THE ALIGNMENT PUZZLE WHITE PAPER

Deep dive:

The history and development of Financial Accounting

1 What does financial accounting have to do with alignment?

Is it worthwhile to delve into the key backgrounds of financial accounting when you're working on alignment issues? Absolutely, because accounting concepts exert an enormous—yet not always justifiable—influence on management science and control. The financial administration is the cornerstone of the management information system, and some organizations appear to be managed primarily through the ledger. That can lead to siloing and many alignment problems. After all, the bookkeeper views the organization through a different lens than the manager who wants to streamline processes.

Classical thinking from cost centers and cost allocations quickly leads to a rigid functional organization in which departmental metrics dominate. With all those islands and local interests, alignment is often difficult.

Those administrative principles and methods were originally intended for something quite different. Over time, however, they have been reshaped—or distorted—into widely used management methods.

That's why it's useful to know where those methods came from. Why were they developed? For what purpose—and especially: for what purpose not? What are they suitable for, and what are they not?

2 The beginnings of accounting: a fifteenth-century monk from Venice

To find the origins we have to travel back in time more than five centuries, to the Italian Franciscan friar Luca Bartolomeo de Pacioli (1445–1517). He is known as the spiritual father of bookkeeping and accountancy and was also the mathematics teacher of Leonardo da Vinci (1452–1519).

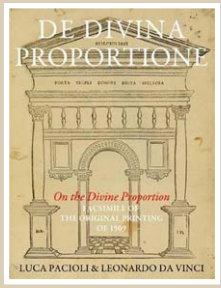
Luca de Pacioli on an Italian postage stamp, 1994

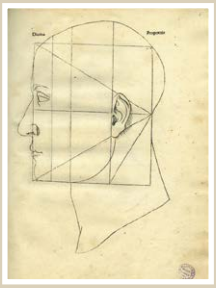
2.1 Double-entry bookkeeping

In 1494, Brother Pacioli published the book Summa de Arithmetica Geometria. Strictly speaking it was a mathematics textbook, but it also discussed the method of double-entry bookkeeping. That combination of topics may seem a little odd today, but at the time it wasn't unusual. Pacioli simply wrote a study book for his students containing everything they needed to learn.

Luca Pacioli & Leonardo Da Vinci

In 1509, Pacioli wrote *De Divina Proportione* about the golden ratio and its application in art, nature, and architecture. Leonardo da Vinci contributed 59 drawings for it.





2.2 Brilliant in its simplicity

The basic idea of double-entry bookkeeping is elegant and at the same time brilliant in its simplicity. On the one hand we ask, "What do we have as resources or assets in our enterprise?" (debit) and, on the other hand, "Where did they come from, or what are the sources that enabled us to acquire those assets?" (credit). And those two are always perfectly in balance. Many events occur—such as purchasing goods, selling products, and paying employees—that affect the balance sheet in different ways, but debit and credit remain in equilibrium.

An example. A Venetian entrepreneur starts a business to trade with Alexandria. He has 100 ducats in his purse and borrows another 600 ducats from Bardi in Florence. He thus starts with 700 ducats in his purse (assets), equity of 100 ducats, and a liability to Bardi of 600 ducats. He then buys a ship for 500 ducats, leaving 200 ducats in cash to buy merchandise. The assets still total 700 ducats.

The financial balance sheet

At the start

Activa		Passiva	
Cash	700	Own assets	100
		Debt to Bardi	600
	700		**700**

After the ship has been purchased

Activa		Passiva	
Cash	200	Own assets	100
Ship	500	Debt to Bardi	600
	700		**700**

During the first voyage the entrepreneur buys goods in Alexandria for 200 ducats—cash turns into goods, the balance sheet still holds. On the return trip to Venice his ship is damaged and its value falls from 500 to 400 ducats.

Fortunately, trade is good in Venice and he can sell the goods he bought in Alexandria for 200 ducats for 400 ducats. He therefore loses 100 ducats due to the damage to the boat, but gains 200 ducats through trade. On balance his equity rises by 100. The balance-sheet total goes to 800, on both sides. The balance sheet is always in balance.

The financial balance sheet

After goods have been purchased in Alexandria

Activa		Passiva	
Goods	200	Own assets	100
Ship	500	Debt to Bardi	600
	700		**700**

At the end of the first voyage

Activa		Passiva	
Cash	400	Own assets	200
Ship	400	Debt to Bardi	600
	800		**800**

2.3 Long-lasting friendships

Brother Pacioli insisted on calculating profit and the composition of equity each year and on closing the books neatly—especially if you are working with others. "Regular bookkeeping leads to long-lasting friendships," he taught in all his wisdom.

Expeditions such as a voyage to Alexandria or even farther—to the Far East via the Silk Road—could take years in the fifteenth century. The enterprise's profit could only be calculated at the end of the expedition, when the ship had returned safely to Venice and everything had been converted into cash. Only then could the enterprise be fully wound up: goods, ships, and camels were sold, employees were paid, and loans were repaid.

Only when all assets had been converted back into cash could the entrepreneur compare the number of ducats in his purse with the number of ducats with which he had started his enterprise, and thus calculate the profit.

2.4 The only thing that counts is real money; the rest is guesswork

But such a complete winding-up of the enterprise was rare. Ships and camels usually remained in the same entrepreneur's possession for a long time. In addition, an entrepreneur could plan several voyages concurrently that started and ended at different times. In short, enterprises evolved from projects into continuously operating businesses that in principle had no end.

If you no longer have a clear beginning and end to an enterprise, it becomes harder to report regularly to financiers. You no longer have an end point with cash in the purse—the ultimate economic truth. For regular reporting you will have to estimate the value of the assets and the profit at the end of a reporting period. And that's where it gets difficult. What is a ship worth after ten thousand nautical miles and several storms? What is the value of the purchased goods on the

Venetian market after a few months? No one can say for certain until they are actually sold on the open market.

And this is only a simple example. How do you deal with wages that will have to be paid to the sailors later? What about goods that are partially damaged? What about the risk of shipwreck, and the investments the entrepreneur has made to build a good relationship with his business partners—or the build-up of goodwill?

When calculating an annual profit and assessing the enterprise's value at a specific moment—such as when an expedition was still under way—many assumptions and interpretations come into play, some of which are very hard to determine. This is still true today in every financial accounting system.

2.5 The Dutch East India Company (VOC)

Over the years, the Italian method of double-entry bookkeeping evolved into modern accounting principles. The method was adopted in the seventeenth century by the Dutch East India Company (VOC). Founded in 1602 in Amsterdam, it was the first multinational in history and also the first company to issue bonds and shares.

The method developed further with the discipline of cost accounting during the Industrial Revolution. Factories needed methods to value products at various stages of the production process.

The rise of stock exchanges in the centuries that followed required more formalization and regulation, giving financial accounting a more prominent position. People who did not know each other could suddenly find themselves in an investor-manager relationship. Formal ways of communicating financial information became indispensable. Bookkeeping and double-entry bookkeeping grew into one of the pillars of capitalism (Riahi-Belkaoui, 2012).

3 Important accounting premises and assumptions

A crucial step in the maturation of financial accounting was taken a few years after the First World War by William Andrew Paton (1889–1991). He was a professor of accounting at the School of Business Administration at the University of Michigan and the founder of the American Accounting Association. Paton was the first to map out accounting principles systematically and to ground them in clear hypotheses and assumptions. As a result, the discipline acquired a solid theoretical foundation. Forty years later his successor Herbert Taggart praised Paton's work in the foreword to the reprint of Accounting Theory:

In 1922, a young, red-headed professor of Scotch ancestry and decidedly conservative economic and political beliefs published a pioneering and even radical book, which he called 'Accounting Theory'. [...] Much of what the writer says is still radical after 40 years.

A full discussion of William Paton's ideas falls outside the scope of this paper, but we want to mention a few key points in his work that have had a major influence not only on financial accounting but also on management accounting—and therefore on how organizations are run and on the alignment puzzle.

That is why we briefly address two fundamental accounting principles (the revenue recognition principle and the matching principle) and William Paton's hypothesis regarding value and cost.

3.1 The revenue principle and the matching principle

The revenue principle and the matching principle have a major impact on how accountants look at enterprises for external reporting. The first principle means that revenue and costs must be assigned to the correct fiscal year (or quarter or other period), and the second means that costs must be assigned to the revenue they helped to generate.

The periods to which items are allocated can be different from the periods in which the cash flows occur. Suppliers are often paid long before the revenue comes in. Customers typically pay 30 to 60 days after receiving an invoice, and obligations and provisions can be recorded far in advance. This means incoming and outgoing cash cannot be the basis for calculating revenue and profit. The real cash flows, as they occur in economic reality, are decoupled from the calculation of the annual results. They are translated into "revenue," "costs," and "value."

William A. Paton
(1889 - 1991)

Paton's accounting principles and assumptions

- Revenue recognition principle:
  Revenue must be attributed to the correct period.
- Matching principle:
  Costs must be attributed to the revenue they relate to.

Accounting assumption

- Costs convey current value:
  "*The value of any commodity or service utilized in production, passes over to the product for which the original item was expended, giving it its value*."

Source: Paton (1922), *Accounting Theory*, reprint 1962.

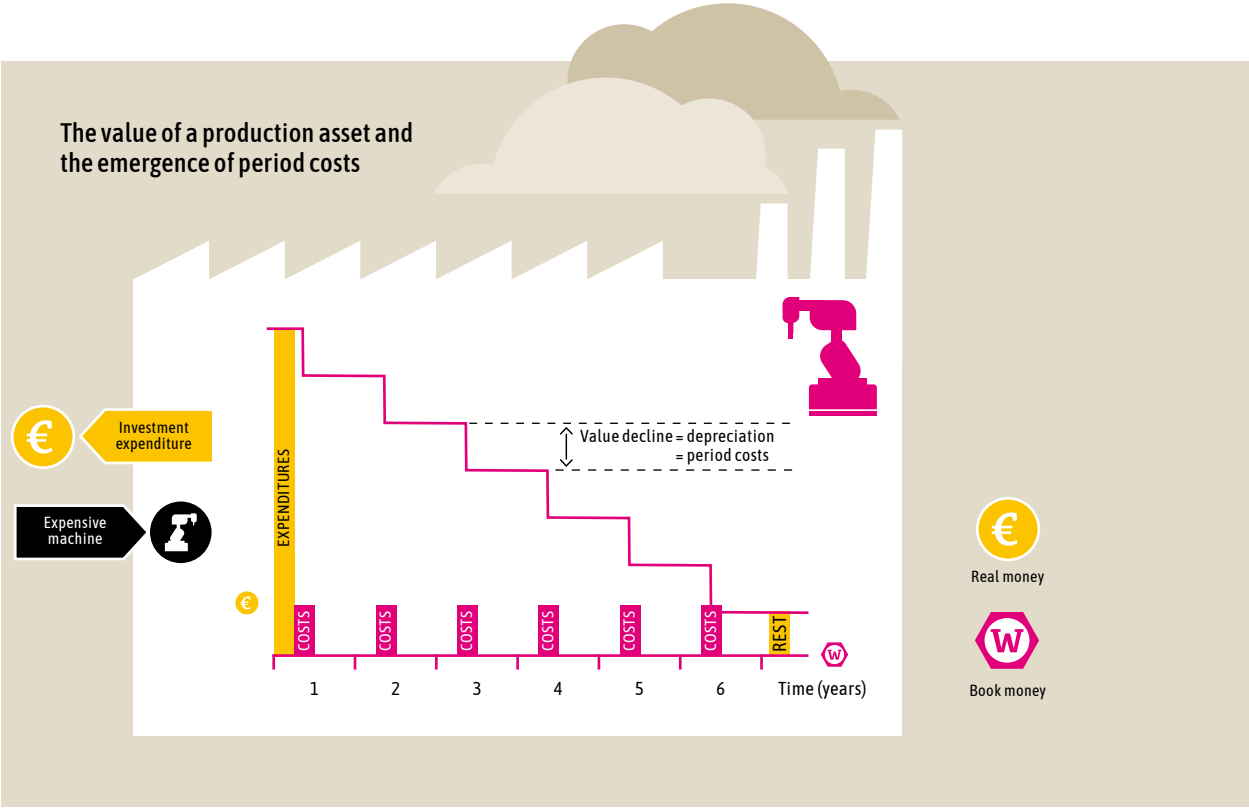
3.2 Allocating revenue to fiscal years and costs to revenue

Allocating revenue to the correct fiscal year is a separate discipline with many rules and guidelines. In most cases, revenue is recorded in the fiscal year in which the invoice is sent, even if it is only paid in the following year. But there are many exceptions. It can become especially complicated if, for example, a service is delivered that spans multiple years.

To assign costs to the right revenue, outgoing cash flows are not immediately marked as "costs," but are converted into "value" on the balance sheet.

An example. A manufacturer buys a machine for one million euros that they expect to use over the next six years. After that it will be dismantled and sold for €100,000. At the moment the machine is acquired, there is an outgoing cash flow. But such expenditures are not "costs" in the sense that they are taken to the negative side of the profit calculation. The cash outflow is converted into an asset. The company's total value on the balance sheet does not change at the moment the money is exchanged for the machine.

The costs will be incurred over time as the machine is used to generate income and its value declines. A depreciation method is used for that. The loss of value is called "depreciation," for example 15% per year. These depreciation charges are the costs that are included in the calculation of profit or loss.



You can also think of depreciation as costs that are temporarily stored as "value" and released in smaller portions over time. Put differently, value stands for deferred costs.

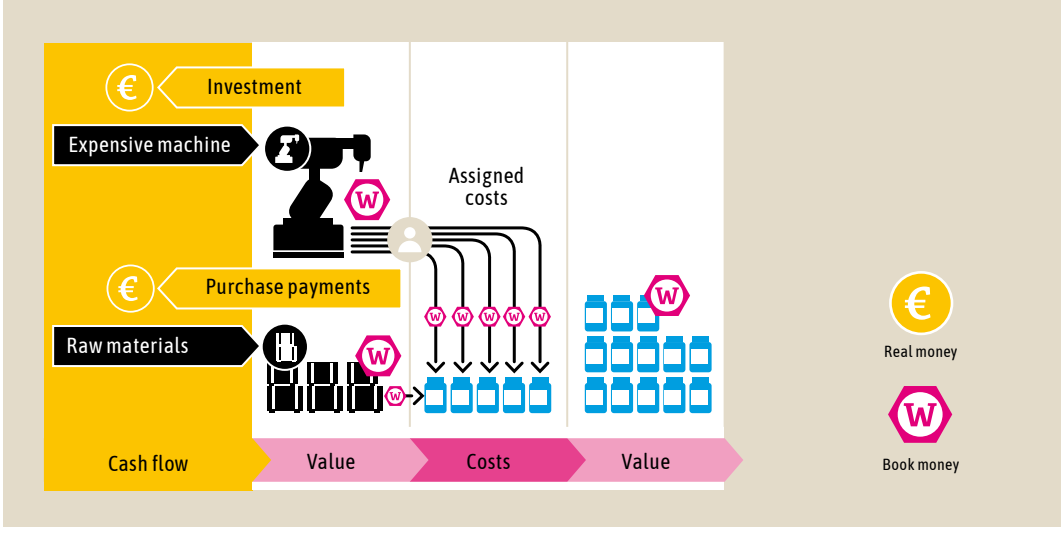
3.3 The assumptions about value and cost

For external financial reporting, the value of a company has to be calculated once a year. If you cannot use decent methods and principles to do that, it becomes a very tricky problem. Imagine a team of accountants in the early twentieth century entering a large warehouse at a production site where hundreds or thousands of different products, components, raw materials, and spare parts are stored. They then have to answer the question: what is all this worth? How do we arrive at the right figures to present external stakeholders with a financial report that is objective and reliable?

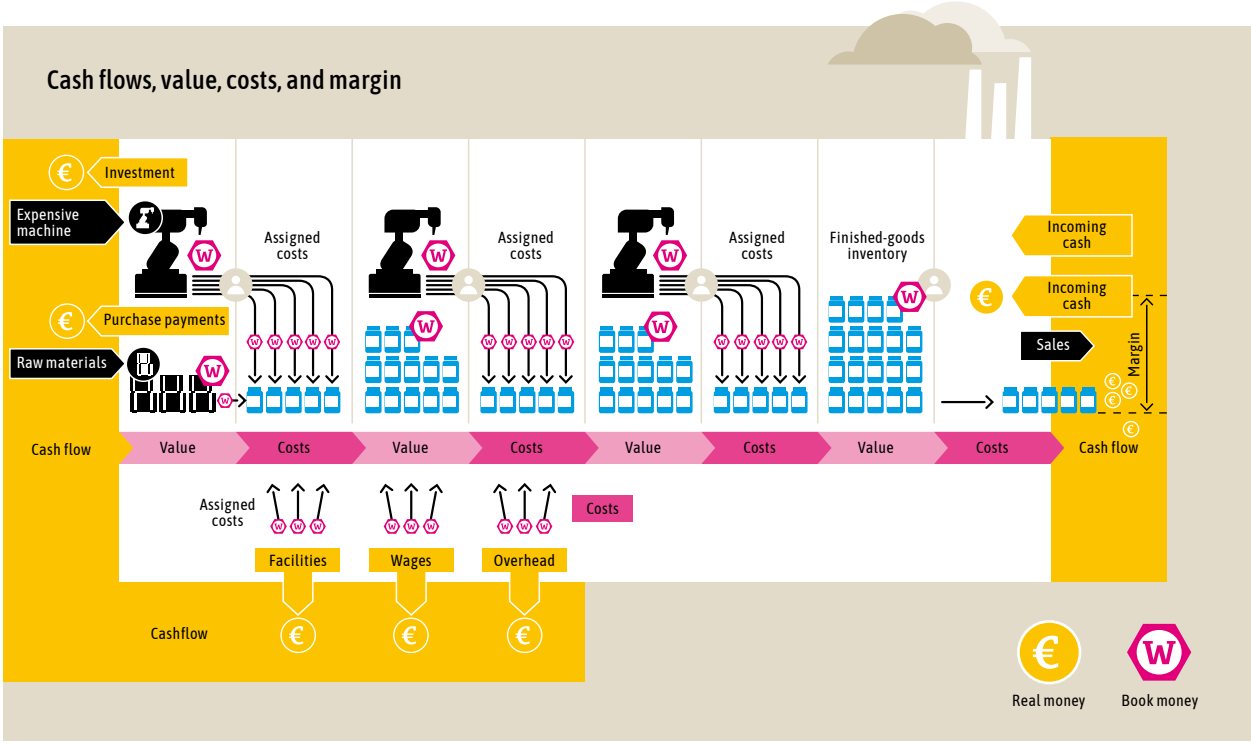
The number of debates about the right approach is countless. Some argue you should look at historical cost, others maintain that value should equal fair market value, and still others believe the value should equal the cost you would have to incur to replace the goods in the current market.

3.4 Value equals the sum of all actual costs incurred

Paton's assumption about value and cost is the most commonly used solution. It takes into account the historical costs needed to make the resources available to the enterprise. He sketches a system in which goods flow through the organization from raw material to finished product, increasing in value step by step. At each step, the value of the machines used declines, and the value of the goods rises by that amount, plus the other costs such as labor hours and overhead. According to Paton: "The value of any commodity or service utilized in production, passes over to the product for which the original item was expended, giving it its value." Put more simply: value equals the sum of all real costs incurred. One-off setbacks due to errors, inefficiency, or damage are not included.



Thus, the value of the raw materials in the warehouse equals the price paid to the supplier plus additional costs for things like transportation, ordering, handling, and overhead, because these are the costs incurred to get the materials into the factory. In the case of manufactured goods, the value of the raw materials consumed is sacrificed and thereby converted into costs for the finished product. That finished product receives its value by adding the costs of the sacrificed raw materials to the costs for labor hours and machine hours.



The core idea of converting costs into value and later converting that value back into costs for external financial reporting was not invented by William Paton himself. It was described 150 years earlier by another conservative Scot, the political economist Adam Smith, in his famous book An Inquiry into the Nature and Causes of the Wealth of Nations (Smith, 1776).

3.5 From cash flows to profit determination for external reporting

Financial accounting is also about determining a company's value and profit. So far we have discussed value. Now we turn to profit.

The issue of periodic profit determination is one of the most difficult and most disputed problems in business economics. At its core, profit equals the difference between equity (the value of all assets minus liabilities) at the beginning and at the end of a period. The following example illustrates this.

Imagine a theoretical situation of a company that consists only of an entrepreneur with a big bag of cash. This entrepreneur gets to work with various business activities and rents a building, buys equipment, hires employees, purchases raw materials, and produces finished goods. Suppose nothing is sold in the first year and all finished goods are stored. Everything goes exactly according to the entrepreneur's master plan. No unexpected events occur, there are no price changes, and the products do not become obsolete. The company also incurs no costs for marketing or sales.

Then, at the end of the first year, when all warehouses are completely full of finished goods, the total value of the company—consisting of this inventory, the equipment, the fixtures, and the substantially shrunken bag of cash—must be exactly equal to the bag of cash with which the entrepreneur started. Cash has been converted into value.

Because beginning equity equals ending equity in that period, profit is exactly zero. Profit only arises when transactions with customers occur and products are sold at a price higher than the accounting value of that product. We call that difference the margin. Profit is calculated by adding the margins of all sales orders and subtracting from that the costs that have not been assigned to products, such as the costs of delivering the goods.

3.6 Paton's model and its use for internal control and decision-making

The model described by Paton is very powerful when it comes to external reporting. But when it comes to decision-making, it is not very suitable.

All the calculations that have been done to allocate costs and revenues to periods are of very limited use for internal decision-making. And determining the value of (parts of) the organization is completely pointless for internal decision-making. In fact, by translating cash flows into other variables such as costs and value, it only becomes harder to see what really matters: the actual cash flows.

But criticism of the model came not only from internal management or management accounting; there was also criticism from financial accounting itself. We discuss this in the following paragraphs.

4 Critique of financial accounting

4.1 Doubts about assumptions, rise of new methods

Even though financial accounting is a mature field, surrounded by regulations and literature, that does not mean that calculating a company's profit and value yields indisputable numbers. This is due mainly to the matching principle, in which outgoing cash flows are allocated to periods, products, or projects via the concept of "costs."

The assumptions that must be made to calculate annual depreciation—such as the useful life of equipment and its residual value—have, in recent decades, increasingly diverged from reality. This means the book value of assets can deviate greatly from their value in the open market. As organizations faced increasing uncertainty and market dynamism, the errors in the assumptions underlying the financial accounting system increased.

4.2 EBITDA

Until 1990, a company's net profit and EBIT (Earnings Before Interest and Taxes) were probably the most important figures for investors and bankers. But because depreciation is opaque, investors became increasingly interested in an organization's profit without applying these less tangible elements in the calculation. For quite some time a joke has been circulating that a good accountant has so many tools at their disposal that they can present any number the executive team asks for as "profit."

That is why toward the end of the twentieth century EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization) became the key performance indicator. Investors want to know an organization's cash-flow-generating power, leaving out the disputable items such as depreciation, provisions, or reserves. The fewer manipulations applied to the measurements, the better.

In a sense, this is a step back from Paton's accounting principles and a step toward the old Venetian entrepreneur who, at the start and end of his enterprise, sells all his goods and the ship and counts the money in his purse. Money in the purse (in the bank account) is, after all, the real economy. The reason companies go bankrupt is always a lack of cash, not a lack of profit. Profit is seen as just a number in the books that results from a complex web of calculations and assumptions. Cash is a fact; profit is merely an opinion.

4.3 Operating cash flow

The next step after EBITDA is the concept of cash flow, in particular the calculation of net cash flow from operations: the actual changes in the bank account resulting from normal business operations. This is the amount of money generated in a given period that is available for investments and financing cash flows.

There are two ways to calculate this figure: the direct and the indirect method. Both calculations must produce the same number. The direct method is the easiest to understand: simply add up all the bank statements. The indirect method is used most often because it is simple to compute if you already have EBITDA: you only need to add the change in working capital to EBITDA. Working capital is the value of inventory plus accounts receivable minus accounts payable.

International Financial Reporting Standards (IFRS) have since made publication of a cash-flow statement mandatory for listed companies.

4.4 Example calculation of EBITDA, working capital, and cash flows

In this section we provide an example of the calculation of EBITDA and working capital. We show how they change in different scenarios and how their behavior differs. We also show how they can steer management in the wrong direction if they are interpreted or understood incorrectly.

The example concerns the following situation:

- The company makes and sells only one product.
- There is 25% more production capacity than market demand.
- Annual demand is 400 units of the finished product.
- The sales price is €5.00 per unit, so if annual demand is fully met, annual revenue will be €2,000.
- The unit cost at normal production is €4.00, so the margin per unit is €1.00.
- At the start there are 100 finished-goods units in inventory.
- Fixed expenditures amount to €100 per month, i.e., €1,200 per year.
- Lead times and payment terms for both customers and suppliers are zero days, and all are 100% reliable.

Single-product company (baseline)	
Maximum annual production volume [units]	500
Annual sales volume [units]	400
Sales price per unit	€ 5,00
Annual revenue	€ 2.000,00
Fixed expenditures per year	€ 1.200,00
Purchase price of components per finished unit	€ 1,00
Unit cost at start of year 1	€ 4,00
Finished-goods inventory at start of year 1 [units]	100
Inventory value at start of year 1	€ 400,00

To show the difference between EBITDA and cash-flow accounting, we present the calculation in three scenarios for the coming year:

1. Production volume equals market demand (so no change in inventory).
2. Overproduction of 25% relative to market demand, resulting in an increase of 100 units of inventory at year-end.
3. Underproduction of 25% relative to market demand and therefore a decrease in inventory of 100 units to 0 at year-end.

You can see in the calculation that in Alt0, EBITDA and cash flow are both €400. That is because working capital remains constant. Inventory remains the same, and because the payment terms for receivables and payables are zero and 100% reliable, no changes can occur there either.

Example: working capital and cash flows

Alternative scenarios		**Alt 0**: Produce exactly what the market demands (stable inventory)	**Alt 1**: 25% extra production (double the inventory)	**Alt 2**: 25% underproduction (use up all inventory)
1	Inventory at start of year [units]	100	100	100
2	Annual sales volume [units]	400	400	400
3	Production volume [units]	400	500	300
4	Change in inventory [units]	0	100 ⇧	-100 ⇩
5	Inventory at year-end [units]	100	200	0
6	Unit cost of finished product	€ 4	€ 3	€ 5
7	Inventory value at year-end	€ 400	€ 680	€ 0
Results				
8	Revenue	€ 2.000	€ 2.000	€ 2.000
9	Fixed costs per year	€ 1.200	€ 1.200	€ 1.200
10	Inventory change during the year	€ 0	€ 280 ⇧	-€ 400 ⇩
11	Supplier expenditures during the year	€ 400	€ 500 ⇧	€ 300 ⇧
12	EBITDA	€ 400	**€ 580** ⇧	**€ 100** ⇩
Working capital and cash flow				
13	Change in working capital	€ 0	€ 280 ⇧	-€ 400 ⇩
14	Cash flow (indirect): EBITDA – WC	€ 400	**€ 300** ⇩	**€ 500** ⇧

It is now interesting to look at how cash flow and EBITDA behave when full production capacity is used (Alt1) so that there is 25% overproduction relative to the market demand of 400 units. Expenditures for purchasing raw materials also rise by 25%. Fixed expenditures remain the same. You can see that in this case EBITDA increases from €400 to €580.

An important rule for determining profit is the so-called principle of conservatism. This rule states that you must recognize a loss as soon as it becomes known, and you may recognize profit only when it is realized. An extra 100 units have now been produced but not sold. So the margin on those 100 units may not yet be added to profit because it has not yet been realized. And yet we see EBITDA increase from €400 to €580. How is that possible?

You can explain this in two ways:

- The increase in inventory provides additional coverage of fixed costs.
- The extra production causes a decline in the cost per unit, so the margin per unit sold is higher.

Without delving too deeply into the details, we can say that both explanations boil down to the same thing: correcting the allocation of fixed costs. That can be done by an additional contribution margin or by lowering rates and thus the unit cost.

4.5 Which information do you use for which decision?

If we look at the classic metrics—profit, EBITDA, and enterprise value—we conclude that 25% overproduction is a good thing. If, however, we look at cash flow, we arrive at a different conclusion. In Alt1, cash flow falls by €100 compared to Alt0, to €300, because €100 more is spent on suppliers. Our conclusion based on cash-flow information is therefore that overproduction is not a good thing.

To make the behavior of cash flow and EBITDA even clearer, we have also included the opposite alternative. There, less is produced than the market demands and all available inventory is sold. Here, as expected, we see a mirror image in terms of EBITDA and cash flow. Again, EBITDA and cash flow lead to opposite decisions: EBITDA is lower while cash flow is higher.

4.6 Which system is best?

The obvious question now is: which system helps us best to make the right decision—EBITDA or cash flow? The disappointing, yet only correct, answer is that you cannot say this in advance. It depends on what will happen in the following years with market demand and the inventory that has been built up.

If next year will see significantly higher demand—more than the available production capacity—then that extra inventory of 100 units will come in very handy because it can all be sold. In that case Alt1 is favorable and EBITDA has advised us well.

However, if the market is declining with increasing structural overcapacity, then the inventory that has been built up will become obsolete. It will have to be sold at a much lower price or even destroyed altogether. In that case EBITDA has not advised us well and we would have been better off looking at cash flow. The second alternative would then have been the best.

We can therefore conclude that neither system is suitable for supporting the decision properly. That is because they are both annual reports, whereas the decision horizon is much longer than that single year. You must of course look at the entire horizon, which also includes market demand for next year and possibly subsequent years. Only then can you make the right decision.

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