,000
Supplies	Monthly	$(\$250 * 12)$	\$3,000
General Manager Salary	Weekly	$(\$1,600 * 52)$	\$83,200
Operations Supervisor Salaries	Weekly	$(\$2,500 * 52)$	\$130,000
Operations Assistant Salaries	Weekly	$(\$3,000 * 52)$	\$156,000
Furniture/Equipment Rental	Monthly	$(\$300 * 12)$	\$3,600
Total Annual Fixed Costs			\$420,800

TN5 – Once the weighted average contribution margin has been calculated and fixed costs have been annualized, the breakeven point can be found. This also allows for the calculation of the margin of safety, which is negative, and a projected small loss in the first year of operations.

First Year Calculations			
Breakeven Point (Annual)	Estimated Annual Volume	Margin of Safety	Projected Annual Loss
$\$420,800 / .2297$	150,000 lbs. * 12	1,800,000 – 1,831,955	31,955 lbs. * .2297
1,831,955 lbs.	1,800,000 lbs.	-31,955 lbs.	(\$7,340)

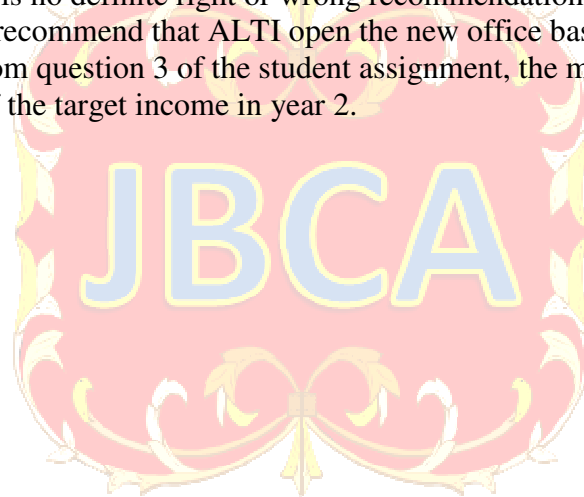
TN6 – The weighted average contribution margin does not change in the second year of operations since sales prices and variable costs stay the same from year 1 to year 2. The fixed costs, however, do increase by two percent. Many students will forget this rise in fixed costs, giving the instructor an opportunity to discuss the importance of accounting for changing costs in multi-year projections. Students may also forget to incorporate a 15% increase in shipping volume for the second year. The instructor should also remind students that the formula used to find the required volume for a target income is slightly different than the formula used to find a breakeven point. Similar to the first year results, ALTI's new office is projected to just miss the \$50,000 target income.

Second Year Calculations (\$50,000 Target Income)			
Target Income Volume (Annual)	Estimated Annual Volume	Excess/Shortfall from Target Volume	Projected Shortfall from Target Income
$(\$429,216 + \$50,000) / .2297$	172,500 lbs. * 12	2,070,000 – 2,086,270	16,270 lbs. * .2297
2,086,270 lbs.	2,070,000 lbs.	-16,270 lbs.	(\$3,737)

TN7 - This is an appropriate time for the instructor to discuss the fact that the CVP analysis indicates that the new ALTI office will fail to meet Preston Smith's two rules when it comes to opening new offices – don't lose money in the first year, and make at least \$50,000 in the second year. Some students will conclude at this point that ALTI should not open the new office based solely on these two pieces of financial data. The instructor, however, should encourage students



to thoroughly contemplate Student Assignment 3 before they settle on a recommendation for ALTI's executive team. While student responses to additional financial and qualitative factors could vary, common financial responses should center on the fact that the new office is only projected to miss the breakeven point and target income volume by small amounts. Mild price increases or cost reductions would likely lead to profitability for the new office. The instructor can demonstrate this by showing that an increase in the weighted average contribution margin to .2350, approximately a half cent, would lower the breakeven point below the estimated annual volume in the first year and lead to a projected income above \$50,000 in the second year. The discussion of qualitative factors should include the fact that Factor Medical is an important client, so a small loss or small shortfall from a target income in one area (Nashville) may be acceptable given the profits being generated by Factor Medical's large business volumes in the western region. Students may also note that shipping volumes grew by 15% from the first to second year, and further increases in volume would likely lead to strong profits in the future. Lastly, the instructor should make sure students take into consideration ALTI's competitive environment. Rejecting the opportunity to service Factor Medical in Nashville would allow a competitor to capture that business, meaning ALTI's entire Factor Medical account could be put in jeopardy. While there is no definite right or wrong recommendation to ALTI's executive team, most students will recommend that ALTI open the new office based on the other financial and qualitative factors from question 3 of the student assignment, the mild projected loss in year 1, and the narrow miss of the target income in year 2.



**REFERENCES**

Brewer, P., Garrison, R., & Noreen, E. (2016). Introduction to Managerial Accounting (7<sup>th</sup> ed.). New York, NY: McGraw Hill.

