

QUALITY AND TIME-RELATED INDICATORS IN INCENTIVE PLANS - Study case -

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ABSTRACT

Key performance indicators (KPIs) relating to quality issues and turnaround time have become an integral part of incentive systems. The data often serves beforehand for planning purposes in costing systems, e.g., for Activity-based Costing (ABC). The case elaborates on related transfer pricing issues across production departments. This leads to discussion about the incentive structure of department heads, who are overly financially incentivized, and start showing dysfunctional behavior that is not in the interest of the owners. Students can use the open questions to discuss improvements.

Keywords: Activity-based costing; transfer pricing; teaching notes; target setting; incentives.

1 INTRODUCTION

FPC is a family-owned construction firm that manufactures and installs customized fireplaces for hotel lobbies and upscale housing. Its owners pursue a strategy of long-term profitability that has a focus on lasting customer relationships, operational excellence, and high quality of their work.

2 ACTIVITY-BASED COSTING

FPC offers basic fireplaces that are relatively easy to install as freestanding installations. In addition, FPC offers to build in these fireplaces and link them to the interior of the house with any type of craftsmanship. These might include complex constructions, such as shaping marble or granite, refurbishing antique fireplaces, building book-walls, pouring fireplaces into concrete surfaces, or even installing a fireplace in the wall between two rooms. Much planning and expertise is required to provide lasting fireplace solutions, because the insulation must withstand substantial heat, and FPC has to give extensive warranty against heat damage.

As a result, FPC charges high prices for such installations. Customers generally expect a precise bid for their fireplace. FPC relies on its hybrid Activity-based Costing (ABC) system to make these bids, since this system prevents over-/underpricing compared to a pure absorption costing system. Overpricing would lead to losing bids, and underpricing would lead to winning unprofitable bids (where FPC's employees would try to compromise on quality). The following information is provided for FPC's ABC system:

ACTIVITY [units]	COST	POOL	ACTIVITY (=allocation basis)	MEASURE	PLANNED ACTIVITY [annual]
Support for direct manufacturing labor [hrs.]			Labor hours (direct)		30,625
Diverse facility-sustaining cost [hrs.]			Labor hours (direct)		18,125
Design support [hrs.]			Labor hours (custom design)		10,000
Price bids [#]			Price bids (number)		4,125

OVERHEAD COSTS [EUR]	ACTIVITY COST POOLS				TOTAL [EUR]
	Support for direct manufacturing labor [hrs.]	Diverse facility-sustaining cost [hrs.]	Design support [hrs.]	Price bids [#]	
Indirect labor cost	500,000	500,000	700,000	300,000	2,000,000
Depreciation	525,000	450,000	450,000	75,000	1,500,000
Rent	150,000	250,000	250,000	350,000	1,000,000
Other overhead	50,000	250,000	100,000	100,000	500,000
TOTAL	1,225,000	1,450,000	1,500,000	825,000	5,000,000

The direct manufacturing labor rate is 45 EUR per hour. For the upcoming year, FPC estimates to complete around 34 orders for complex build-in fireplaces, which need an average of 250 hours of Design Support. In addition, FPC expects approximately 300 orders for freestanding fireplaces, which only need 5 hours of Design Support.

Required:

- 1) Compute the cost driver rate of each cost pool.
- 2) The historical Splendor Hotel wishes to replace its carbon-emitting fireplaces with more environment-friendly solutions while preserving the original, antique designs. 8 of their fireplace-refurbishments would include a complex design, and 2 of them a standard design. Direct cost of material is 152,925 EUR, and direct labor are estimated to be 275 hours in total. FPC makes only one price bid for the 10 fireplaces, so the price bid is charged only once. Calculate the cost of this order.
- 3) FPC' has used the exact information from requirement 2) to make a bid. The managing director of Splendor Hotel is confused by the ABC-based bid. She calls the office of FPC and asks: *"When we get bids, we tend to see that companies use absorption costing. They charge us for the material they provide and for the direct labor. Overhead costs are added as a percentage of direct labor. Why is your bid more complex? Isn't this a worse deal for me?"* Provide 2 arguments why the bid based on the ABC system will get Splendor Hotel a more realistic price for their order than an absorption costing system would.

3 TRANSFER PRICING

FPC has two production departments that build their fireplaces. The BURNER department builds the inside fireplace technology ('burners'). The department SHELL builds the outside corpus around these burners. FPC employs transfer pricing and runs the departments as profit centers. Heads of departments behave accordingly and take actions that maximize the profitability of their own departments. To produce a burner, the department BURNER has variable cost of 5,000 EUR. To further process this burner into a fireplace, the department SHELL incurs variable cost of 3,000 EUR. The outside market would buy an FPC burner for 7,500 EUR, and a completed FPC fireplace for 16,000 EUR.

Required:

- 4) Assuming FPC would like to maximize its contribution margin, should it sell the burners, or continue processing them and sell them as completed fireplaces?
- 5) Assume that BURNER could transfer its burners at 130% of variable cost to SHELL, or sell them to the outside market. Elaborate if the actions of the department heads will be in the best interest of FPC.
- 6) Now assume that BURNER could transfer its burners at market price to SHELL, or sell them to the outside market. Elaborate if the actions of the department heads will be in the best interest of FPC.

4 INCENTIVE SYSTEMS

The owners of FPC thought they had solved the issue of self-serving actions among BURNER and SHELL after introducing a new transfer pricing system. As it turned out, department heads of BURNER and SHELL started gaming quality standards and delivery times in order to manage contribution margins and increase their bonuses. Caren F. Olsen, the CFO of FPC, revised the bonus plans and introduced additional indicators. She wanted to encourage department heads to focus on areas that mattered to customers and FPC's profits, namely rework costs, and on-time deliveries (OTDs). Caren now offers a base bonus of 3% of semi-annual operative income. She adjusts this base bonus as follows:

- If rework costs exceed 1.5% of operating income, the bonus is reduced by the excess amount (that means there is no adjustment at all if rework cost stay below this percentage).
- Caren pays an extra 5,000 EUR if more than 98% of deliveries are on time. If 96-98% of deliveries are on time, she still pays 2,000 EUR.
- Bonuses cannot be negative, and they are not carried forward.

Last year, the department heads of BURNER and SHELL earned an annual bonus of 23,223 EUR and 24,410 EUR, respectively.

	BURNER		SHELL	
Positions [in EUR and in %]	1st semester	2nd semester	1st semester	2nd semester
Revenues	2,895,654	3,121,246	3,179,248	3,345,214
Operating income	405,392	405,762	445,095	535,234
On-time delivery	94.0%	97.0%	99.0%	95.0%
Rework costs	9,729	10,550	5,341	7,493

Required:

- 7) Provide two conceptual arguments why Caren's broader bonus plan could be better for FPC than the purely income-based plan.
- 8) Compute the bonuses for the heads of the department BURNER and SHELL per semester, per year, and in comparison to last year.
- 9) Elaborate on the effect of the changed bonus plan (analysis). Has Caren achieved all changes in the departments heads' behavior that she wanted (implications)? Make two suggestions how she can further improve the bonus plan for the next quarter (conclusion).

5 DISCUSSION

Solutions and times are suggestions only. Their numbering corresponds to the numbering of the requirements above.

SOLUTION 1 (APPROX. 12 MINUTES)

Students need to divide the cost pools by the allocation bases to get the cost driver rates.

ACTIVITY COST POOLS	Cost [EUR]	Allocation Base [units: see left]	Cost driver rate [in EUR per cost driver unit]
Support for direct manufacturing labor [hrs.]	1,225,000	30,625	40.00
Diverse facility-sustaining cost [hrs.]	1,450,000	18,125	80.00
Design support [hrs.]	1,500,000	10,000	150.00
Price bids [#]	825,000	4,125	200.00

SOLUTION 2 (APPROX. 16 MINUTES)

FPC will make its bid based on the following costing information:

COST TYPE	EUR
Direct material [EUR] (see text)	152,925
Direct labor [hrs.] = 275 hrs x 45 EUR	12,375
Support for direct manufacturing labor [hrs.] = 275 hrs x 40 EUR	11,000
Price bid [#] = 1 bid x 200 EUR	200
<i>Design support [hrs.]</i>	
Complex design = 8 fireplaces x 250 hrs x 150 EUR	300,000
Simple design = 2 fireplaces x 5 hrs x 150 EUR	1,500
Diverse facility-sustaining cost [hrs.] = 275 hrs x 80 EUR	22,000
Total cost	500,000

SOLUTION 3 (APPROX. 12 MINUTES)

Analysis: A pure absorption costing system would allocate all overheads based on direct labor or the cost of direct material. FPC offers two fundamentally different fireplace designs (standard and customization) that use the overhead resources very differently, and irrespective of the cost of direct material or direct labor. For this reason, FPC differentiates between different cost pools, and uses different cost drivers for them. A pure absorption costing system would overcost the simple designs, and FPC would price itself out of the market. And it would undercost the complex designs, leading to winning unprofitable bids. In the latter case, FPC employees would probably try to compromise on quality, which might cause litigation by customers and decreasing promoter scores among them.

Implications: Students may argue that using an ABC system for bidding carries several advantages for Splendor hotel. They should make two of the following arguments:

- If FPC used an absorption costing system, Splendor Hotel would overpay for the standard fireplaces, as too many overheads are being allocated to these orders (excellent students provide numbers what the cost driver rate would be). This is not in the interest of Splendor Hotel.
- If FPC used an absorption costing system, Splendor Hotel would underpay for the customized fireplaces, as too few overheads would be allocated to these orders. This might seem a good deal for Splendor Hotel. However, FPC would probably realize along the way that it is over budget. Typical reaction of contractors would be to compromise on quality, or to cancel the job to cut losses. None of this would be in the interest of Splendor Hotel.

- With the detailed bid, Splendor Hotel has it easier to understand what drives the cost. With 300,000 EUR spent on design only for the complex 8 fireplaces, Splendor could save a lot if they opted for one or two more simple solutions without getting fewer fireplaces refurbished.
- Splendor Hotel can see that the price bidding is calculated with ABC, so they are charged only once for a bid of 10 fireplaces. An absorption costing system would add the overhead of FPC's back office per direct labor (or per cost of a fireplace), and that would likely be more expensive for Splendor Hotel.

SOLUTION 4 (APPROX. 10 MINUTES)

Students have two alternative ways of solving this task.

(A) is to compare the unit contribution margins (cm) of selling or further processing.

(B) is to make an incremental profit analysis.

Students should explain concerning (A) that FPC will make a cm of 2,500 EUR, while further processing would increase this margin to 8,000 EUR. Students should explain concerning (B) that the revenue per unit will increase by 8,500 EUR while the variable cost per unit only increase by 3,000 EUR, leading to an incremental cm of 5,500 EUR. Students should state in both approaches (A) and (B) that it is clearly preferable for FPC to process the product until it is fully finished.

	(A) Comparison contributions margins		(B) Incremental contribution margin analysis	
Position <i>[all in EUR]</i>	Sell vs process further	Increments	
Revenue	7,500	16,000	8,500	<i>Revenue stage 2 minus stage 1</i>
Variable cost burner	5,000	5,000	3,000	<i>Variable costs stage 2 minus stage 1</i>
Variable cost corpus	-	3,000		
Contribution margin	2,500	8,000	5,500	<i>Incremental contribution margin</i>

SOLUTION 5 AND 6 (APPROX. 15 MINUTES EACH)

Students should create four scenarios where the burners are sold or further processed under cost-based transfer prices and under market-based transfer prices.

<i>Position [all in EUR]</i>	Transfer price at % of variable costs		Transfer price at market price	
	(1) Sell in stage 1	(2) Sell in stage 2	(3) Sell in stage 1	(4) Sell in stage 2
BURNER department				
Department revenues	7,500.00	6,500.00	7,500.00	7,500.00
Department variable costs	5,000.00	5,000.00	5,000.00	5,000.00
Department contribution margin	2,500.00	1,500.00	2,500.00	2,500.00
SHELL department				
Department revenues	-	16,000.00	-	16,000.00
Transferred-in costs (=revenue <i>BURNER</i> department)	-	6,500.00	-	7,500.00
Department variable costs	-	3,000.00	-	3,000.00
Department contribution margin	-	6,500.00	-	5,500.00
Total contribution margin per unit	2,500.00	8,000.00	2,500.00	8,000.00

Students should notice the following:

Analysis: A comparison of scenario (1) and (2) – respectively (3) and (4) – yield the same results as the previous calculations. They show that processing the burners to finished fireplaces is more profitable for FPC than selling the burners after stage 1.

Implications:

- Under cost-based transfer pricing, the SHELL department will prefer finishing the product in stage 2 (scenario 2) as scenario (1) offers them no contribution margin at all. This behavior is in line with FPC's overall interest of maximizing contribution margins.
- This remains true under market-based transfer pricing: The SHELL department will prefer finishing the product in stage 2 (scenario 4) as scenario (3) offers them no contribution margin at all. This behavior is in line with FPC's overall interest of maximizing contribution margins.
- However – under cost-based transfer pricing – the BURNER department will object to finishing the product in stage 2 (scenario 2) as scenario (1) offers a higher contribution margin per unit (2,500 EUR instead of 1,500 EUR). BURNERS behavior is dysfunctional as it opposes FPC's overall interest of maximizing contribution margins.
- A solution to the problem is offered in scenario (4) where BURNER is allowed to charge the market-based transfer price. BURNER receives a contribution margin per unit of 2,500 EUR whether it sells to the outside market or to the SHELL department. This makes BURNER indifferent. SHELL will now ask to buy all burners.

Conclusion: Scenario (4) is the only one that ensures that both departments will act in the full interest of FPC's profit maximization goal.

SOLUTION 7 (APPROX. 10 MINUTES)

Caren's incentive plan should lead to more aligned interests/behavior because it draws attention to tradeoffs that managers must make, and the indicators she proposes add a future-oriented perspective to the existing lagging indicator of operating income. In particular:

- **TRADEOFFS:** The CFO has noticed that department heads sacrifice quality and OTDs in order to increase operating income. Students may give examples. For instance, heads of departments might try to sell more units faster (also to the other department) while compromising on quality. They might both make sales they cannot deliver, or BURNER might save on their distribution channels, causing late deliveries.
- **FUTURE ORIENTATION:** This problem occurs because operating income is a historical measure that is lagged. Caren tries to counter this behavior by adding leading indicators that predict future income, namely OTDs and reduction of rework cost. This might improve customer loyalty and net promoter scores and thereby secure future business.

SOLUTION 8 (APPROX. 15 MINUTES)

Students should use the algorithm provided in the text and show the following data:

	BURNER		SHELL	
Positions [EUR]	<i>1st semester</i>	<i>2nd semester</i>	<i>1st semester</i>	<i>2nd semester</i>
Operating income	12,161	12,172	13,353	16,057
On-time delivery	-	2,000	5,000	-
Rework costs	- 3,649	- 4,463	-	-
Semester bonus	8,513	9,709	18,353	16,057
Total bonus	18,223		34,410	
Bonus last year	23,223		24,410	
<i>Difference</i>	- 5,000		10,000	

SOLUTION 9 (APPROX. 15 MINUTES)

Analysis (students should present numbers where available):

The head of department of BURNER will receive a lower bonus than last year. The profitability of BURNER has decreased into the 2nd semester (students should argue with Return on Sales [RoS]) while rework costs have slightly increased. However, OTDs have improved a lot. The head of department of SHELL will receive a higher bonus than last year. The profitability of SHELL (RoS) has much improved into the 2nd semester. This offsets the increase in rework cost and the decrease in OTDs.

Implications (students should present numbers where available):

At first sight, it might look like Caren's plan did not pan out. The decreased (increased) profitability of BURNER (SHELL) must be related to price decreases (increases) in the market, extraordinary items, or increases (reduction) in other cost than rework. The development of the bonuses is thus unrelated to the added indicators: at least for SHELL, the worse performance still translated into a higher bonus, while the improvements at BURNER are unrewarded. It might seem that Caren's revision of the bonus plan did not trigger the desired behavior: Only the BURNER department improved on the OTD dimension, and its manager might be frustrated that the bonus decreased anyway.

However, this is likely to be a temporary state: the head of SHELL will understand that there are upper limits to profitability in this industry, and that low OTDs and higher rework cost will eventually affect bonuses in a negative way. This insight should motivate both managers to improve operative performance.

Conclusion (students should present numbers where available): Students should conclude that the bonus plan could need fine-tuning. They could elaborate on two areas:

- Decrease the weight of the bases bonus, and thereby the dependency on lagged, financial data.
- Increase the size of the OTD bonus.
- Adjust the benchmark values for OTDs.
- Increase the weight of the rework bonus (e.g., with a leverage so it counts double)
- Adjust the benchmark values rework cost.
- Allow negative bonuses and/or bonus banks over several years.
- Introduce base targets for expected minimum performance.
- Instead of persistent percentage points every semester, Caren could introduce relative performance measures that benchmarks other department heads or direct competitors.
- Instead of persistent percentage points every semester, Caren could reward incremental/continuous improvements from the last period to the next (special issue here: dealing with 'volatility drag').
- Caren could substitute/complement bonus cash payments with non-cash perquisites (awards, good parking spaces etc.).

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