

CUSTOMER ACCOUNTING WITH BUDGETS AND ACTIVITY-BASED COSTING: A CASE STUDY IN ELECTRONIC COMMERCE

Rainer Lueg, Aarhus University
Margit Malmose, Aarhus University

ABSTRACT

This case study deals with an unexpected budgetary loss of an online wine trader. It can serve both as a discussion basis in class as well as an exam for advanced Master students in management, marketing, and accounting. The case illustrates how variance analysis and Activity-based Costing help managers to better understand the different profitability of customer groups in their portfolios. The rather open questions at the end of the case study allow for an adjustment to the level of knowledge of the students. They also serve the purpose to raise students' awareness for the limits of customer accounting. Students will need to reflect on how a mechanical application of customer profitability analysis can lead to dysfunctional decisions that run counter to a company's business model.

Keywords: *Customer Accounting; Customer Profitability Analysis; budget; variance analysis; business model; management accounting; e-commerce; trade; case study; teaching notes; shareholder value; dysfunctional decision making.*

1. THE COMPANY

Business Model

For five years, Don Vivant has operated an online wine shop that he named after himself (DV). From the very beginning, Don had made profits, and business was picking up quickly. Therefore, he can simply not believe that his profit and loss accounts show a loss for 2013 (Exhibit 1).

Don's business model is to buy and sell wines from around the world, provided they belong to the absolute premium tier in their respective category. Prices can range from normal premium wines at 30 EUR per bottle to rare dry-berry-selections around 500 EUR per bottle. Don earns above-market margins with this business model in two ways: First, by ordering large quantities of fashionable wine directly from the vintners. Don is the son of a vintner himself, and has a talent for anticipating trends. Second, DV only offers a very limited variety of wines at once to national customers only. Since DV has made itself a name in offering well-known wines at unexpectedly low prices, demand always exceeds supply, and the new wines are generally sold out after 20 work days.

Pricing

Don uses a markup on the full acquisition cost of the wine that gives him a gross margin of 11%: so if he sells a bottle of wine for 100 EUR, the cost was 89 EUR. This markup seemed reasonable compared to actual expenses of the last years, as well as compared to Don's profound knowledge of the competitive situation in this high-end market. DV offers discounts to frequent customers. All customers have to pay immediately.

Value chain

DV's value chain looks as follows:

Receive and store wine in warehouse → Compose customer order → ship order

DV pays all of its bills instantly. The logistics employees of DV receive shipments directly from numerous and constantly changing vintners. DV employees unload the arriving trucks with forklifts, and place the standard-size wine cartons (6 bottles each) on pallets in the warehouse.

Customer Orders

Three years ago, DV introduced an online ordering system that automatically forwards orders to the warehouse staff after a short plausibility check by the administration. That way, DV's sales staff does not have to enter any data manually. Small orders (less than 6 bottles) can only be made through this web shop. Restaurants and large private customers have the option to order by phone as well.

Warehouse personnel then compose the orders of customers. Customers have different options for their orders.

- They can order standardized 6-bottle cartons of one single type of wine.
- They can also order different wines that DV-employees mix in one carton. Cartons with less than 6 bottles are filled with air cushions.
- Customers can also dispatch presents. Such orders are sent in the original 6-bottle cartons, or they are re-packaged into smaller cartons in case there are less than bottles. Customers can enter a text for a greeting card free of charge with their online order. These self-adhesive cards are automatically printed from the online ordering system.

Shipment

DV normally ships all orders with the help of a parcel service. Orders of standard 6-bottle-cartons are paid by DV. Customers that order less than 6 bottles have to pay freight directly to the parcel service when they order online.

In January 2013, DV surprisingly decided to make some deliveries itself. A back-of-the-envelope calculation showed that this was profitable. So DV has leased a minivan and hired a driver who now delivers on favorable routes where customers are clustered nearby.

2. ANALYSES

Don Vivant remembered that they did not plan a loss in the master budget. The master budget was built upon the experience from the past years.

EXHIBIT 1: ACTUAL RESULTS AND MASTER BUDGET

<i>in EUR</i>	ACTUAL budget (476920 bottles)		MASTER budget (480000 bottles)	
Sales	23,022,348		24,000,000	
Cost of items purchased	20,740,854		21,621,622	
Gross margin	2,281,494	100.0%	2,378,378	100.0%
Personnel expense	506,268	22.2%	421,200	17.7%
Warehouse workers	482,160	21.1%	421,200	17.7%
Minivan driver	24,108	1.1%	-	0.0%
Rent / leases	815,511	35.7%	780,000	32.8%
Warehouse expenses	489,411	21.5%	485,000	20.4%
Office expenses	287,600	12.6%	295,000	12.4%
Minivan (incl. operating costs)	38,500	1.7%	-	0.0%
Freight	333,690	14.6%	420,000	17.7%
Order entry expenses (wage incl benefits and IT)	210,000	9.2%	210,000	8.8%
General, marketing and selling expenses	425,000	18.6%	425,000	17.9%
Net income before taxes	-8,976	-0.4%	122,178	5.1%

He wanted to investigate this issue further. So he talked to the **warehouse manager Oz Packer**. Oz reported:

"Basically, operations here are straightforward: all the cartons that come in weigh the same, take the same space and have the same turnover. So the amount of work we have in handling our stock depends just on the number of cartons we receive."

Then come the customer orders. We get very nice printouts from both the online orders and the ones our sales colleagues send us. They are really no different for us. The same goes for the delivery options: it's the same for us to use the parcel service or our new colleague.

But it is quite time consuming when we have to put these mixed orders together where customers order cartons with less than 6 bottles of one kind. We have to break cartons open and then repack them. I call that the 'repacked carton' as opposed to the 'standard carton'. In total, my guys tell me that repacking a carton takes three times(!) as long as just processing one standard carton that our supplier has already packed – and about 60% of all cartons we process here need to be repacked, I kept statistics on that! Actually, I hired new employees by the beginning of the year, because we are just so incredibly busy."

Don thought this was all quite interesting. He also wanted to know more about DV's delivery. The new **delivery driver Danny** explained:

"Overall, there is more work than I can handle. It is my goal to visit as many customers per day as I can. I am very good at optimizing my routes. Deliveries take pretty much all the same time because the big restaurant customers normally help me unload."

Don wanted to check in the sales and administrative department as well and asked the **sales manager Sally van d'Or**. She commented:

"You know that our expenses include the operation of the online order system. And all small orders of less than 6 bottles are handled by that system now, so that is quite efficient. We just need an eye's glance to check for plausibility.

But we still enter some orders manually. Those are mainly our private collectors and sometimes the restaurants. That normally takes quite long because every type of wine has to be entered separately, and they change so often. These customers also ask us about the taste and the exact technical data on the wine. And I think that is important if you buy so expensive wines. But we have enough time for this, because this new online ordering system has taken pressure off us."

Don asked Sally for samples of typical orders that typical customers place every day. Sally could immediately give him some of these examples that were representative for about 75% of all DV's sales.

Exhibit 2: Typical orders

	CUSTOMER		
	Small donor	Collector	Restaurant
	sends a single bottle	buys regularly	buys regularly
Somehow similar orders per year	42,100	10,625	1,920
Invoice amount (EUR)	75	600	4,320
Discount on invoice amount (%)	0%	4%	8%
No. of bottles in order (#)	1	12	96
No. of cartons in order (#)	1	2	16
Order placement	online	phone	online
Repacking of cartons	yes	no	no
Shipment	parcel service	Minivan	Minivan

Don then talked to his **controller Penny Processor** and asked her for some hard data on the discussed issues. She sent Don the following pieces of information:

- The markups on the wines bought by DV were as planned.
- The practical capacity (i.e., after deducting vacation, sick days, breaks, training etc.) for any of DV's employees was 1,500 hours per year.
- The master budget planned for 18 employees in the warehouse, but there were 20 for the whole year.
- A warehouse employee was supposed to cost 23,400 EUR per year (salary plus benefits). But they all got a raise in January, raising the cost to 24,108 EUR per year.
- Another obvious change was that DV employed an additional delivery driver (at the conditions of warehouse employees as of December last year). Also, DV leased a Minivan (for both, see actual budget).
- The cost of shipping one carton with a parcel service was 7.00 EUR.
- After repacking, the warehouse shipped **128,370** cartons:
 - Of these, **11,000** were dispatched by minivan delivery.
 - **47,670** were shipped at the expense of DV (orders with min. 6 bottles)
 - The remaining **69,700** were shipped at the expense of the customer (orders with <6 bottles)
- Danny made 2,000 deliveries. 25% of those were for the "typical" restaurant and 75% for the "typical" collector customer as described in Exhibit 2.
- DV employed 4 order entry operators in the sales department that were hired before the online order system was operative.
- DV had close to 90,000 orders in 2013. About 4,500 of those were made by phone – mostly by private collectors.
- Based on Penny's observations, order entry operators needed 0.03 hours to validate an order from the online system. In case the customer ordered by phone, an additional 0.2 hours were needed to process that manual order.

3. QUESTIONS

Imagine you work with Penny in the controlling department. Please perform the following analysis for Don Vivant:

3.1) Budgeting:

- a. Perform variance analyses of the budget. Be as detailed as the data allows you to be.
- b. Comment briefly on the main steps in your analysis.
- c. Name 2 major reasons why DV experienced a loss.

3.2) Activity-based Costing (ABC) (33 points): Determine

- a. the costs of processing one standard carton, and one repacked carton
- b. the costs of a customer order by phone, and a customer order through the online ordering system
- c. the delivery cost of one order with the minivan
- d. the profitability of the three customer types according to exhibit 2. Instead of using your results from 2a-2c, you may assume the following costs:
 - processing one standard carton: 4 EUR
 - processing one repacked carton: 12 EUR
 - customer order by phone: 8 EUR
 - customer order through the online ordering system: 1 EUR
 - delivering one order with the minivan: 30 EUR

3.3) Comments and improvements:

- a. What would be the next things you would like to change / analyze in more detail? In total, make six comments for the sales department, the warehouse operations, and the minivan.

- b. Don says: "It is great that we now know the full cost of, for instance, one delivery. Penny, we need to keep and use this traditional ABC information to run a tighter ship around here!". Penny Processor is a bit skeptical if this is the right direction, because her concerns are profits, not efficiency. And she believes Don might have misunderstood some assumptions underlying her analyses. Think outside the box and discuss three—DV-specific(!)—issues that Penny should bring up.

4. TEACHING NOTES

Question 1) Budgeting

1a) Exhibit 3: Variance analysis

	ACTUAL budget (476920 bottles)		MASTER budget (480000 bottles)	
Sales	23,022,348		24,000,000	
Cost of items purchased	20,740,854		21,621,622	
Gross margin	2,281,494	100.0%	2,378,378	100.0%
Personnel expense	506,268	22.2%	421,200	17.7%
Warehouse workers	482,160	21.1%	421,200	18.5%
Minivan driver	24,108	1.1%	-	0.0%
Rent / leases	815,511	35.7%	780,000	32.8%
Warehouse expenses	489,411	21.5%	485,000	21.3%
Office expenses	287,600	12.6%	295,000	12.9%
Minivan (incl. operating costs)	38,500	1.7%	-	0.0%
Freight	333,690	14.6%	420,000	17.7%
Order entry expenses (wage incl benefits and IT)	210,000	9.2%	210,000	8.8%
General, marketing and selling expenses	425,000	18.6%	425,000	17.9%
Net income before taxes	-8,976	-0.4%	122,178	5.1%

First level variance		Second level variance		Third level variance	
Variance	FLEXIBLE budget (476920 bottles)	Planning variance	Flexible budget variance	Efficiency variance (quantity)	Rate variance (price/cost)
-977,652	23,846,000	-154,000	-823,652	-	-823,652
-880,768	21,482,883	-138,739	-742,029	-	-742,029
-96,884	2,363,117	-15,261	-81,623	-	-81,623
85,068	421,200	-	85,068	70,200	14,868
60,960	421,200	-	60,960	46,800	14,160
24,108	-	-	24,108	23,400	708
35,511	780,000	-	35,511	n/a	n/a
4,411	485,000	-	4,411	n/a	n/a
-7,400	295,000	-	-7,400	n/a	n/a
38,500	-	-	38,500	-	38,500
-86,310	417,305	-2,695	-83,615	-83,615	-
-	210,000	-	-	n/a	n/a
-	425,000	-	-	n/a	n/a
-131,154	109,612	-12,566	-118,588	n/a	n/a

1b) Comments on the variance analysis

Students need to explain the variance analysis they are performing. Some points they might raise are the following:

First level variance

1. Variance: Difference between the master budget (planned) and actual results

Second level variance

2. Flexible budget variance: Difference between flexible budget and actual results
3. Planning variance: Difference between the master budget and the flexible budget

Third level variance

4. Efficiency variance (quantity): Difference between the planned and the actual use rates per unit of output
5. Rate variance (price/cost): Difference between the planned and the actual price or cost per unit of the various cost items

Flexible budget:

6. adjusts the forecast in the master budget for the difference between planned and actual sales

1c) Reasons for the loss

Students should comment why the loss in the actual results occurred compared to the original budgets. Some issues they should address are the following:

1. The sales price of the average wine bottle sold decreased. Therefore, DV had problems covering its fixed cost that year.
2. Hiring more warehouse workers (they are seen as a fixed cost, because DV calculated more bottles with less of them)
3. Giving the warehouse workers a raise (but this was not so impactful)
 - a. **It is not** the loss of volume (=units) because the flexible budget still shows a profit (see flexible budget). Students do not get a point if they confuse this with the decrease in bottle sales price.
 - b. **It is not** the introduction of the new minivan-delivery option, because it costs less than what the company saves in freight (see third level variance).

Question 2) ABC analysis**2a-c) Exhibit 4: Activity-based costing analysis**

a) Practical capacity of carton processing	
Total cartons per year (#)	128,370
Cartons that need repacking	60%
Time factor for repacking	3
Standard cartons per year	51,348
Carton equivalents (repacked)	231,066
Total carton equivalents per year (#)	282,414
Capacity cost of warehousing	
Warehouse workers	482,160
Warehouse expenses	489,411
Cost of warehousing	971,571
Cost rate of processing 1 standard carton (EUR)	3.44
Cost rate of processing 1 repacked carton (EUR)	10.32
b) Capacity cost of customer order	
Order entry expenses (wage incl benefits and IT)	210,000
Practical capacity	6,000
Cost of order entry per h	35.00
Processing a phone order (h)	0.20
Validation of an order by phone or online (h)	0.03
Cost rate of online order (EUR)	1.05
Cost rate of phone order (EUR)	8.05
c) Capacity cost of delivery with minivan	
Minivan driver	24,108
Minivan (incl. operating costs)	38,500
Total cost of delivery with minivan	62,608
Minivan-deliveries (#)	2,000
Practical capacity	1,500
Cost rate per delivery (EUR)	31.30
Cost rate per hour of delivery (EUR)	41.74

2d) Exhibit 5: Customer Profitability Analysis

Student exhibit

	CUSTOMER		
	Small donor sends a single bottle	Collector buys regularly	Restaurant buys regularly
Somehow similar orders per year	42,100	10,625	1,920
Invoice amount (EUR)	75	600	4,320
Discount on invoice amount (%)	0%	4%	8%
No. of bottles in order (#)	1	12	96
No. of cartons in order (#)	1	2	16
Order placement	online	phone	online
Repacking of cartons	yes	no	no
Shipment	parcel service	Minivan	Minivan

Solution

	CUSTOMER		
	Small donor sends a single bottle	Collector buys regularly	Restaurant buys regularly
Invoice amount (EUR)	75.00	600.00	4,320.00
Cost of goods sold	66.75	534.00	3,844.80
Gross margin	8.25	66.00	475.20
Discount per customer	-	24.00	345.60
Order placement	1.05	8.05	1.05
Processing of cartons	10.32	6.88	55.04
Shipment	-	31.30	31.30
Contribution margin (EUR)	-3.12	-4.23	42.20
Contribution margin (%)	-4.2%	-0.7%	1.0%

Solution (with assumed numbers)

	CUSTOMER		
	Small donor sends a single bottle	Collector buys regularly	Restaurant buys regularly
Discount per customer	75.00	600.00	4,320.00
Cost of goods sold	66.75	534.00	3,844.80
Gross margin	8.25	66.00	475.20
Discount per customer	-	24.00	345.60
Order placement	1.00	8.00	1.00
Processing of cartons	12.00	8.00	64.00
Shipment	-	30.00	30.00
Contribution margin (EUR)	-4.75	-4.00	34.60
Contribution margin (%)	-6.3%	-0.7%	0.8%

5. IMPROVEMENTS

a) Students should name the issues they see. Here are some suggestions (not exhaustive, students may construct their own arguments):

1. **Sales:** there is no detailed information on the order entry costs. How much is IT, how much is personnel, etc.?
2. **Sales:** The order entry department has 4 employees, which is a practical capacity of 6,000 hours. But given 90,000 orders (5% by phone), this adds up to 40% unused capacity (slack). Employees need to be redeployed.
3. **Sales:** Collector customers are interested in the technical data of the wines. This information can be put onto the website, it is not necessary to spend the operators' time on that.
4. **Sales:** The extra cost of the phone order of the "typical" collector customers makes over 10% of the gross margin. DV should rethink the discounts and offer less to the ones ordering by phone than to the ones ordering online.
5. **Sales:** Pricing could be reconsidered in general. Why not charge donors for greeting cards, or make better offers for cases of 6 bottles?
6. **Delivery:** Danny saves more money than he costs. But that is not sufficient. He seems to offer 25% big deliveries to restaurants that save "typically" 16 cartons (=112 EUR less ~30 EUR), and 75% small deliveries that lose money as he just delivers 2 cartons (would cost 14 EUR to ship them commercially). While it is not possible to make only restaurant deliveries (=1,920 per year vs. 2,000 deliveries of Danny's capacity), Danny should at least try to change the delivery mix, assuming that the deliveries still take a comparable amount of time each.
7. **Delivery:** Changing the delivery mix towards restaurants only might result in longer routes with fewer deliveries (and/or unused capacity). In that case, the cost driver rate for one delivery might increase because DV allocates the same cost on fewer deliveries. But DV wants to keep the rate stable to avoid a spiral of fewer deliveries at increasing prices. The use of time-driven ABC (how

long does one delivery take?) would therefore be preferable to traditional ABC (what is the average cost of making one delivery).

8. **Delivery:** Danny estimates that every delivery takes 45 minutes (2,000 deliveries at 1,500 h capacity). That is not very likely, especially not when the delivery mix changes and Danny only goes to restaurants.
9. **Delivery:** If it turns out that there are enough profitable deliveries, DV might consider extending capacity and hiring a second driver (redeployed from order entry?).
10. **Warehouse:** The master budget builds on the experience of the past years, so the warehouse staff should be able to handle the repacking. It is very surprising the 2 new people got hired, even though DV handled fewer bottles than expected. If it takes three times the effort to repack, a process re-engineering should be considered.
11. **Warehouse:** For the process re-engineering, Penny Processor should calculate the breakeven point at which 18 workers can handle the planned load. That way, they know the benchmark of how many seconds have to be saved per carton.

b) Penny's comments

- The costs according to ABC are not full costs because the cost of administration has not been allocated. This is quite arbitrary because there are (most of the time) no direct relations to operations.
- Also, traditional ABC includes the cost of unused capacity. These, however, should be allocated to the person who decided to employ this (too large) capacity. Don might say that DV should only deliver to restaurants with the minivan. But that might be a mistake, because what happens when this leads to unused capacity and Danny just sits around? As long as Danny has free capacity, he should be delivering as long as cost of gas < amount saved for freight.
- The Management Control System needs to focus on the areas that are most relevant, not the ones that are easy to measure. For instance, the profit from Danny's deliveries (cost saved minus cost incurred) is about 0.1% of DV's gross margin. Penny should not spend too much of her time on that.
- Instead of increasing the efficiency of the existing business model, DV could spend time re-engineer its business model. For instance, could DV not only be a platform for trading wines, and the vintners dispatch directly to the customers?
- There have been no analyses of the cost of capital for DV. Since there are no interests paid, DV might consider financing some of its operations with bank loans to leverage returns to Don Vivant.
- There was no discussion of the marketing strategy of DV. What would be ways to increase sales?
- If there are customers that are not profitable (e.g., the small donors), DV should first try to streamline their own operations to make them profitable. If that does not succeed, DV needs to direct these customers to other channels.
- What about product profitability? Is the pricing of 11% of the sales price a realistic markup for the most expensive wine bottles, or might DV earn more money by selling more bottles of cheaper wines?

REFERENCES:

- Atkinson, A. A., Kaplan, R. S., Matsumura, E. M., & Young, S. M., Management Accounting, International Edition, Pearson, New Jersey, NJ, 2011.
- Bushong, J. G., Talbott, J. C., & Cornell, D. W., "Instructional case - Activity-based Costing incorporating both activity and product costing", Accounting Education: An International Journal, 17 (4), 2008, 385-403.
- Cooper, R., & Kaplan, R. S., "Measure costs right: make the right decision", Harvard Business Review, 66 (5), 1988, 96-103.
- , & ---, "Profit priorities from Activity-based Costing", Harvard Business Review, 69 (3), 1991, 130-135.
- , & ---, "Activity-Based systems: measuring the costs of resource usage", Accounting Horizons, 6 (3), 1992, 1-13.
- Guidling, C., & McManus, L., "The incidence, perceived merit and antecedents of customer accounting: an exploratory note", Accounting, Organizations & Society, 27 (1/2), 2002, 45-59.
- Johnson, H., & Kaplan, R. S., Relevance Lost. The Rise and Fall of Management Accounting, Harvard Business Press, Boston, MA, 1987.
- Kaplan, R. S., Midwest Office Products, Harvard Business School, Cambridge, MA, 2005.
- , & Anderson, S. R., "Time-driven Activity-based Costing", Harvard Business Review, 82 (11), 2004, 131-138.
- , & ---, Time-driven Activity-based Costing: a simpler and more powerful path to higher profits, Harvard Business School Press, Boston, MA, 2007.
- , & Atkinson, A. A., Advanced Management Accounting, Prentice Hall, New Jersey, NJ, 1989.
- , & Cooper, R., Cost and Effect: Using Integrated Cost Systems to Drive Profitability, Harvard Business School Press, Boston, MA, 1998.
- Lightbody, M., "Teaching Note - Playing factory: active-based learning in cost and management accounting", Accounting Education, 6 (3), 1997, 255-262.
- Lueg, R., Value-based Management: Empirical Evidence on its Determinants and Performance Effects, WHU Otto Beisheim School of Management, Vallendar, 2008.
- , "Value-based Management – Antecedents and performance effects", 284-285. In: K. Pantz, Summa Cum Laude 2008: Wirtschaftswissenschaften, Roter Fleck Verlag Darmstadt, 2010, 284-285.
- , Clemmensen, S. N., & Pedersen, M. M., "The role of corporate sustainability in a low-cost business model – A case study in the Scandinavian fashion industry", Business Strategy and the Environment (forthcoming), 2013.
- , & Lu, S., "Improving efficiency in budgeting - An interventionist approach to spreadsheet accuracy testing", Problems and Perspectives in Management, 10 (1), 2012, 32-41.
- , & Lu, S., "How to improve efficiency in budgeting - The case of business intelligence in SMEs", European Journal of Management, 13 (2), 2013, 109-120.

- , & Lueg, K., "The Balanced Scorecard and different Business Models in the textile industry - A case study", International Journal of Strategic Management, 13 (2), 2013, 61-66.
- , Nedergaard, L., & Svendgaard, S., "The use of intellectual capital as a competitive tool: a Danish case study", International Journal of Management, 30 (2), 2013, 217-231.
- Lueg, R., & Nørreklit, H., "Performance measurement systems – Beyond generic strategic actions", 342-359. In: F. Mitchell, H. Nørreklit and M. Jakobsen, The Routledge Companion to Cost Management, Routledge, New York, NY, 2012, 342-359.
- McManus, L., & Guilding, C., "Exploring the potential of customer accounting: a synthesis of the accounting and marketing literatures", Journal of Marketing Management, 24 (7-8), 2008, 771-795.
- Roslender, R., & Wilson, R. M. S., "The marketing / accounting synergy: a final word but certainly not the last word", Journal of Marketing Management, 24 (7-8), 2008, 865-876.