

PROCUREMENT SAVINGS METHODOLOGY

A key indicator of Procurement is Savings. The methods of its measuring should cause the absolute trust of Finance, Beneficiaries and Internal Clients, as well as motivate the Team.

"If You Can't Measure It, You Can't Improve It"

Peter Drucker

IN FIGURES WE TRUST

Author



Andrey Germanchuk
Co-founder & CEO
V&G Procurement

Editor



Elena Vyshlova
Co-founder
V&G Procurement

Users

- CPOs and their Teams
- Other employees procuring materials and services
- Financial controllers
- CFOs
- Accountants
- CEOs

Updated: 08 October 2022

Document: MTD003 v1.2 (ENG)



CONTENT

MTD003 METHODOLOGY OF PROCUREMENT SAVINGS CALCULATION 1

1 PURPOSES..... 5

2 GENERAL PROVISIONS..... 8

2.1 MAIN DEFINITIONS..... 8

2.2 WORK ORGANIZATION WITH PROCUREMENT SAVINGS 12

2.3 TYPES OF SAVINGS: COST REDUCTION AND COST AVOIDANCE 12

2.4 LEVERS FOR SAVINGS..... 13

2.5 IDENTIFIED, CONTRACTED AND REALIZED SAVINGS 14

2.6 STAGES OF SAVINGS CALCULATION 16

2.6.1 Determination of the baseline 16

2.6.2 Key principles for savings calculation 17

2.6.3 Measuring the impact of procurement savings to company results 18

2.6.3.1 Procurement savings and variation of purchase spend 18

2.6.3.2 Direct and indirect economic factors of price variation. 19

2.6.3.3 Cost reduction and Cost avoidance..... 23

2.6.3.4 Financial statements and indicators in which you can see the impact of procurement savings 25

2.6.3.5 The terms "Stock/Inventories" and "Expense" in the understanding of Finance and Purchasing..... 26

2.6.3.6 Savings in direct procurement and COGS / stock variation 28

2.7 PERIOD OF MEASURING OF PROCUREMENT SAVINGS..... 30

2.8 PERIMETER OF PROCUREMENT 31

2.9 NET PRESENT VALUE (NPV)..... 33

2.10 DATA SOURCES AND DATA QUALITY. ASSUMPTIONS. 34

2.11 TOTAL COST OF OWNERSHIP (TCO) 37

2.12 QUALITATIVE PROCUREMENT PERFORMANCE 37

3 PROCUREMENT SAVINGS..... 39

3.1 PRICE SAVINGS OF RECURRING PURCHASES 39

3.1.1 Historical baseline of recurring purchases..... 39

3.1.2 Current bids baseline for recurring purchases..... 43

3.1.3 Unit price variation..... 44

3.1.4 Cost variation of recurring purchases 48

3.2 SAVINGS NEW AND ONE-OFF PURCHASES 51

3.2.1 Baseline for new and one-off purchases 51

3.2.2 Baseline for new Single/Sole source suppliers 52

3.2.3 Savings calculation of new and one-off purchases..... 52

3.3 SAVINGS AT CONSUMPTION REDUCTION 54

3.3.1 Baseline of consumption of regular purchases 54

3.3.2 Consumption reduction..... 55

3.3.3 Savings calculation at consumption reduction 58

3.4 SUBSTITUTION SAVINGS 60

3.4.1 Substitution savings calculation 60

3.4.2 TCO approach at substitution savings calculation 64

3.5 REBATE AS SAVINGS..... 65

3.6 WORKING CAPITAL REQUIREMENT (WCR)..... 66

3.6.1 "Photo" method (accounting method) of WCR calculation 68

3.6.2 "Film" method (business method) of WCR calculation 69

3.6.3 Prepay / payment delay in days 72

3.6.4 Variation of WCR 74

3.6.5 Measuring of the Procurement contribution to WCR variation 74

3.7 SAVINGS IN CASH FLOW 76

3.7.1 Comprehensive bids estimation with various payment terms..... 79

3.8 STOCK MANAGEMENT SAVINGS..... 81



- 3.9 IMPACT OF SAVINGS ON THE CASH FLOW STATEMENT83
- 4 SYNTHESIS OF CALCULATION FORMULAS FOR PROCUREMENT SAVINGS85
- 5 ANALYSIS AND REPORTING OF PROCUREMENT SAVINGS.....87
- 6 ETHICAL ISSUES AND PROCUREMENT SAVINGS..... 88
 - 6.1 MANIPULATION AT MEASURING THE BASELINE..... 88
 - 6.2 TIME FRAME DISTORTION 88
 - 6.2.1 The short term focus..... 88
 - 6.2.2 The long term focus 88
 - 6.3 ONLY REPORTING WINS..... 89
 - 6.4 BUDGETED BUDGET SAVINGS 89
 - 6.5 INFLATION TRICK 89
- 7 BIBLIOGRAPHY..... 91
- ANNEXES.....92

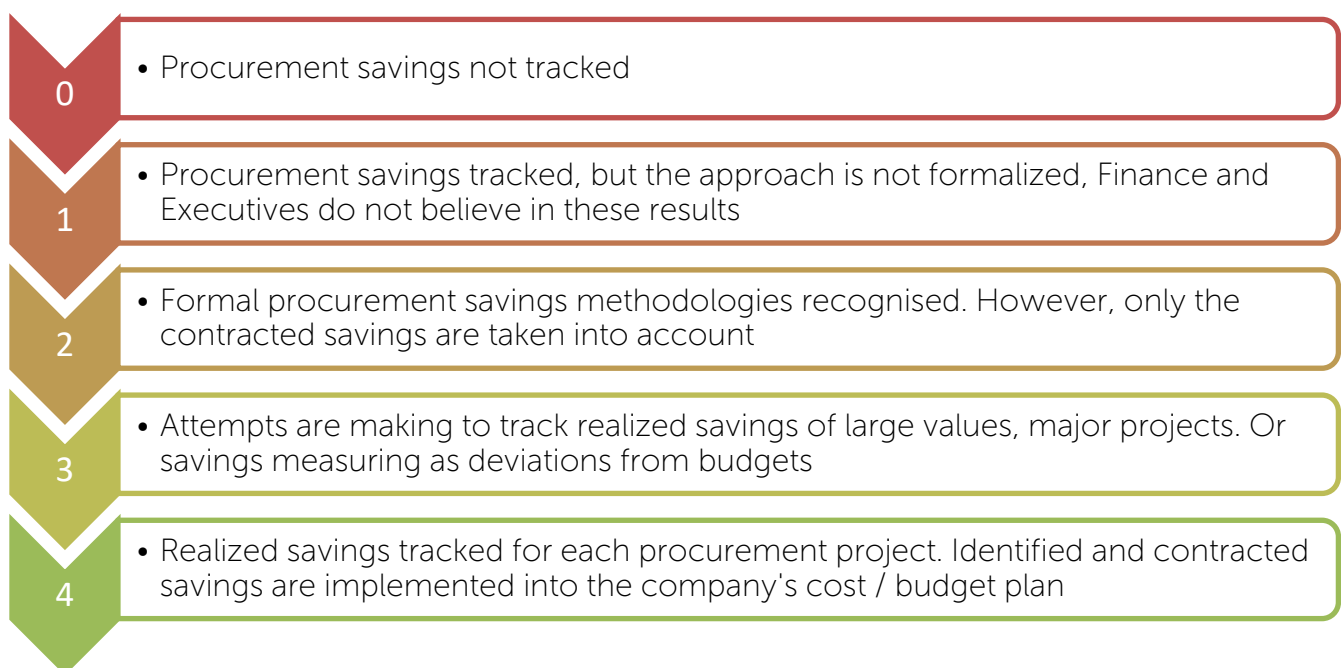


1 PURPOSES

The main purpose of this methodology is to describe the methods for measuring Procurement Savings, which cause absolute trust within the company, increase the level of cross-functional interaction between teams, enhance motivation and determine the impact of Procurement to the Company Results.

At present, there are no uniform universal rules for measuring the savings in commercial procurement¹ that are accepted in the world or particular countries.

Depending on the procurement maturity level, there are following savings tracking models:



At the moment of our research, we note that only 22% of companies in the world measure realized procurement savings. At the same time there are many factors that determine the difference between contracted and realized savings, here are some of them:

- purchases from backup or nonapproved suppliers;
- policies poorly documented / not enforced;
- specification change, including at describer's initiative;
- noncompliant supplier pricing or consumption volume;
- maverick purchases by employees (as exceptions).



Therefore, it is extremely important to measure not only identified and contracted savings, but also realized ones. Only realized savings impact on financial results of the company and it can be confirmed by Finance.

¹ In some countries there are formal rules for measuring of government procurement savings, determined by laws. However, these rules are not relevant to the spirit or activity of procurement.



Using this methodology will allow you to move to the highest level of tracking procurement savings. The difference of this methodology from the other approaches in measuring savings is its depth. Most of the existing methods are quite simple, which seems to be their advantage at first glance, but they are not able to answer a large number of questions that arise in the real business with mature procurement.

At this document presents:

- **Scientist approach** that allows you to using the proposed measuring methods for any kind of situations;
- **Illustrative Examples** - simple and practical examples that clearly demonstrate the approach;
- **Real business cases study** - the application of the proposed approaches in real situations with large and often poor quality of data

Present methodology defines:

- Major principles for measuring procurement savings;
- Ways to determine the baseline of cost, unit prices and volumes of consumption;
- Methods of calculating various types of procurement savings;
- The link between procurement savings and financial reporting indicators.

Mostly companies show differences in understanding savings: on one hand there are Procurement that declare the savings earned, and on other hand there are Finance that do not see the impact of these savings on the company's result.



Saving figures should inspire confidence towards the Procurement within the company, that is why the Procurement themselves should be as critical as possible to the methodology for calculating savings.

A good understanding between Procurement and Finance will help not to miss great savings opportunities. In all possible cases, the result should be visible in the financial statements. It is strongly recommended to involve Finance to the discussion on procurement savings at the earliest stages. Thanks to this methodology, Procurement will be able to speak in the "finance" language. And one day Procurement will find that Finance is their loyal supporters.

Procurement have to be efficient and bring added value to the company. The process of calculating procurement savings should be as automated as possible or outsourced so as not to shift focus from "heart of profession".

Perhaps, at first glance, the efforts to implementing the methodology and the process of calculating procurement savings do not seem appropriate, but it is necessary to take into account the benefits like as:

- availability of accurate data on savings without errors and subjective estimates;
- ability to manage the budget, taking into account savings, which leads to cut overall costs;



- identify and avoid cases where suppliers do not comply with the contract prices;
- identify and avoid cases where internal customers purchase from nonapproved suppliers at overprice;
- a good understanding of historical prices and baseline by buyers will more clearly set and achieve the goal of saving;
- possession of information will avoid manipulation by the suppliers;
- understanding within the company of Procurement contribution to the overall financial results and the growth of professional credibility to Procurement teams;
- motivation of Procurement teams.



2 GENERAL PROVISIONS

2.1 Main definitions

Need – justified business-need for purchase of materials and services by an internal client and approved by the head of the internal client or other responsible and independent person. The description of the need should not contain any discriminatory signs regarding suppliers (brand name, unique characteristics, etc.).

Specification - necessary and sufficient characteristics of materials or services that satisfy the Need.

Technical Requirement – a document sent to suppliers involved in the bidding, reflecting the needs of the client. It is used as a source document, which takes into account: the main purpose of the procurement of goods, works, services; their characteristics and specifications; the client's task; a description of the primary data; goals and objectives of the procurement; delivery time for work or services; requirements for goods, works, services, their results; guarantees; description of the subject of procurement; volume of purchased goods, works, services; reporting forms; contracts forms; economic requirements, as well as special requirements (example at [Annex #1](#)).

Internal client - within this methodology: users of the procurement subject and / or budget holders.

Describer - the employee (s) formalizing the Technical Requirement (TR) based on the business needs of the Internal Client. The describer may participate in technical negotiations with suppliers.

WACC (Weighted Average Cost of Capital) - companies often run their business using the capital they raise through various sources. They include raising money through listing their shares on the stock exchange (equity), or by issuing interest-paying bonds or taking commercial borrowing funds (debt). All such capital comes at a cost, and the cost associated with each type varies for each source. In other words, WACC is the average rate a company expects to pay to finance its assets. Or WACC can characterize the opportunity cost of investing, the level of profitability that a company can get when investing not in a new project, but in an existing one. WACC can be calculated with the following formula:

$$WACC = k_d * (1 - T) * \frac{D}{E + D} + k_e * \frac{E}{E + D} \quad (1)$$

where,

k_d -cost of debt, %;

T -corporate tax rate;

D – market value of the firm's debt;

E - market value of the firm's equity;

k_e – cost of equity (ROE), %.

For example, if you use your own (ROE = 20%) and borrowing capital (12% rate) in equal shares, WACC = 14.8% (see [Annex #2](#) for the calculation form).



This equation describes the situation for homogeneous equity and borrowing capital. If there are preferred shares in the capital with their own value, the formula will include additional terms for each source of capital.

WACC is a key parameter for measuring the impact of payment terms and comparing "purchase" schemes (buying or leasing).

Consumption perimeter - the scope and volume of the company's activity on which business needs are formulated. The perimeter of consumption determines the basis for calculating specific consumption. This term has meaning for substitution projects, savings at consumption and stock management, i.e. in such projects we are talking about specific savings, while the perimeter of the purchase may vary. For example, for direct purchases, the perimeter is the volume of finished products. For example, a company may adopt policies for the consumption of materials in production, but with the expansion of production (the consumption perimeter), the total consumption increases, and the savings will be determined by specific consumption.

TCO – total cost of ownership includes total purchase and operating costs, as well as costs associated with disposal, replacement, or modernization at the end of the life cycle. TCO analysis is used to assess the viability of any investment. An enterprise can use it as a tool for comparing products / processes. It is also used by credit markets and financial agencies. The total cost of ownership is directly related to the total cost of assets and / or related systems of the enterprise for all projects and processes, which gives an idea of profitability over time. The period of time at which the TCO is assessed is extremely important; it should be related to the life cycle or the period of operation of the subject of the assessment, the period of financial depreciation, or another justified period. Typical cost areas that are taken into account when assessing TCO include (but not limited to) planning, design, construction and purchase, storage and operation, maintenance, updating and restoration, depreciation and financing costs, and replacement or disposal.

The TCO method must be used in assessing needs and commercial offers from suppliers during the procurement process. However, a number of identical TCO components in bids within the TR can be ignored. For example, the TR define the type of equipment that is operated by one employee of a certain qualification, then the payroll spend will be the same for various bids of suppliers equipment and can be ignored when comparing. But if options are possible for another type of equipment (corresponding to the TR), where a different number of operators may be involved or their qualifications may differ, then the personnel costs should be taken into account in the TCO when comparing bids.

COGS (Cost of Goods Sold) - this is a stricter definition of direct spend. In the case of COGS, it is possible to accurately measure the share of these materials or services per unit of output product. A particular example of COGS in trading companies may be a product for direct resale.

Direct spend – direct spend in procurement refers to goods and services that are directly related to




making products. There is no strict definition of direct spend, therefore, different companies interpret this in different ways, from the cost of goods sold (COGS) to all variable costs, including personnel. Examples may include raw materials, components, hardware and services related to manufacturing processes.

Indirect spend – indirect spend in procurement is the sourcing of materials and services not directly related to manufacturing products (sale of a unit of goods, for trading companies). Indirect procurement enables businesses to maintain and develop its operations.

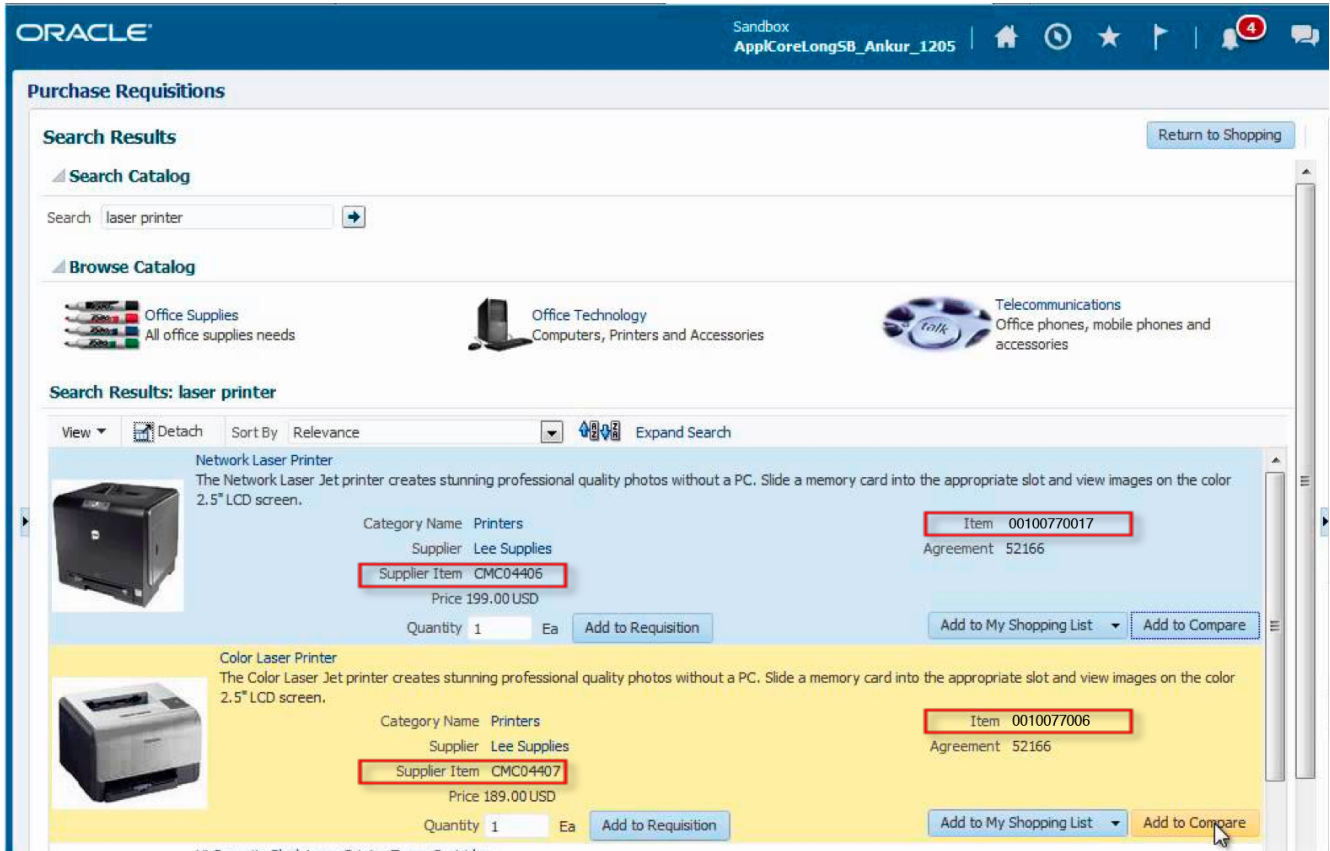
 **The division into Direct and Indirect procurements is essential when dividing the procurement function between the various services of the company.**

OPEX - Operating Expenses or an expense a business incurs through its normal business operations. Operating expenses include rent, equipment, inventory costs, marketing, payroll, insurance, duties, and funds allocated for research and development.

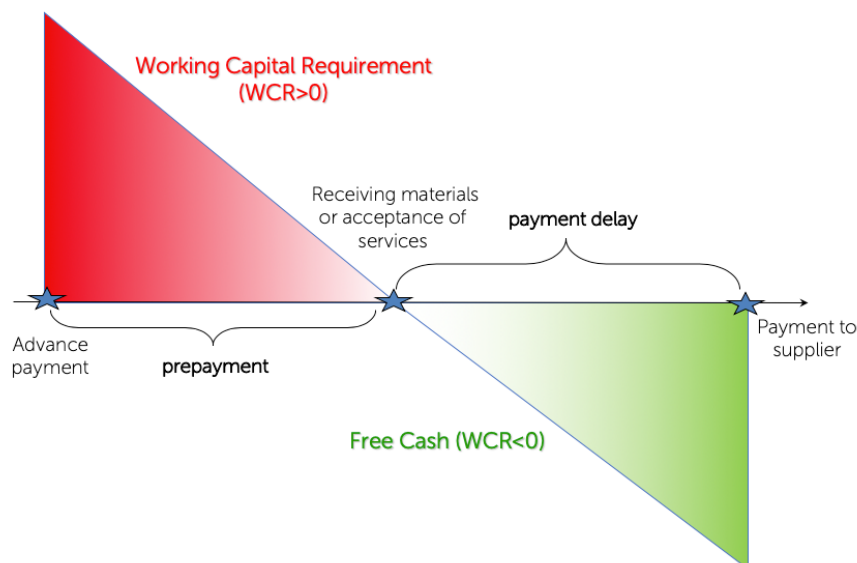
CAPEX - Capital Expenditures or purchases a business makes as an investment. Capital expenditures include costs related to acquiring or upgrading tangible and intangible assets. Tangible business assets include real estate, factory equipment, computers, office furniture, and other physical capital assets. Intangible assets include intellectual property, copyrights, patents, trademarks, et. al. In other words, CAPEX is any type of expense that a company capitalizes on or displays in its balance sheet as an investment, rather than in an income statement as an expense.

 **The partition between CAPEX and OPEX can varies depending on different tax laws and accounting policies.**

SKU - Stock Keeping Unit. Within this methodology, a particular item of procurement related to materials or services. If there is a procurement catalog, a catalog item (see example).



WCR - Working Capital Requirement characterizes the cash gap between payment to the supplier and receipt of funds from the client. The required value of funds that a company needs to keep on hand in order to be able to pay its debt obligations and other business-related expenses. WCR is affected by terms of payment to the supplier and discipline of workflow, terms of payments by customers and the period of stock rotation for direct purchases. If services or materials are purchased at prepay, then there is a need for working capital, as early as advance payment is made. If payment for the services rendered or material delivered is made after receipt upon a delay, this will lead to a decrease in the need of working capital and emergence of Free Cash. The WCR calculation is described in detail in Chapter 3.





Terms of payment depend on the long-term financial strategy of the company.

EBITDA - Earnings Before Interest, Taxes, Depreciation and Amortization. EBITDA is a measure of a company's overall financial performance and is used as an alternative to simple earnings or net income in some circumstances. EBITDA excludes the effect of the capital structure (i.e. interest paid on borrowing funds), tax rates, and the organization's amortization policy. EBITDA is one of the bottom lines of the Profit and Loss Statement (P&L).

NCF - Net Cash Flow is a balance remaining after deducting cash outflows from cash inflows for the period for three types of activities: operating, financial and investment. NCF is the bottom line of Cash Flow Statement.

2.2 Work organization with procurement savings

Before introducing this approach of measuring procurement savings, procurement managers have to get support of company executives and financial experts by showing economic reasons for developing this critical initiative.

Procurement together with Finance should approve the rules for calculating procurement savings, the forms and frequency of reporting.

Procurement responsible must manage the following three key areas when building a cost savings program:

- **Credibility of savings:** Without an established process in place approved by key stakeholders as top management, the procurement organization's cost savings claims are often not believable. By earning executive approval of a savings measurement system, procurement professionals can ensure management and business unit belief in cost savings figures.
- **Accuracy of savings:** Typical procurement staff, such as buyers and commodity managers, specialize in soft skills such as negotiation and supplier relationship management, but lack analytical experience required to critically evaluating cost savings. In order to track true, valid cost savings claims, procurement employees must methodically address savings tracking with a rigor expected of financial analysts. To ensure rigorous reporting, procurement organizations can incorporate the finance function in process creation and execution.
- **Ability to track savings:** Most procurement organizations now use procurement platforms and e-procurement systems. These systems are necessary to record, and track spend by commodity and business units. Only then can procurement organizations begin to identify, realize, and track cost savings. If the procurement data is poor, you may need to create a dedicated business intelligence function or use outsourcing services to measure procurement savings.

2.3 Types of savings: Cost Reduction and Cost Avoidance

Procurement saving is the difference between the value obtained in the procurement process and the baseline. Generally, there are no terminological difficulties with determining



the values of the current purchase (prices, quantities, payment terms). But with the definition of a baseline (or historical level), questions often arise. Fundamentally, there are two types of procurement: within an existing Need and within a New or One-Off Need. But even for regular purchases, it is not always possible to rely on the historical level. This methodology most fully reflects the factors and rules for calculating procurement savings.

Cost Reduction – type of savings using to measuring the performance of recurring purchases within the Need. It is calculated as a reduction of unit prices and / or volumes. Affects the bottom line of the Profit and Loss (P&L) and the Cash Flow Statements of the company.



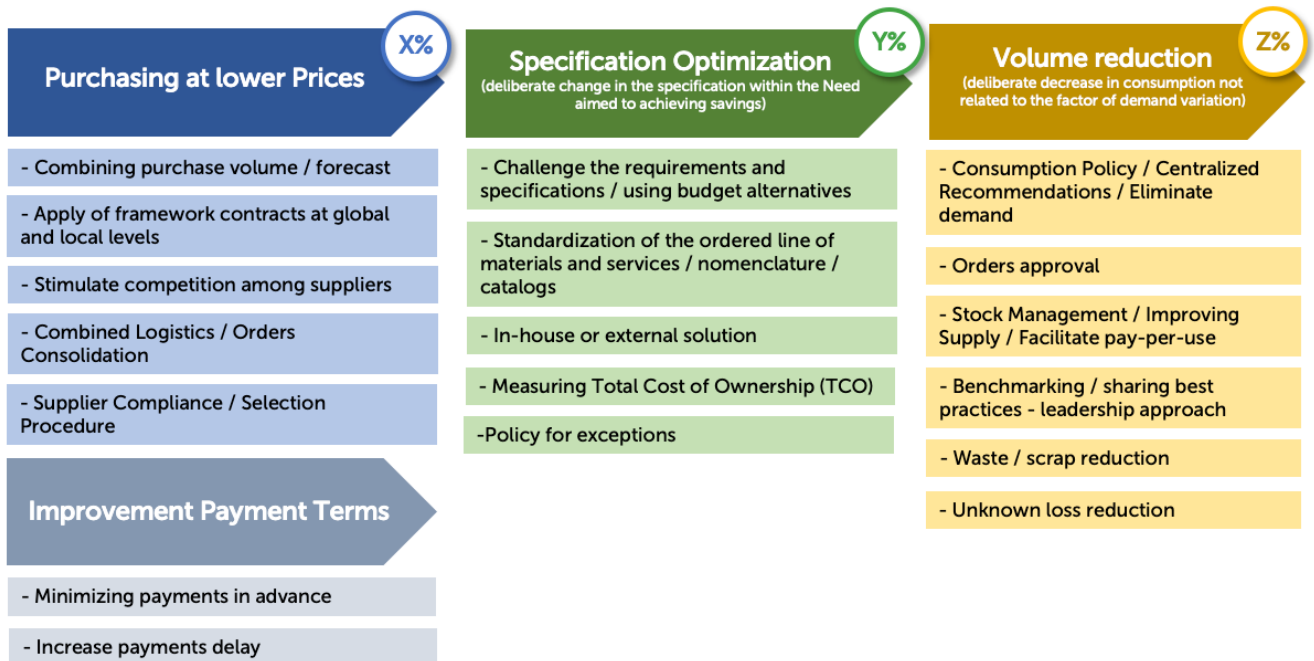
Cost Avoidance – is using to measuring procurement savings within the New or One-Off Need, as well as for some recurring purchases with an increase of unit prices. This type of savings is not reflecting in the statements but characterizes a decrease of additional costs that the company would have to incur.



2.4 Levers for savings

All existing leverage for saving can be divided into three main categories:

- «Buy cheaper», using commercial leverage;
- «Buy better», using technical specifications control levers;
- «Buy less», using the management levers.



Demand and consumption can variate constantly. But for the purpose of calculating procurement savings, it is only necessary to take into account the effect of deliberate actions aimed to reducing costs on a comparable consumption perimeter.

**Example 1 – New need:** Precision machine tools

The company purchased machines for the production, but implementation of new production standards required to modernize production and switch to machines with a higher accuracy class. I.e. there has been **a modification of Need** (a new one has arisen) and it is impossible to measure the change in value from the savings point of view (or rising costs).

Example 2 – Specification Optimization: Low Cost Analog

The company uses high-precision machines, but exactly the same products can be produced on lower-class machines. In this case, **the Need does not change**, and the transition to simpler and cheaper machines is a savings.

Example 3 – Substitution: More expensive tool

Saving does not necessarily mean buying a cheaper analog. A practical comparison of the two types of milling cutters from different manufacturers showed that the use of a more expensive tool (+ 30%) made it possible to increase the number of machining by one tool by 70%. This type of saving is called “**substitution savings**” (it will be described in detail in paragraph 3.4).

Quantitative criteria for spend are determined by three components: price, volume of consumption and financing conditions.

- Commercial leverage affects price and WCR;
- Quantity control levers affect the volume of units consumed;
- And specification control levers affect both, prices and consumption volumes.

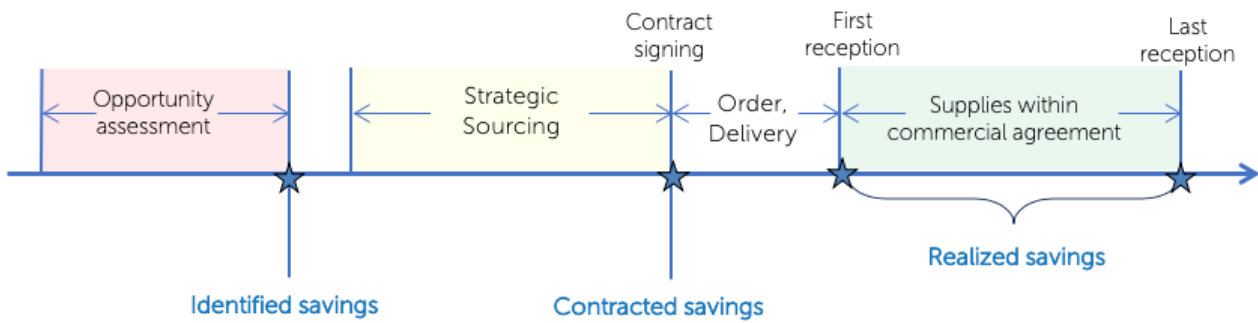


The justification of the profitability of a new need or project does not apply to procurement savings.

For example, production unit plans to purchase new equipment, and the reason of this purchase is profitability due to reduced personnel costs. This savings is not a procurement savings. Another example, the sales department decides to purchase new trading equipment (more complex and expensive) for customers traffic and revenue growth. A profitability assessment of such projects is made, but it is not treated as procurement result, even if the project initiator and the buyer are the same person.

2.5 Identified, contracted and realized savings

At different stages of the procurement life cycle, various types of savings are determined.



Identified savings – saving of procurement projects, determined at the stage of opportunity identified and target setting. Savings are determined on the basis of the potential for reducing unit prices, consumption or challenging specification and improving payment conditions. At the same time, future consumption and the baseline of savings is not precisely defined and exists in the form of a forecast.

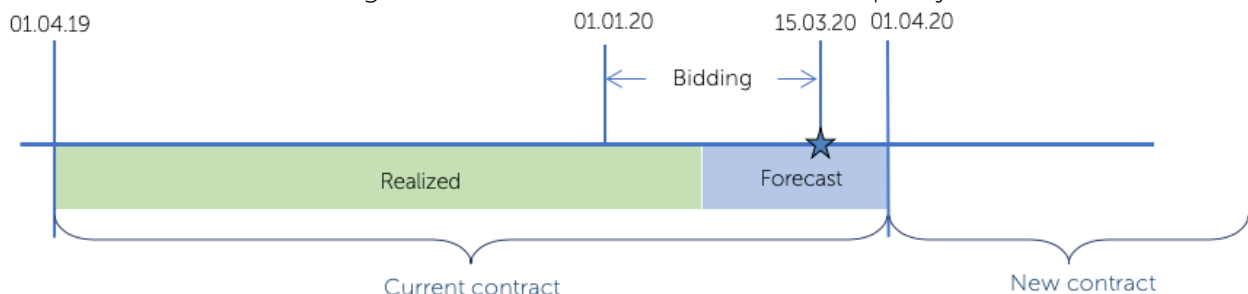
👉 Identified savings are not determined for unplanned (maverick) projects.

👉 Identified savings should be taken into account in the budget of the company / BUs / cost centers.

Contracted savings – savings of procurement projects, determined immediately once the sourcing is over and contracts are signed. At this stage, purchase prices and payment terms are known (although they may change in the process of fulfilling the contract), but consumption volumes still remain at the forecast level. The baseline for calculating savings, exists in the form of an updated forecast too.

Example: Forecast of baseline

- annual bidding, new prices are valid from 01.04.2020;
- the bidding period is 01.01.2020 to 15.03.2020;
- it is obvious that during the bidding, purchases under current agreement can still be in progress;
- and contracted savings are calculated on the baseline of partly forecast.



Realized savings – determined for the period based on the actual receptions (and invoice matching¹) of materials or services. At this stage, the final purchase prices, payment terms

¹ **Invoice matching** - a three-sided reconciliation of the Invoice is used at automating purchases: at prices from the Order, at the quantity from the Acceptance and the total amount from the Invoice. In cases of long settlement on discrepancies, the total amount of savings may be adjusted.



and volumes of consumption are known. Prices and volumes may differ from the contract for a number of reasons: the terms of price variations can be stated in the contract, specifications can be adjusted during the execution of the contract (both from the client and the supplier), additional work may occur, etc.

	Identified savings	Contracted savings	Realized savings
Detection	Based on the aims and budgets of the coming year	According to the results of the bidding or other procurement iterations	Calculating at the period of work under new commercial conditions
Source	Buyer / Internal client	Buyer / Describer	Buyer / Finance
Baseline	Forecast	Updated forecast	Fact
Price	Target price	Weighted average contract price	Weighted average realized price
Volume	Target volume	Planned volume	Realized purchase volume
Reason	Target vision	Contract	Actual realization


There is a best practice to adjust available limits (budgets) to guarantee realized savings

Example: «budget consumption»

- Procurement did successful negotiations and reduced the overall cost of the event;
- Since the internal client (for example, the HR department) had "free money" at the budget, they decide to buy an additional X boxes of champagne.

As a result:

- Finances do not see any savings: both with the procurement optimization or without - spend was the same;
- In essence, there was a procurement savings, but it was offset by the increasing demand for champagne.

 Money could be saved by reducing the limits of expenses (budgets) by the amount of savings.

2.6 Stages of savings calculation

The calculation of savings consists of 3 main stages:

- Determination of the baseline;
- Savings calculation (as Cost Reduction and Cost Avoidance);
- Measuring the impact of procurement savings to the company results.


2.6.1 Determination of the baseline




If the business need does not change, then purchases are considered as recurring. If the need changes or a new one arises, then such a purchase should be considered as new. For recurring and new purchases, two principal types of assessment of the baseline exist:

- from historical level;
- and from the level of current bids (if the first is impossible);

Some organizations use the budget as a baseline for measuring savings, because of misconception or immaturity of procurement function [6]. And this methodology was created to fill this gap.

 The budget should not be taken as a baseline for calculating procurement savings, because: firstly, the budget is inaccurate, it is often overestimated and includes inflationary expectations; secondly, procurement savings should already be included in the Budget.

The issue of budget method in the calculation of savings will be considered later in the chapter on procurement ethics [6.4]

 From the point of view of the procurement process, the baseline has to be identified before the first supplier offer received.

2.6.2 Key principles for savings calculation

The principle determining the calculation of savings can be represented in the form of the equation:

$$\text{Savings} = \left(\text{Spend with procurement impact} - \text{Spend would have been if procurement hadn't been involved} \right)$$

In other words, the spend that could have been without the procurement involved are the baseline for calculating savings. This definition is true for identified, contracted and realized savings.



To calculate the % of procurement savings:

$$\% \text{ Savings} = \frac{\text{Savings}}{\text{Spend would have been if procurement hadn't been involved}} = \frac{\text{Savings}}{\text{Spend with procurement impact} - \text{Savings}}$$



2.6.3 Measuring the impact of procurement savings to company results


Saving is the key KPI of procurement. But there is a misconception: "since there is a procurement savings of \$10, then this should be seen in P&L as a reduction in expenses at \$10." But it's not so simple. To show and to explain this is one of the most difficult tasks for Procurement.

2.6.3.1 Procurement savings and variation of purchase spend

Impact of savings on spend arises from the fact that saving is the effect of managing the price or volume consumed, and more precisely, is the management of **price components** and sometimes **components of consumption**, and cost are multiplication of price by quantity:

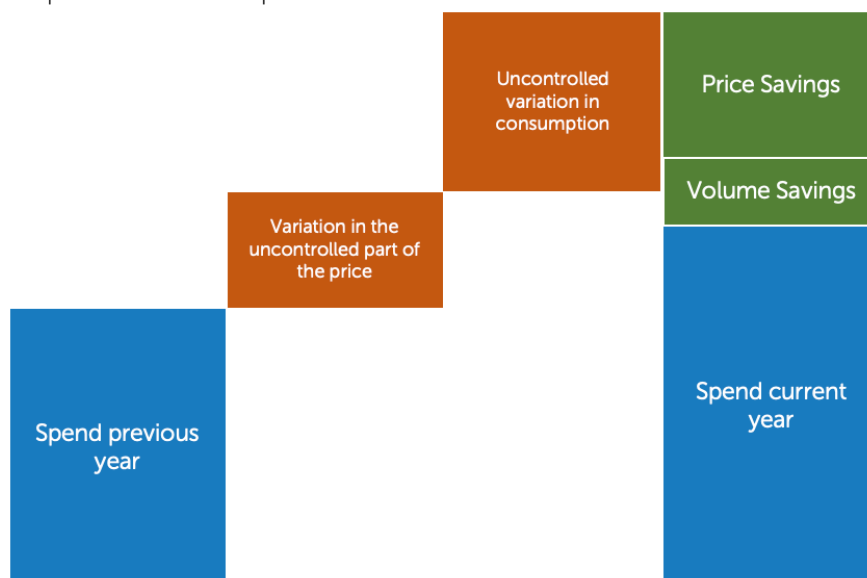
$$Cost = Price * Quantity$$

Generally, there are factors that procurement cannot manage. For example, a production unit as many materials as it needs. Or the final price may depend on exchange rates. But, with the help of consumption policies, it is possible to reduce the volume of indirect spend.

 In order to see the impact of Savings on Spend, it is necessary to consider the controlled and uncontrolled components of cost (in terms of procurement) separately.

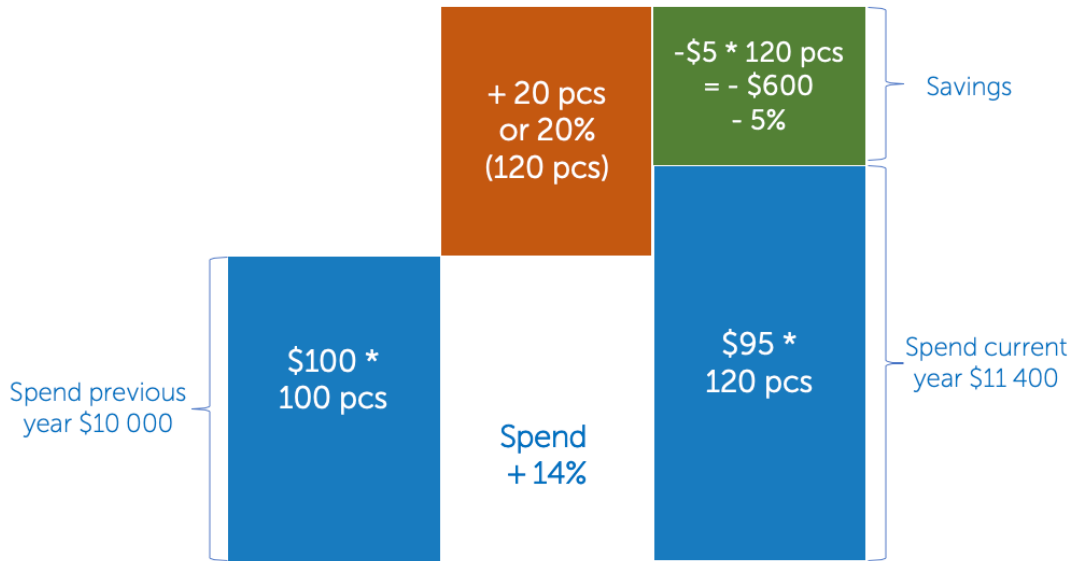
$$Cost = (Part\ of\ the\ Price^{controlled} + Part\ of\ the\ Price^{uncontrolled}) * (Quantity^{controlled} + Quantity^{uncontrolled})$$

Thus, the change in spend can be represented as:



Example: Savings and increasing consumption

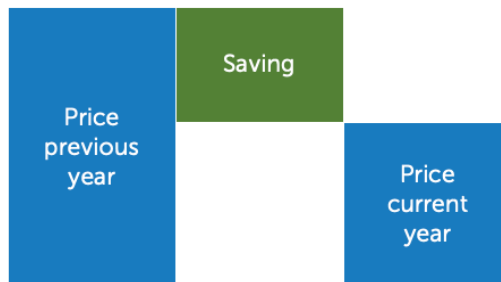
Buyer reduced the prices of packaging materials by 5%, but at the same time their consumption increased by 20% (increase in production), respectively, the spend for packaging materials increased by 14% (see example below).



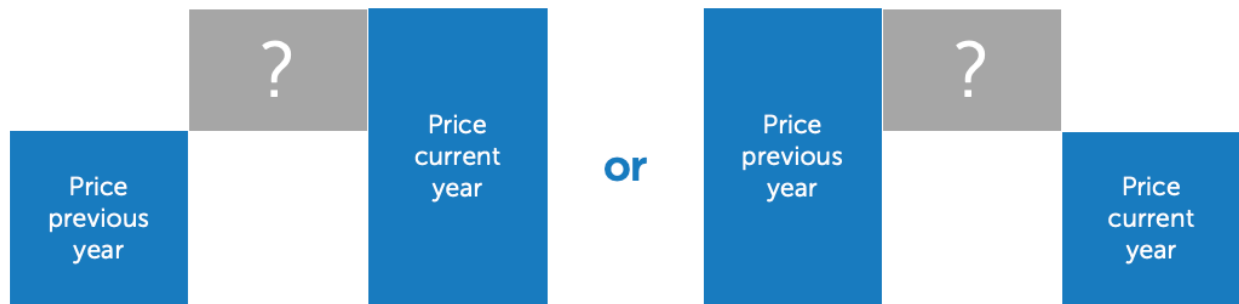
And if the reasons for the variation in volumes can be accurately classified as controlled and uncontrolled parts, then the factors affecting the variation in price require a more detailed consideration.

2.6.3.2 Direct and indirect economic factors of price variation.

In a market economy the price is determined by Supply and Demand on the entire procurement chain from raw materials to finished products. If there was no market, the purchase price would be determined between the seller and the buyer only, and the savings would depend solely on purchase price variation:



External factors may not be relevant for first iteration of the bidding, but it is becoming increasingly difficult to achieve a price reduction in further iteration of the bidding, even using the full set of procurement savings leverages. When purchasing materials or services, we have to keep in mind that there are external economic factors in price variation:



In some cases, procurement can manage this, but in other cases this is not possible. In addition, the behavior of the buyer in a growing market and in a falling one will be different. The market provides the buyer with *challenges* and *opportunities*.

Example: Currency dependence

The buyer purchases imported spare parts, which are 100% dependent on the dollar exchange rate. What happens when the rate changes:



Those, in the first case, the buyer had a challenge from the market, he used it and achieved savings (cost avoidance), because if he had not made efforts, the price would have been even higher. And in the second case, the buyer had the opportunity, but he either did not take full advantage of it (lost savings), or there were other factors (except for currency rate) that could negatively affect the price.

The presence of market factors does not necessarily mean that they will affect the final price of the material or service, this depends a lot on how the seller and the buyer use it and generally know about them. For example, a buyer may not monitor exchange rates at all and not know that the dollar has already fallen in price for a long time. There are contracts where the influence of currency and other market factors on the final price is specified in it (dynamic tariffs), but this does not mean that the buyer cannot reconsider these conditions (in next iteration of bidding) in a way that is more favorable for his company (for example, switch from a dollar contract to a local currency one with a currency proviso).

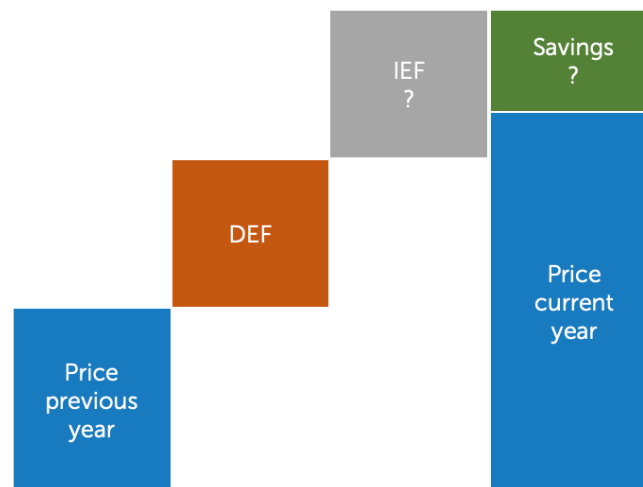
If we classify external market factors, we can identify two groups:



- **Direct Economic Factors (DEF).** These are factors that can be accurately identified. These include:
 - Variation of stock indices;
 - Currency fluctuations;
 - Variation in duties, excises and fees.
- **Indirect Economic Factors (IEF).** Such factors whose influence the price variation of a material or service cannot be accurately measured. The most obvious is inflation. In fact, it is impossible to measure the impact of inflation on a particular product, since this is just an aggregate indicator (determined from the price increase of a set of products and services), and even an industry-specific inflation indicator may have nothing similar with a particular product. In addition, it is impossible to accurately measure the impact of payrolls, fluctuations in demand, cartel agreement, monopolization of a supplier, prices variation of products of deep processing, etc.

It does not matter if the direct supplier is a consumer of raw materials or an importer. It is important that the final cost depends on fluctuations in commodity prices and exchange rates.

I.e. in more detail, direct and indirect economic factors can influence the price variation, the DEF can be estimated, the IEF not.



Direct and indirect economic factors cannot be taken into account unconditionally. For DEF, there should be a clear view of the price structure and the significant contribution of these factors. For example, the price of racks for a warehouse is 70% dependent on the cost of the steel. It is impossible to accurately measure the IEF, but there must be a reasoned assumption about their significant effect on the price. For example, if inflation is about 2%, then this value cannot be estimated as a significant factor of influence, especially if the purchase price increases by 10%.

Accordingly, the formula for calculating savings can be represented as:

$$S = P_Y - P_{Y-1} - DEF - IEF \quad (2)$$

where:

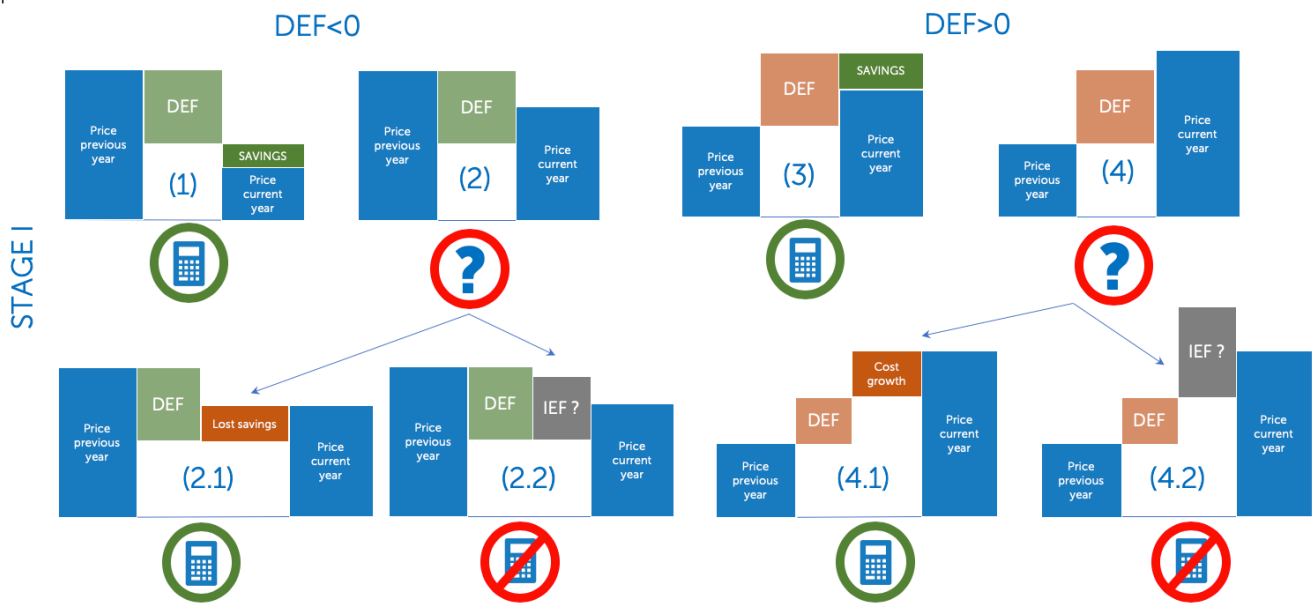


P_Y – weighted average current period price in local currency;
 P_{Y-1} – weighted average previous comparable period price in local currency.

But this savings cannot be calculated because the IEF component is not exactly known. At the first stage of savings calculating of recurring purchases, it can be assumed that indirect market factors are insignificant or completely absent $IEF \approx 0$.

$$S = P_Y - P_{Y-1} - DEF \tag{3}$$

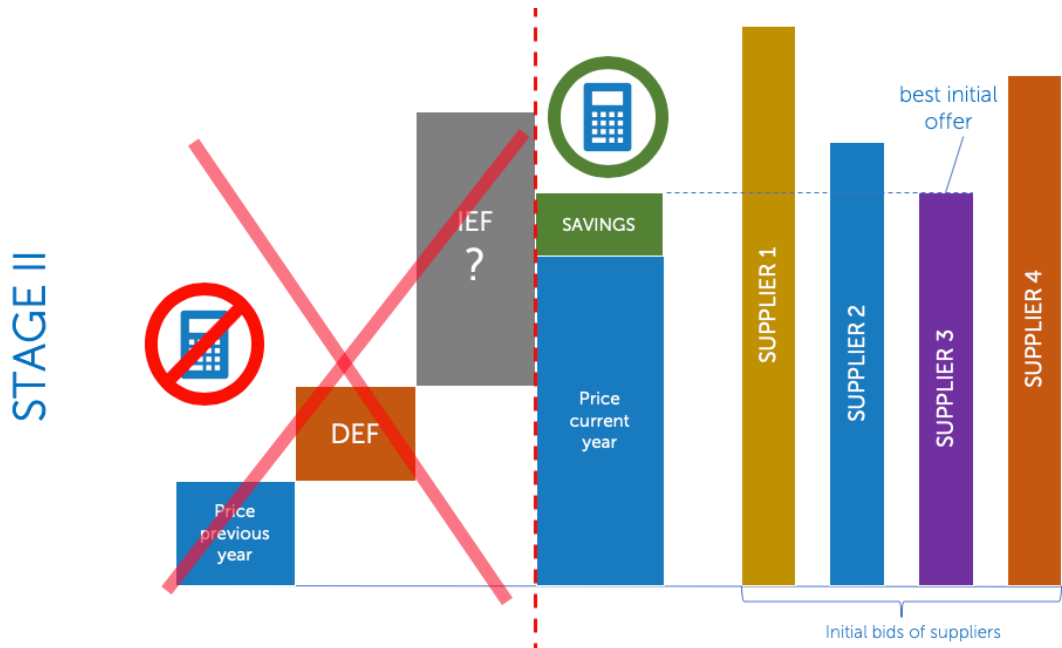
Procurement savings calculation on a historical baseline becomes possible, we consider 4 possible scenarios:



1. $DEF < 0$ – opportunity, and the buyer fully implements it $S \leq 0$ – calculation is possible;
2. $DEF < 0$ - opportunity, but the buyer cannot realize it $S > 0$:
 - 2.1. Lost savings – calculation is possible;
 - 2.2. reasonable impact of IEF – calculation is not possible;
3. $DEF \geq 0$ – challenge, and the buyer copes with it wholly or partly $S \leq 0$ – savings calculation is possible;
4. $DEF \geq 0$ - challenge, but the buyer cannot manage with it $S > 0$:
 - 4.1. Cost growth – calculation is possible;
 - 4.2. reasonable impact of IEF – calculation is not possible;

👉 It is the reasonable existence of indirect economic factors (IEF) that is the trigger in the transition of the baseline calculation from historical prices to current bids.

In cases 2.2 and 4.2, the impact of IEF itself cannot be measured, i.e. there is no exact link of baseline with historical price. Therefore, at the second stage, we consider the following conservative option for measuring procurement savings from the best initial offer (BIO) of suppliers as a baseline:



The same approach is used to measure the savings of new purchases when there is no historical price.

$$S = P_Y - P_{BIO} \tag{4}$$

where:

P_{BIO} – best initial offer (BIO).

Summary for regular purchases:

№	СЦЕНАРИЙ	ФОРМУЛА ЭКОНОМИИ ЗАКУПОК
0	<p>$DEF \approx 0$ и $IEF \approx 0$</p>	$S_{Unit\ Recurring}^{[0]} = P_Y - P_{Y-1} \tag{5}$
1	<p>$DEF \neq 0$ и $IEF \approx 0$</p>	$S_{Unit\ Recurring}^{[1]} = P_Y - P_{Y-1} - DEF \tag{6}$
2	<p>$IEF \neq 0$</p>	$S_{Unit\ Recurring}^{[2]} = P_Y - P_{BIO} \tag{7}$

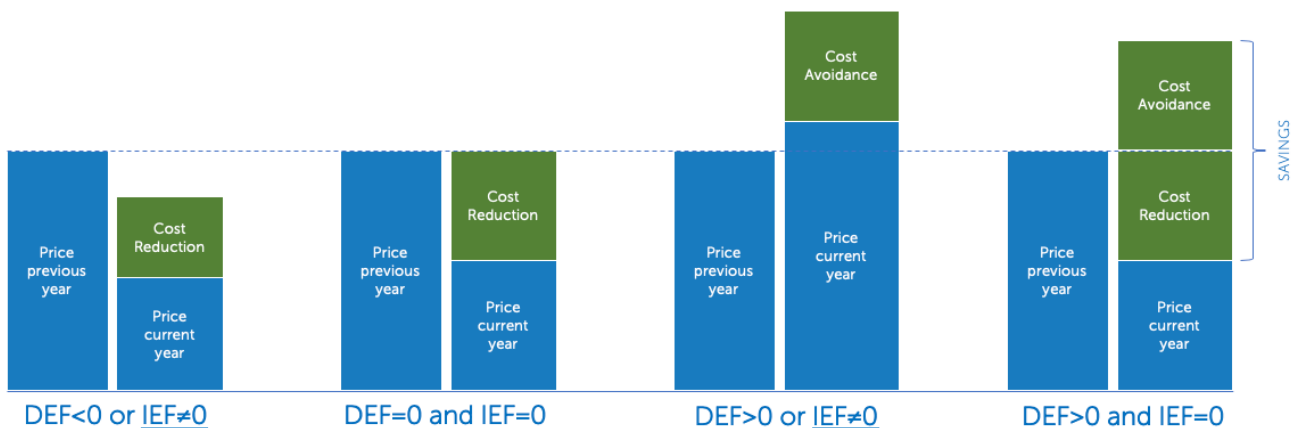
2.6.3.3 Cost reduction and Cost avoidance

We considered that variation purchase prices and procurement savings are not the same thing!

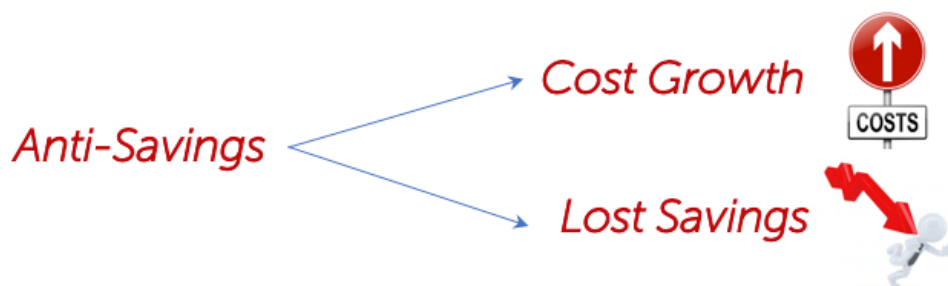


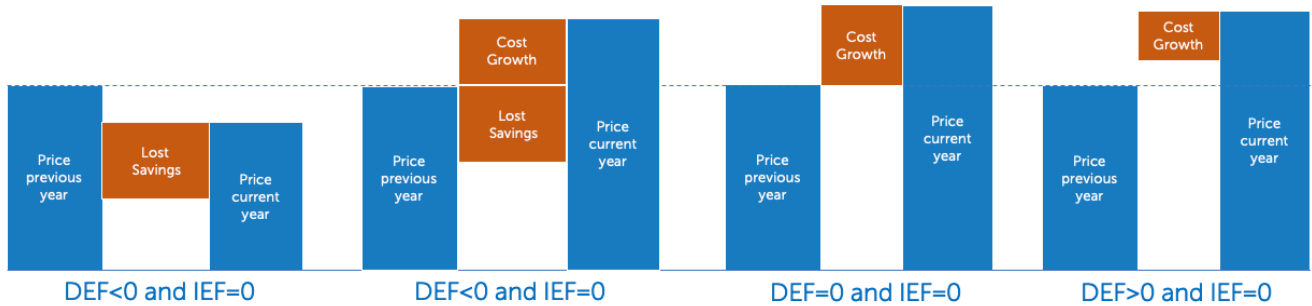
- First, the procurement savings should be **related to the procurement process in place**: bidding, negotiations or revision of the commercial terms of the contract (if there is a price reduction within the terms of the current contract, this reduction is taken into account for the existing project, but not of a new one);
- Secondly, direct and indirect economic factors affect the savings calculation;
- Thirdly, savings cannot always be achieved, or not for all components of costs. For example, with the TCO approach, some components may increase in price, but overall savings will be achieved. Some growth is also possible in certain periods of the project (in the interval of 12 months).

In turn, a costs reduction can be considered only that part of the savings that gives a price reduction compared with the historical level of materials or services. The other is a cost avoidance.



Similarly, for situations where there is no saving, there is either a cost growth from the level of historical prices, or lost savings in a falling market.



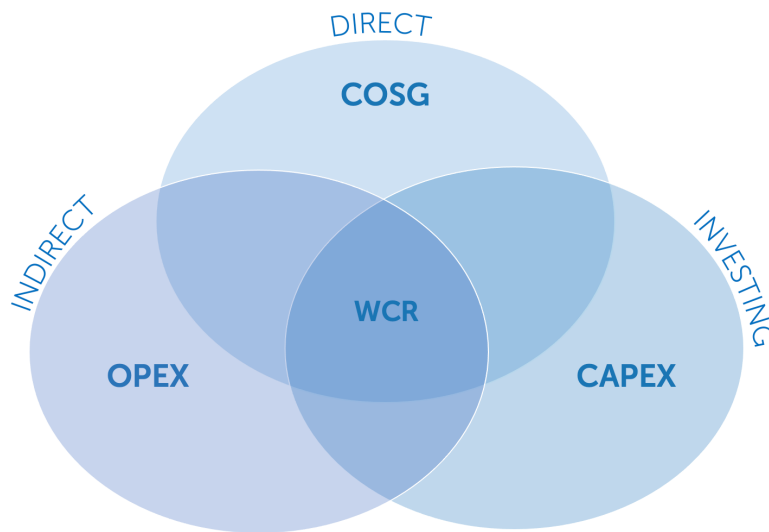


Such a classification is necessary to assess the impact of price reductions or price growth correctly on the company's financial performance.

2.6.3.4 Financial statements and indicators in which you can see the impact of procurement savings

Direct, indirect and investment¹ purchases affect various financial indicators, which in turn are displayed in various company reports.

👉 From the point of view of the Purchasing profession, there is not much difference in the classification of costs. But this understanding have to be in order to speak "the same language" with colleagues from Finance.



At the same time, not all types of savings can be seen in the profit and loss statement (P&L), some types of cost reduction affect only the indicators of the cash flows statement (Cash Flow), and some do not fall into the reports at all - this is a cost avoidance.

The resulting financial indicators, which are affected by cost reduction, are:

- in the income statement (P&L) - EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) - profit before (excluding) interest on loans, tax and depreciation of fixed assets and intangible assets. This indicator is more convenient


¹ The parameters of investment expenses are set by local tax legislation and the company's accounting policy.



for the analysis of procurement savings than Net Profit, since it excludes the impact of depreciation and payments for the use of credit funds.

EBITDA is affected by:

- common business expenses (OPEX) in the framework of indirect purchases;
 - direct purchases forming the cost of goods and services sold (COGS).
- in the cash flow statement - NCF (Net Cash Flow).

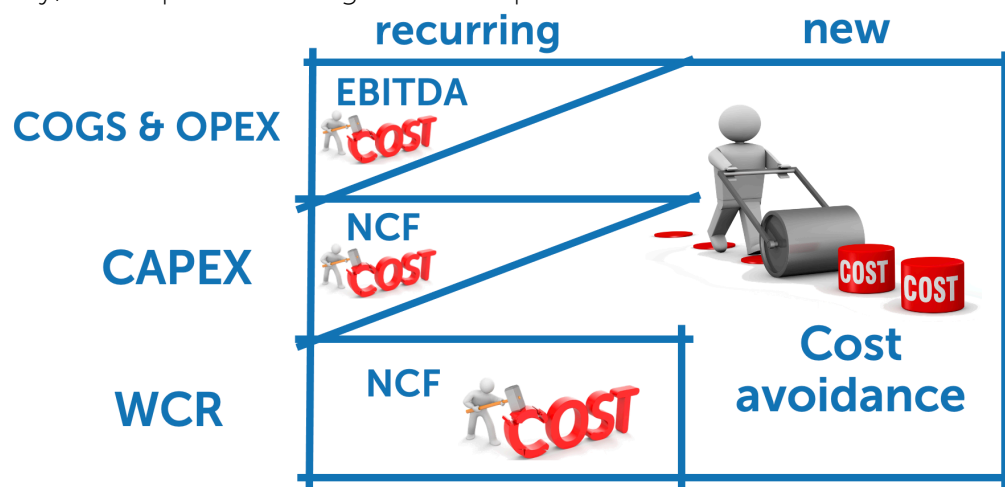
 The cash flow statement includes net income (see example in paragraph 3.9), and therefore EBITDA. Therefore, it can be argued that all types of cost reduction are reflected in this report.

NCF is affected by:

- change in the inventories;
- investment expenses (CAPEX);
- changes in accounts payable and receivables, and consequently, changes in Working Capital Requirements (WCR) (see clause 3.6).

WCR management through payment terms indirectly affects financial activities related to the management of the loan portfolio and interest on loans.

Schematically, the impact of savings can be represented as follows:



2.6.3.5 The terms "Stock/Inventories" and "Expense" in the understanding of Finance and Purchasing

Something lying in a dark corner of a warehouse is often referred to by buyers, warehouse workers and other company employees as "stock", but for financiers this term has a clear definition, according to International Accounting Standards (IAS2) [2]: inventories¹ are assets:

- held for sale in the ordinary course of business (including finished products);

¹ Local tax laws may impose different requirements for accounting for Inventory against common business expenses. For example, in some countries, the procedure for accounting for low-value items with a long period of use (stationery, overalls, tools, spare parts) has not been adjusted at the moment. The organization must itself establish and reflect in the accounting policy the chosen approach based on the principles of materiality of information and rationality of accounting.



- in the process of production for such sale (work-in-progress, WIP); or
- in the form of materials or supplies to be consumed in the production process or in the rendering of services.



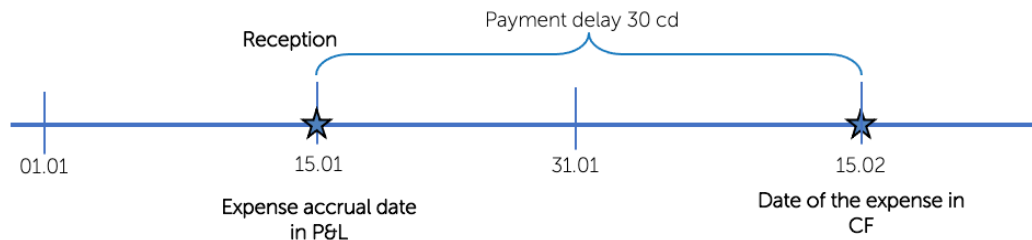
Therefore, the material assets in the warehouse, in addition to the Stock, can be:

- common business materials;
- and fixed assets (equipment).

Usually, tax legislation establishes a mandatory frequency of inventory of Stock and Fixed Assets. But there are no such requirements for common business materials (written off as expenses), and they can be in warehouses for years.

The term "expense" also has specifics for each type of purchasing:

- when making indirect and investment purchases, there is an expense for common business and investment costs, respectively. At the same time, the period of accrual of expenses differs in the statement of cash flows (CF) and the income statement (P&L).

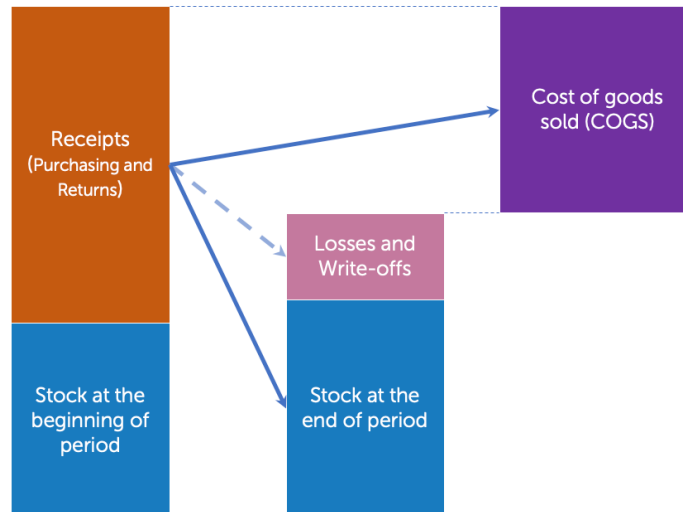


The general practice is that all receipts from indirect purchases at a time can be written off to Current Period Expenses and not form a Stock.

The term "Stock" is also not applicable in the case of investment costs. Such acquisitions form the register of Fixed Assets¹.

- direct purchases form the Cost Price (COGS) and Stock, respectively, the **Cost ≠ Purchases**. To understand this, it is necessary to consider the general (simplified) cost calculation scheme:

¹ Within the framework of this methodology, the procedure for the formation of the Fixed Assets register, the commissioning of the Fixed Assets and the calculation of depreciation are not considered.



The cost of goods sold is determined from the ratio:

$$\text{COGS} = (\text{Stock at the Beginning} + \text{Receipts}) \\ - (\text{Stock at the End} + \text{Losses} + \text{WriteOffs})$$

Buyers manage the price, as well as using leverage to decrease the stock of raw materials and components:

- reducing the Minimum Order Quantity (MOQ);
- reducing packaging capacity (PCB par combien, fr.);
- search for local suppliers (shortening the supply chain and reducing safety stocks);
- search for suppliers able to deliver "just in time" and "just in sequence";
- applying Payment Upon Consumption Model;
- shift the need for inventory management to the supplier (for example, the customer-general contractor can transfer the entire purchase of materials to contractors).

In addition, a decrease in physical material assets for all types of purchases in warehouses can lead to other types of savings [3] that go beyond the boundaries of this methodology:

- decrease of operating costs for inventory management;
- reduction of errors: the smaller the stock, the more manageable it is;
- reduction of insurance fees;
- reduction of losses from natural attrition (for example, shrinkage ...) and obsolescence (depreciation);
- reduction of costs for storage, purchase and maintenance of the warehouse;
- reduction of logistics processing costs;
- and lower accounting costs.

2.6.3.6 Savings in direct procurement and COGS / stock variation

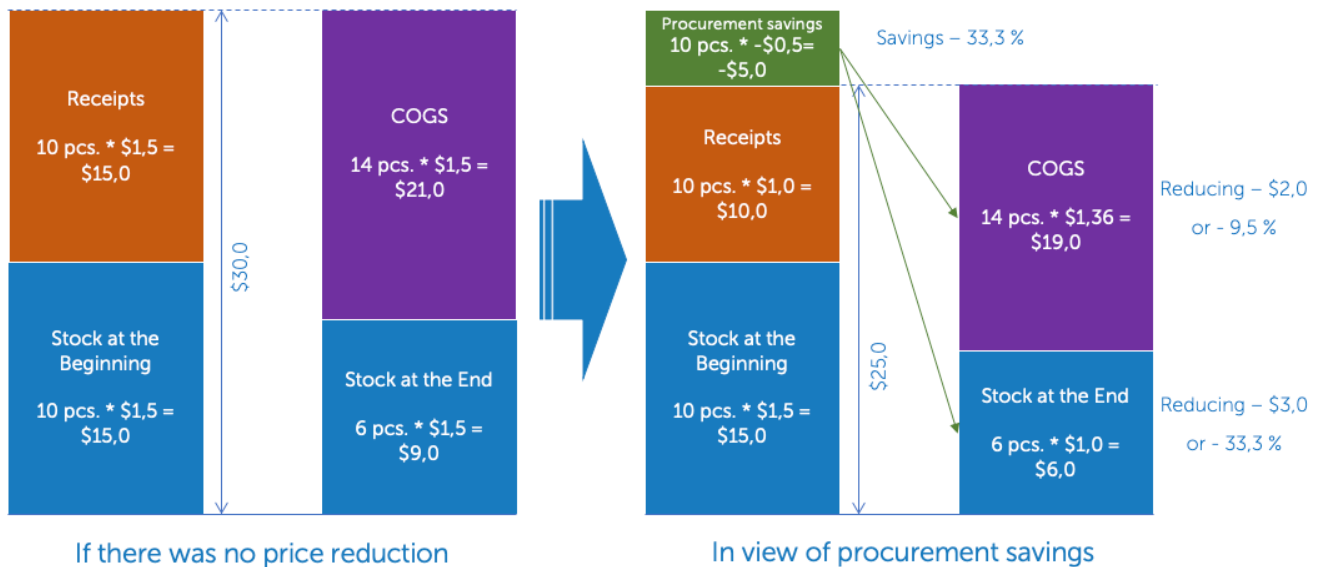
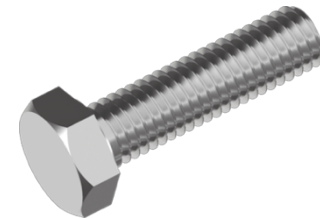
The volumes of direct purchases depend on the production plan, sales, order and supply algorithms, therefore methods of optimizing the stock are applicable (see chapter 2.6.3.5) but not the consumption reduction.



In the case of indirect purchases, the price variation affects Costs only, but a variation in the price of direct purchases at the same time affects at least two indicators: Cost of goods sold (COGS) and volume of Stock at the end of the period (i.e. the whole period). It is also possible to impact on Losses and Write-offs. The proportion of the impact of purchase price variation on the final stock and COGS is highly dependent on the accounting policies of the enterprise.¹

Example: variation in COGS and stock

- Reducing the purchase price of a bolt from \$1,5 to \$1,0;
- Stock at the beginning of the period 10 pcs.;
- Stock at the end of the period 6 pcs.;
- Purchase 10 pcs.;
- Inventory valuation by FIFO method.



Procurement savings by \$5,0 decreased the COGS by \$2,0 during this period. Depending on commercial policy, this may lead to a proportional increase in Margin and EBITDA if sale prices do not change, or to a change in sale prices and with no direct contribution to Margin and EBITDA. At the same time, the remaining \$3,0 of savings affected the reduction in the Inventory, i.e. to reduce the working capital requirement (WCR), which also gives an economic effect in Cash Flow.

It can be seen from the above example that the procurement savings are not immediately passed into COGS reductions, since there is the influence of the old stock, especially with the FIFO valuation method.

The impact of procurement savings on COGS and Stock with various accounting methods:

	FIFO	Average	LIFO
COGS	SLOWER	MEDIUM	FASTER

¹ There are various methods for measuring the value of inventory, the most common methods are: FIFO - First In, First Out, LIFO - Last In, First Out, the average cost method and the cost of each unit.



STOCK	FASTER	MEDIUM	SLOWER
-------	---------------	---------------	---------------

Laying out the impact of procurement savings in details, procurement departments can show their contribution to the company's result and speak the same language with Finance.

2.7 Period of measuring of procurement savings

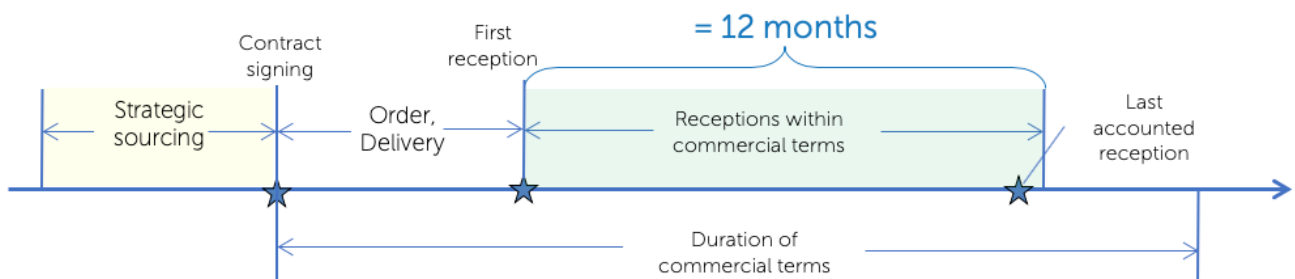
Another topical question: "How long should we measure the procurement performance? 12 months, a fiscal year, the valid period of the commercial terms or something else?" The aim is not to show the greatest possible procurement savings, but to reflect the contribution to the company results as accurate as possible. But here is a trap: since procurement savings are a qualitative indicator, first of all, that should reflect the effectiveness of the procurement team and build trust in it, and only secondly, it is a financial indicator to be reflected in company reports.

Let's take two examples:

- **Result of the sales team.** If the sales team successfully implemented the project and brought the company to a new market, their figures are seen once in annual report, or in the results of the "sliding" year.
- **Consumption policies.** If the procurement team together with the internal client put consumption policies in place, the savings are reflected within 12 months in the company's results. Although consumption policy management may require regular resources, this issue already goes beyond procurement savings and relates more to cost management and financial management. Otherwise, such saving could be taken into account for an indefinitely.

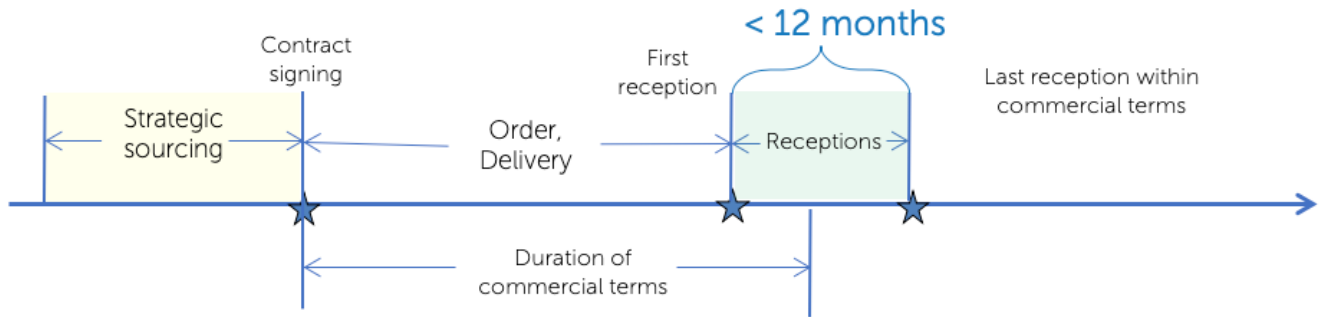
👉 So, for most purchases, savings are taken into account the first 12 months from the moment of the first reception or less than 12 months until the commercial agreement is expired.

Scenario No. 1: standard project, the term for calculating savings is 12 months:





Scenario No. 2: standard project, calculating savings of less than 12 months:

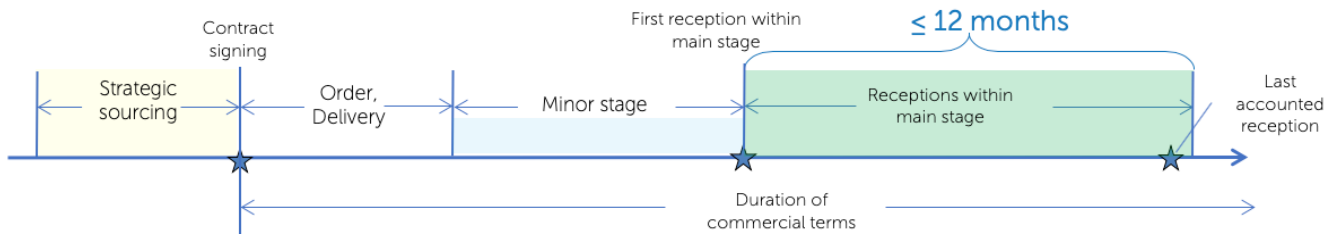


The most common duration of contracts (commercial terms) are 1-2 years, while it is obvious that it is easier for the buyer to fix the conditions for one year than for two or three years. In this case, it may be tempting to focus on the short term. This is a question of professional ethics (see paragraph 6.2.1).

There are specific long-term procurement projects, the implementation of which does not fit into 12 months. And we are not even talking about its significant beginning. For example, software implementation projects (a detailed example is given in paragraph 3.2.3) may take several years and have stages: development -> testing -> pilot -> **roll-out**. In this case, the first minimum batch of licenses can be purchased at the beginning of the project, and the bulk in a few years. Another example is the purchase of call center services: a test implementation for one year and only then a full implementation.

👉 For long-term projects, commercial terms for several years should be fixed, stages should be defined, and savings can be calculated from the moment of the first reception within the main stage for a period of not more than 12 months.

Scenario No. 3: a long-term project, the term for calculating savings is less than or equal to 12 months:



Such a measurement should be carried out at the level of SKU (or the part of a contract), since for different articles of the contract different stages can occur at different times.

Long-term investment projects, such as "Purchase of the Future Thing" (in the field of capital construction) can be singled out separately. After the contract signing, there may be several stages of long-term investment (essentially advances). In this case, the actual measuring of procurement savings occurs at the time of the transfer of property rights, but the financial costs of the advance payments should be taken into account throughout the entire financing period. And savings should be considered cumulatively.

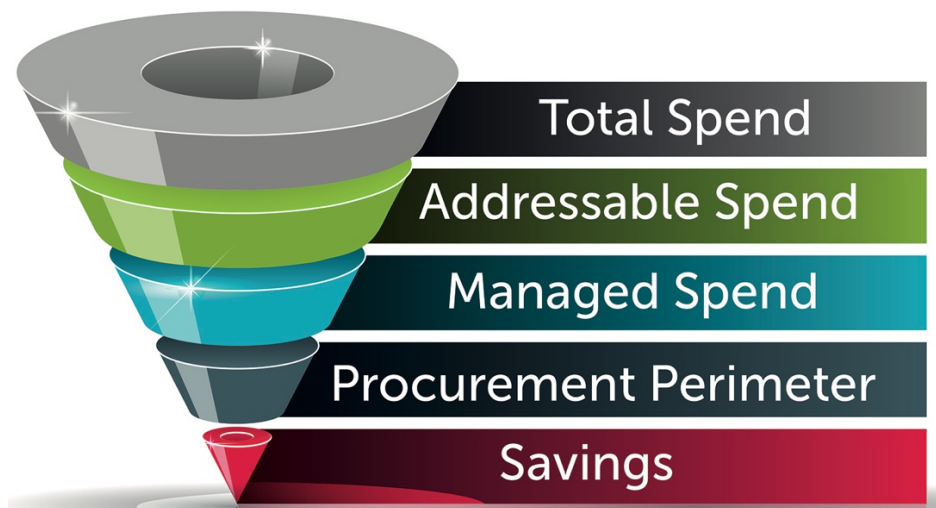
2.8 Perimeter of procurement



The terms of “procurement perimeter” and “addressable spend” are closely related to measuring of the procurement efficiency and its impact to the company's result.

Consider the classification of spend types in terms of the procurement function:

- **Total spend** - this is the sum of absolutely all company spend/purchases;
- **Addressable spend** – expenses that procurement teams can potentially manage. Addressable spend do not include payroll fund, charity and sponsorship, duties and taxes, etc.
- **Managed spend** – for some costs, sourcing decisions are based on market constraints and are not always driven by purchasing processes and may not be managed by the purchasing function. For example, low-value purchases can be delegated to Internal Clients. The company may have more than one procurement service (for example, commodity and non-commodity in trading companies, production and indirect) in this case, the addressable spend are determined for each of these services.
- **Procurement perimeter** - spend within the global or local contracts concluded by specialists of the procurement department (s).



- **Savings** – perimeter project management result.

The total procurement savings are considered within the procurement perimeter. **And the Perimeter is under control (%) = (Procurement Perimeter / Managed Spend)** since the actions of the Procurement are focused within these frames.

Case Study: Procurement Perimeter

At first glance, the task of determining the procurement perimeter does not seem complicated, however, in practice, difficulties arise in classifying these costs. There are several different approaches depending on the quality of the master-data in the organization's ERP system:

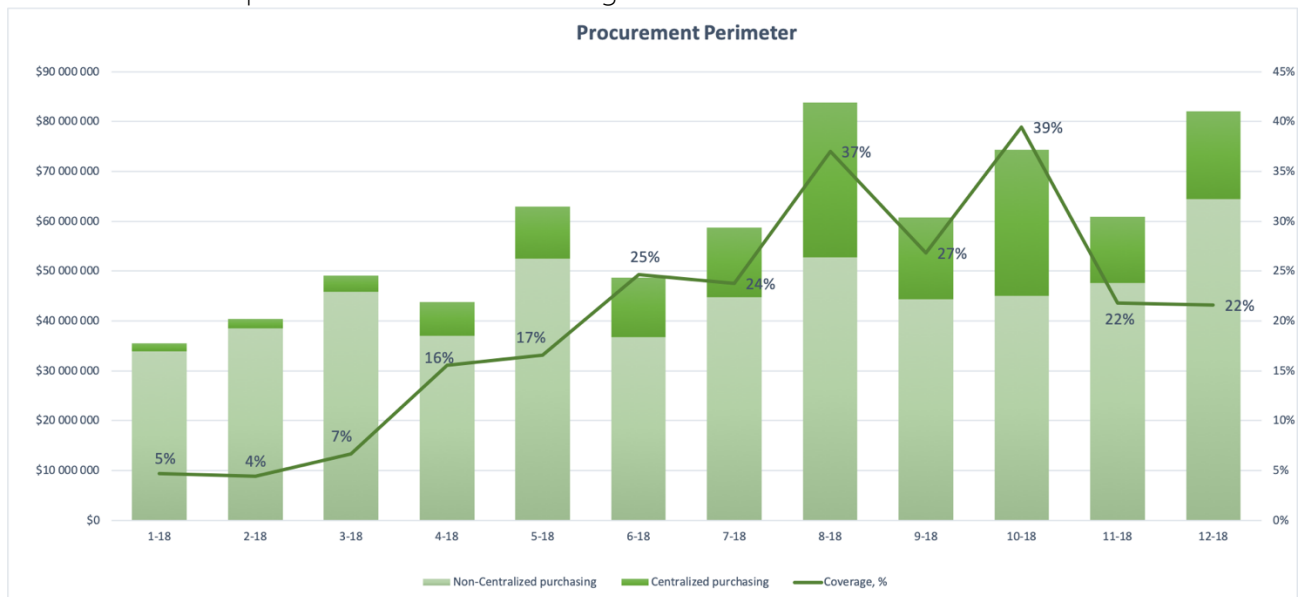
- **Tracking spend by suppliers.** Difficulties arise when expenses with a particular supplier are out of a specification list agreed. For example, there is a frame agreement signed with a supplier N with a list of computers approved for purchase, but at the same time,



this supplier may deliver another IT equipment not listed. With this approach, it is necessary to fix the share of purchases upon specification list agreed, for each supplier (exactly or approximately);

- **Tracking contract spend** (if such master-data is in the ERP). Each agreement with a supplier can have the essence of a “contract” in ERP. This approach provides a more accurate measurement of the procurement perimeter, but does not exclude the purchase of non-approved items.
- **Tracking spend by article.** The most accurate method that allows you identifying articles at the SKU listing stage.
- **Tracking spend by initiators** if a centralized purchasing service exists.

The result can be presented in the following form:



Since the volume of spend is constantly varying, it is advisable to monitor the % of procurement perimeter indicator every quarter or once a year.

2.9 Net Present Value (NPV)

If the choice is between buying and leasing (or long-term lease with option to buy), then a direct cost comparison is not possible. In addition to the assessment of TCO (taxes, maintenance, etc.), the price of the main asset upon purchase should be compared with the Net Present Value (NPV). This method links the Current Value of money to the Future one. So, the net present value shows the value of future costs at present moment and is determined by the formula:

$$NPV = \frac{FV_0}{(1 + WACC_0)^{t_0}} + \frac{FV_1}{(1 + WACC_1)^{t_1}} + \frac{FV_2}{(1 + WACC_2)^{t_2}} + \dots + \frac{FV_n}{(1 + WACC_n)^{t_n}} \quad (8)$$

where:

FV –Future Value or deferred expenses (in case of spend);

WACC – weighted average cost of capital;

t – number of the time period;



FV_0 , $WACC_0$ and $t_0 = 0$ – in fact, these are expenses of the current period or initial investments.

Case study: comparison of the cost of the forklift truck when buying and leasing

- 1st option - purchase: \$32 000;
- 2nd option - 4 years leasing with option to buy: equal payments of \$ 10 000 per year;
- WACC – 8% constant;
- Other TCO components are not presented in this case.



To answer the question: “What is more profitable to buy or lease?”, it is necessary to compare the one-time costs of \$32 000 with the discounted costs of leasing. To bring the costs of future periods to the cost of today:

$$NPV = \frac{\$10\,000}{(1 + 0,08)^0} + \frac{\$10\,000}{(1 + 0,08)^1} + \frac{\$10\,000}{(1 + 0,08)^2} + \frac{\$10\,000}{(1 + 0,08)^3} =$$
$$= \$10\,000 + \$9\,259 + \$8\,573 + \$7\,938 = \$35\,770$$

Thus, the purchase of the forklift truck is more profitable than leasing for \$ 3 770. The next question is the financing strategy in the company, if there is free cash to purchase or which financial tools are available.

2.10 Data sources and data quality. Assumptions.

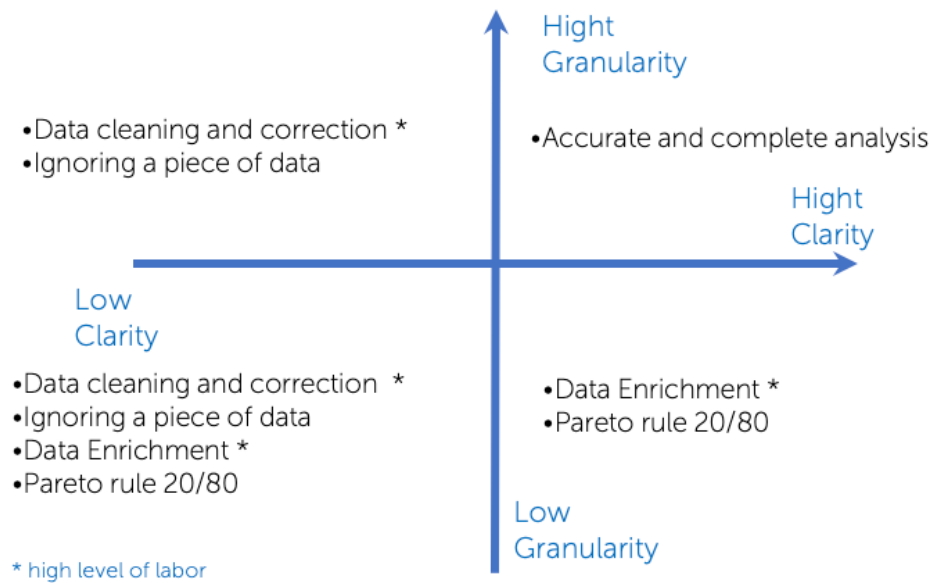
The accuracy of procurement savings calculation depends on the quality of data and data sources. The main sources of procurement data can be: ERP or P2P systems, orders, General Ledger data, registers of capital assets, invoices, information from suppliers, contracts.

The quality of the source data is determined by the methods of working with them and the quality (accuracy) of the result. Data quality is determined by two main indicators:

- **Granularity** - with high granularity of procurement data, there is information on all deliveries at the level of unit prices and quantities, with low granularity data may be absent (or not available) on part of deliveries, or procurement data exists only as total amounts without granularity.
- **Clarity**. High clarity data excludes errors and “human factor” (data is generated automatically), “dirty” data can contain many anomalies and loads of manual inputs, which makes identification and analysis difficult (for example, the same procurement item may be named differently).



In some cases, in real business conditions, the calculation of procurement savings may contain a number of tolerances, depending on the quality of the source data.



Direct procurement data is often of better quality because there is stock accounting at SKU level. It is more difficult to obtain detailed data on indirect procurements, primarily because of the lack of a clear unified classification of SKU materials and services.

Case study: detailing services.

There is a service for holding a New Year's event for employees. This can be one line of expenses, can be divided into: rental of premises, meal and animation, and can have even greater detail. A very common question: "What level of detail is needed?"

It is necessary to build on the true subject of procurement and consumption:

- **Hall rental** - it does not make sense to detail for 1 sq. m., since this is not a long-time office rental, but a rental of a particular place for 1 evening. In fact, this is a unique SKU, which cannot be compared "face-to-face" with other offers.
- **Meal** - and here, of course, the costs directly depend on the set of products and the number of guests. Champagne and black caviar cannot be compared with sausage and beer. That is, SKU is a specific set of products for 1 person.
- **Animation** - here, too, detailing by types and hours is possible, for example, the performance of a rock band - \$ XXXX per hour, an emcee - \$ XXX per hour.

This approach will create an array of data on which procurements can rely on in their activities.

The efforts for obtaining accurate data should be consistent with the complexity level of the procurement project. For small projects with a poor initial data, the calculation of savings can be ignored.

Case study: procurement of packaging materials stretch-film and scotch tape.

Task: calculation of the base price level for the procurement project.



Data sources - Oracle OeBS and "Directum" - enterprise contract management (ECM) system, information about unit prices and volume is not available in the ERP system, there are only primary documents - scans of delivery notes and invoices, some of the documents are lost.

1,503 shipments from 75 suppliers last year.

Obviously, under the conditions of such initial data, an exact analysis is not possible and unreasonably labor-intensive.

Accepted assumptions:

- to analyze only 20 suppliers (out of 75) forming 80% of the spend - the Pareto rule (Fig. 1)
- to take into account data of 20% of deliveries from 4 different quarters for selected suppliers (Fig. 2)

Thus, the volume of analysis was reduced from 1,503 documents to 200, while the data error is not significant within the business task.

Supplier	Total \$ without VAT	% , cumulative
	\$2 393 250	
Excellent	\$326 738	13,7%
CvadroCom fg	\$242 441	23,8%
SPB Tach Roll	\$209 652	32,5%
SouzPack fg	\$148 905	38,8%
NordPack	\$118 742	43,7%
PromTorgService	\$103 967	48,1%
Alliance Center Company	\$85 535	51,6%
DeltaPack	\$78 538	54,9%
Vector-N	\$75 922	58,1%
RostDonTorg	\$68 686	61,0%
Production Complex	\$60 071	63,5%
Volga Packaging Company	\$58 335	65,9%
AVAL Plus	\$56 033	68,3%
Packaging and Service South	\$53 165	70,5%
FAO	\$52 037	72,7%
Alyans-Regions Company	\$50 821	74,8%
PromPack	\$46 480	76,7%
DisPack	\$39 779	78,4%
Vector Group	\$39 316	80,0%
Liga-Pack	\$37 581	81,6%
Kamsk field	\$33 240	83,0%
Union Group	\$30 739	84,3%
Veles-Torg	\$26 725	85,4%

Supplier	Description	Material	Qty 2016	Corresponding Price	Total 2016
Excellent	stretch-film 500 mm * 23 µm 2 kg.	stretch-film	70 345	\$3,72	\$261 390,55
Excellent	scotch tape 48 mm x 66 m	scotch tape	200 453	\$0,33	\$65 347,64
CvadroCom fg	stretch-film 500 mm * 20 µm 2 kg.	stretch-film	47 314	\$4,10	\$193 952,96
CvadroCom fg	scotch tape 48 mm x 66 m	scotch tape	123 986	\$0,39	\$48 488,24
SPB Tach Roll	stretch-film 500 mm * 12 µm 2 kg.	stretch-film	36 162	\$4,64	\$167 721,31
SPB Tach Roll	scotch tape 48 mm x 66 m	scotch tape	128 560	\$0,33	\$41 930,33
SouzPack fg	stretch-film 450mm 17µm 2 kg	stretch-film	32 165	\$3,70	\$119 123,66
SouzPack fg	scotch tape 48 mm x 66 m 40 µm	scotch tape	103 961	\$0,29	\$29 780,91
NordPack	stretch-film 450*285m*17µm	stretch-film	28 350	\$3,35	\$94 993,72
NordPack	scotch tape 48mm*140m*54µm	scotch tape	75 761	\$0,31	\$23 748,43
PromTorgService	stretch-film 1kg	stretch-film	15 791	\$5,27	\$83 173,49
PromTorgService	scotch tape	scotch tape	70 652	\$0,29	\$20 793,37
Alliance Center Company	stretch-film 1 kg	stretch-film	19 837	\$3,45	\$68 427,90
Alliance Center Company	scotch tape 48x100	scotch tape	60 822	\$0,28	\$17 106,98
DeltaPack	stretch-film 20µm1 kg	stretch-film	19 277	\$3,26	\$62 830,19
DeltaPack	scotch tape	scotch tape	57 651	\$0,27	\$15 707,55
Vector-N	stretch-film 500*15/17/20 µm*2,0 kg	stretch-film	20 797	\$2,92	\$60 737,40
Vector-N	scotch tape 48mm*120m*40µm	scotch tape	46 037	\$0,33	\$15 184,35
RostDonTorg	stretch-film 1kg	stretch-film	18 167	\$3,02	\$54 948,89
RostDonTorg	scotch tape	scotch tape	47 724	\$0,29	\$13 737,22
Production Complex	stretch-film 500 mm * 17 µm 2 kg.	stretch-film	14 015	\$3,43	\$48 056,84
Production Complex	scotch tape 50 mm x 66 m	scotch tape	43 872	\$0,27	\$12 014,21
Volga Packaging Company	stretch-film 2 kg	stretch-film	11 547	\$4,04	\$46 668,31
Volga Packaging Company	scotch tape	scotch tape	27 708	\$0,42	\$11 667,08
AVAL Plus	stretch-film 500*300m*17µm (2,0 kg)	stretch-film	13 590	\$3,30	\$44 826,66
AVAL Plus	50mm*45m 45 µm	scotch tape	31 002	\$0,36	\$11 206,66
Packaging and Service South	stretch-film 500mm*215m,20µm (0317-969)	stretch-film	11 993	\$3,55	\$42 531,70
Packaging and Service South	48mm*66m	scotch tape	30 772	\$0,35	\$10 632,92

(fig. 1)

(fig. 2)

Baseline calculation result:

- stretch-film 500 mm, 17 µm 2 kg. – 511 200 pcs., base unit price –\$3,76;



- Scotch tape 50 mm x 66 m, 45 μm – 1 456 328 pcs., base unit price – \$0,34.

2.11 Total cost of ownership (TCO)

Total Cost of Ownership (TCO) [8]. Measuring the total cost of ownership presents a more complete picture of what a product is and how much it costs over time.

When choosing an alternative in a procurement decision, buyers must look not only at the short-term price of the product, known as its purchase price, but also at its long-term price, which is the total cost of ownership. An item with a lower TCO is the best value in the long term.

The total cost of ownership takes into account the cost of long-term ownership of the asset by measuring both its purchase price and the costs of storage, operation, modernization and disposal / replacement at the end of the life cycle.

As part of the analysis of procurement savings or comparing commercial bids with TCO components that do not differ much and do not affect the overall assessment or are the same, can be ignored, thereby reducing the labor costs for the measuring.

For example, if we compare electric forklifts truck of a comparable power class and those operating on Lead-acid batteries, then we can exclude the energy from measuring of consumption and costs, since the calculation itself can be complicate, and it does not affect comparing the TCO of equipment from different manufacturers. At the same time, if you are comparing a truck model with a Lead-acid battery and a Li-ion battery, the differences in energy consumption will be significant (due to the different energy conversion efficiency), and they must be taken into account in the TCO.

Comparing the total cost of ownership is not a calculation of savings in itself (but it may be as a special case). When calculating TCO, the period of time is accepted as realistic as possible (depreciation period, leasing period, planned operation period), while the savings are calculated no more than 12 months. For example, equipment with a depreciation period of 48 months, TCO is estimated for 48 months, but the calculation of savings is 12 months.



Different lines of TCO can be related to different types of costs of both CAPEX and OPEX, and sometimes COGS (for example, if the equipment works only on a certain type of raw material), therefore, the result of the savings measurement of such projects can partially affect NCF and partially EBITDA.

2.12 Qualitative procurement performance

In addition to savings, procurement projects can set and achieve quality objective that need to be considered in a comprehensive manner and fixed at the level of each project. For instance:

- Improved Management of Business Process:
 - Decreased non-compliance risk;



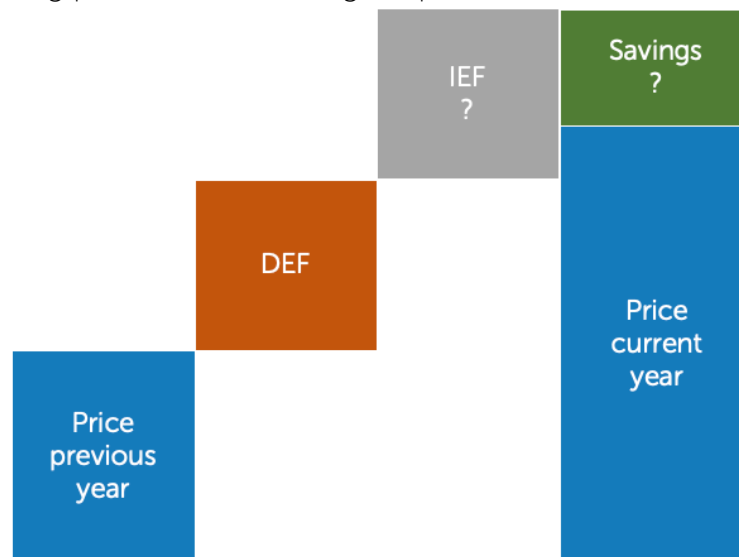
- Flexibility to adapt to changing business requirements;
- Better process control;
- Localization;
- Increased productivity;
- Reducing delivery times;
- Improved OTIF (On Time In Full)
- Improving cross-functional interaction;
- Improved quality level:
 - Satisfaction of internal and external clients;
 - Shortening the service cycle;
 - Increasing the quality of work / service;
 - Improving professional skills;
 - Strengthening partnerships;
- Improved Technology Leverage:
 - Innovation;
 - Increased automation of key processes;
 - Enhanced IT integration;
 - Easier coordination of technology initiatives and implementation of new technology;
 - Greater flexibility to adapt to changing technology environment.
- Improved Data Quality and Accessibility:
 - Improving decision-making processes through easy access to accurate information;
 - Enhanced data quality, reliability, and integrity;
 - Improved ability to leverage common information;
 - Improved comparability, consistency, timeliness, and accuracy of financial information;
 - Better access to information.



3 PROCUREMENT SAVINGS

3.1 Price savings of recurring purchases

In the previous chapter, we defined direct (DEF) and indirect economic factors (IEF) and their impact on variation in purchase prices. Moreover, the identified significant impact of indirect factors make calculating procurement savings impossible from the historical level.



Prices can be compared only in case of identical payment terms to suppliers. If a request to suppliers was made without specifying requirements for payment terms, that are different from different suppliers, then a comprehensive method for evaluating proposals (see paragraph 3.7.1) should be used and offers should be compared considering the cost of capital under different financing conditions.

3.1.1 Historical baseline of recurring purchases

The historical baseline for calculating the savings of recurring purchases is the prices and volumes that correspond to the subject of the current purchase for a comparable period and perimeter of consumption.

A comparable period is the same period of last year, i.e. minus 12 months. For example, to compare purchases in the third quarter of 2019, you need to take the basic indicators of the third quarter of 2018, and for the period of purchase from April 13, 2019 to April 12, 2020, the base will be the period from April 13, 2018 to April 12, 2019

If there are no actual historical prices in the range of -12 months (from the date of the first delivery under new terms), then such a purchase cannot be considered recurring and the previous historical prices should not be taken into account. In addition, P&L considers changes in costs only to a comparable period last year.

The perimeter of consumption becomes important if we manage volume in order to save (for example, by implementing consumption policies) or for substitution projects (for

example, when the consumption of material depends on its quality). In these cases, it is important to calculate the specific baseline consumption per unit of production, equipment, area, building, etc. For example, the base level of equipment consumption per 1 store (perimeter) was 34 units, but by applying best practices and implementing consumption policies you achieved a consumption of 26 units by increasing productivity, while the number of stores can increase or decrease, that affects the total volume consumption, but not the specific volume.

In general, the purchase cost formula is as follows:

$$C = \sum_i p_i^{SKU_1} * q_i^{SKU_1} + \sum_j p_j^{SKU_2} * q_j^{SKU_2} + \dots + \sum_k p_k^{SKU_n} * q_k^{SKU_n} \tag{9}$$

where:

C – total costs for the period;

p^{SKU} – purchased item (SKU) price of the material or service;

q^{SKU} – the quantity of purchased or returned items (multiplied by a coef. -1 upon return);

i, j, \dots, k – receipts and returns of positions 1,2, ..., n, respectively, for the period.

The method of considering VAT in the spend structure depends on the type of expenses and the method of VAT refund. If the VAT on expenses is refundable, then the costs may be taken VAT excluded.

And the weighted average cost formula for one item (SKU) is:

$$P_{Weighted\ Average} = \frac{C}{Q} = \frac{\sum_i p_i * q_i}{\sum_i q_i} \tag{10}$$

where:

Q – total quantity purchased for the period.

The procurement item in the current and previous periods may not always coincide within the Need, and sometimes it is impossible (for example, due to updating the model range). The following options are to compare the recurring purchases:

- **Identical material or service** - previous and current purchases occur within the same SKU / manufacturer's article;



- **Similar material or service** is a material or service with identical characteristics within the described business need;



- **Corresponding material or service** - materials or services whose characteristics can be correlated through a cost coefficient;



- **Substitution of a material or service [more in paragraph 3.4]** – in the case when a given business need may be covered by another solution. For example: buying or leasing; outsourcing or in-house; purchasing software, developing or purchasing a Service (SaaS, Software as a Service); a material or service with other characteristics within the same Need.



Consider the following examples:

Example #1 - Similar material or service: office folders
The Need - a regular office folder with an arch mechanism, width 75 mm.

This year's purchase is brand N folders.

For a comparable period of last year, two brands of folders (brand M and brand L) were purchased within this need.

At this example, a direct comparison with baseline costs is possible.

The baseline volume - the total quantity of folders purchased for the previous period.

The baseline price is the weighted average price of M and L folders.





For example, there were 3 delivery per period (Y-1):

Delivery	Price	Qty
brand M, invoice #1	\$2,00	300 pcs.
brand M, invoice #2	\$1,96	500 pcs.
brand L, invoice #1	\$2,4	1000 pcs.

Total folders costs for the period (Y-1):

$$C = \sum_{i=1}^2 p_i^{\text{brand M}} * q_i^{\text{brand M}} + \sum_{j=1}^1 p_j^{\text{brand L}} * q_j^{\text{brand L}} = \$2,00 * 300 + \$1,96 * 500 + \$2,4 * 1\,000 = \$3\,980$$

The volume of consumption for the period (Y-1):

$$Q = \sum_{i=1}^2 q_i^{\text{brand M}} + \sum_{j=1}^1 q_j^{\text{brand L}} = 300 + 500 + 1000 = 1800 \text{ pcs.}$$

Weighted average folder price in period (Y-1):

$$P_{WA} = \frac{C}{Q} = \frac{\$3\,980}{1800 \text{ pcs.}} = \$2,21$$

Example #2 - Corresponding material or service: scotch tape.

The Need - scotch tape transparent for packaging;

Purchase in the current year - scotch tape brand N, width 48 mm, winding length 60 m, thickness 45 microns. For a comparable period of last year, brand M scotch tape was purchased: width 50 mm, winding length 50 m, thickness 45 μm (commonly, different manufacturers make windings of different lengths: 50 m, 60 m, 66 m, 100 m, 132 m, etc.)

Direct comparison of prices and volumes is impossible, it is necessary to bring the baseline to the subject of the current procurement. The difference in widths of 48 and 50 mm can be ignored, since it does not affect the need and fits into the range of specifications TR. But prices and volume can be compared with the coefficient of 1,2.

The baseline volume - the total quantity of scotch tape per period divided by 1,2.

The baseline price is the weighted average cost of 1 roll multiplied by 1,2.

Example #3 - Substitution: in-office printing

The Need - laser printing of documents, A4 format, black and white.

Purchase of copy printing as a service: equipment, maintenance, consumables (including paper) are provided by the supplier. The customer pays for each printed sheet only.

In previous periods, the company purchased equipment, supplies and other things on their own.


A direct comparison of costs is impossible; therefore, the baseline of the previous period should be bringing to the subject of the current purchase, i.e. cost of one printed sheet A4.

The baseline volume - the quantity of sheets of paper purchased or consumed (depending on the availability of an accounting system for consumption and stock management) for the period Y-1.



The baseline price - is the total cost of ownership of TCO (depreciation of equipment for the period, maintenance and repair, purchase of cartridges and paper) divided by the baseline volume.

Therefore, it is possible to compare the cost of the subject of purchase - black and white printing of 1 sheet A4 with the costs of previous period.

 In the case of substitution savings, unit prices cannot be simply compared,, but it is necessary to correlate spend over a period of time and perimeter of consumption.

This example will be considered in more detail in paragraph. 3.4.2.

3.1.2 Current bids baseline for recurring purchases

Let's consider in detail indirect economic factors (IEF):

- **Inflation** – there is a general mistake when inflation is directly taken into account to calculate procurement savings. This approach allows you inflating the figure of declared savings, but in fact it undermines the confidence within the company to Procurement. The inflation index (general and industrial) has no direct impact on the pricing of a procurement item and cannot be attributed to direct economic factors (DEF).
- **Payroll** - often payroll represents a significant part in the total cost of a material or service, however, there are no indicators that can accurately determine its change in each case. Each supplier company has its own policy on employee salaries, and in some cases the supplier's declaration on increasing employee salaries has nothing to do with reality. Therefore, this indicator, like inflation, cannot be attributed to direct economic factors (DEF) directly affecting the price of the procurement item.
- **Derivative materials** - it is obvious that almost all materials and even services have a raw materials share determined by commodity indices: metal, oil, agricultural products, etc. For example, granular polyethylene, which is made from petroleum products, is a common raw material, but the technological chain and economic model of production are so complex that there is no direct relationship between the cost of granules and the oil price. Therefore, their impact should be attributed to indirect factors, or considered in a deep study an economic model, if this is an important part for the enterprise.

 In order to consider the IEF in the form of a procurement savings calculation, its significant effect must be justified

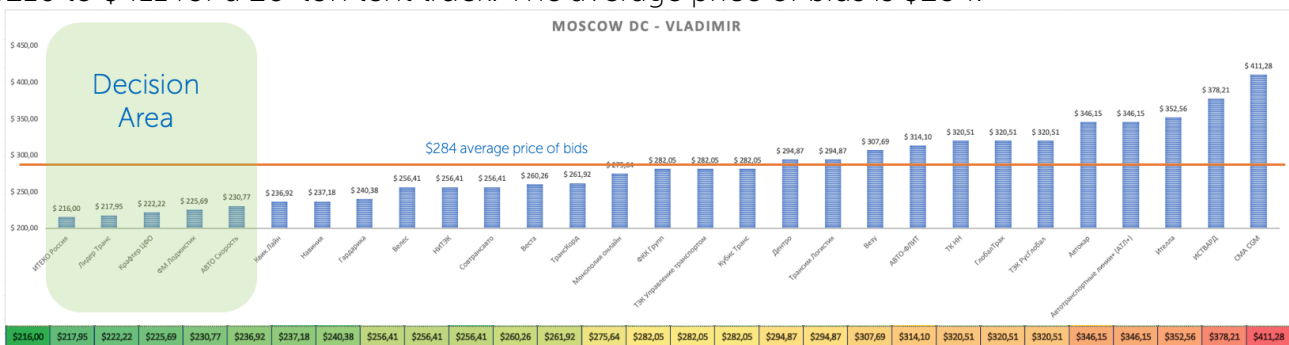
So, with the identified and significant impact of indirect economic factors (IEF), the measurement of procurement savings from the historical price baseline becomes impossible. Therefore, an alternative baseline is the price of **the best initial offer (BIO)**, as the most conservative assessment method. And that is why this approach is finding more and more supporters in the world.



An alternative method for determining the price baseline, adopted by some companies, is the average price of bids (first or final). Of course, there will always be savings upon this approach. But will the declared savings be credible? The answer is no. Supporters of this approach argue: "The average price is the price of the market!" But this is not so, the average market price is the price of a deals, but not the offers price. When purchasing, you never focus on maximum prices, but one or two bids with maximum prices will increase the average price of bids. That is why this approach is contrary to the objectives of this methodology: to build confidence in the savings figures announced by the Procurement.

Case Study: Transport logistic.

There is logistics bidding: 120 participants, 400 logistic directions throughout Russia. Dozens bids received for each direction. From Moscow Distribution Center to Vladimir: 29 bids from \$216 to \$411 for a 20-ton tent truck. The average price of bids is \$284.



Obviously, the decision-making area will be among the top 5-10 proposals. And the average level of bids cannot be considered as a picture of the market.

3.1.3 Unit price variation

In the previous chapter, we examined three possible scenarios for calculating savings of recurring procurement:

#	SCENARIO	PROCUREMENT SAVINGS FORMULA
0	<div style="display: flex; align-items: center; gap: 20px;"> <div style="text-align: center;"> <p>Price previous year</p> <div style="width: 20px; height: 20px; background-color: #0070C0; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <p>Price current year</p> <div style="width: 20px; height: 20px; background-color: #0070C0; margin: 0 auto;"></div> </div> </div> <p><i>DEF</i> ≈ 0 and <i>IEF</i> ≈ 0</p>	$S_{Unit\ Recurring}^{[0]} = P_Y - P_{Y-1}$



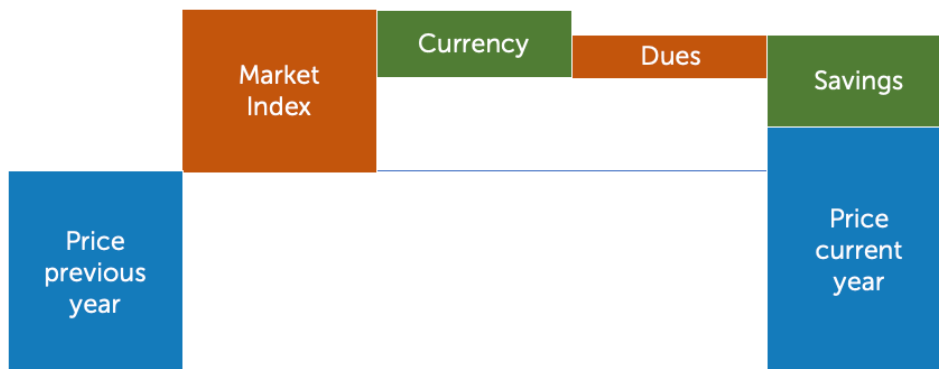
1		$S_{Unit\ Recurring}^{[1]} = P_Y - P_{Y-1} - DEF$
2		$S_{Unit\ Recurring}^{[2]} = P_Y - P_{BIO}$

Scenario #0 is a special case of Scenario #1, i.e. a scenario in which there is no obvious impact of direct and indirect economic factors. In the Scenario #3, it is impossible to measure indirect factors affecting price variation from the historical level.

Direct economic factors (DEF) include:

- Variation of commodity indices;
- Currency fluctuations;
- Variation in duties, excises and fees.

$$DEF = Market + Currency + \Delta Dues \tag{11}$$



In general, the formula for calculating savings for one unit is as follows:

$$S_{Unit\ Recurring}^{[1]} = P_Y - P_{Y-1} - (Market + Currency + \Delta Dues) \tag{12}$$

where:

- $S_{Unit\ Recurring}$ – unit savings of recurrent procurement;
- P_Y – weighted average current period price in local currency;
- P_{Y-1} – weighted average previous comparable period price in local currency.
- Market** – the impact of variation in commodity indices on the price;
- Currency** – the impact of variation in currency on the price;
- $\Delta Dues$** – the impact of variation in duties, excises and fees on the price;

The value for **Market** is defined as:

$$Market = Share_{Market} * P_{Y-1} * \left(\frac{Index_Y}{Index_{Y-1}} - 1 \right) \tag{13}$$

where:



$Share_{Market}$ – the share of the part of the price at the previous period (P_{Y-1}) depending on commodity quotes;

$Index_Y$ – weighted average commodity quotation for the current period in the currency of the exchange;

$Index_{Y-1}$ – weighted average commodity quotation for the previous comparable period in the currency of the exchange;

The value for $Currency$ is defined as:

$$Currency = Share_{Currency} * P_{Y-1} * \left(\frac{ExRate_Y}{ExRate_{Y-1}} - 1 \right) \quad (14)$$

where:

$Share_{Currency}$ – the share of the part of the price at the previous period (P_{Y-1}) depending on the currency rate;

$ExRate_Y$ – weighted average exchange rate for the current period to local currency;

$ExRate_{Y-1}$ – weighted average exchange rate for the previous comparable period to local currency;


The value for $\Delta Dues$ is defined as:

$$\Delta Dues = Dues_Y - Dues_{Y-1} \quad (15)$$

where:


$Dues_Y$ – weighted average fees, excise taxes or duties per unit in the current period;

$Dues_{Y-1}$ – weighted average fees, excise taxes or duties per unit in the previous comparable period;

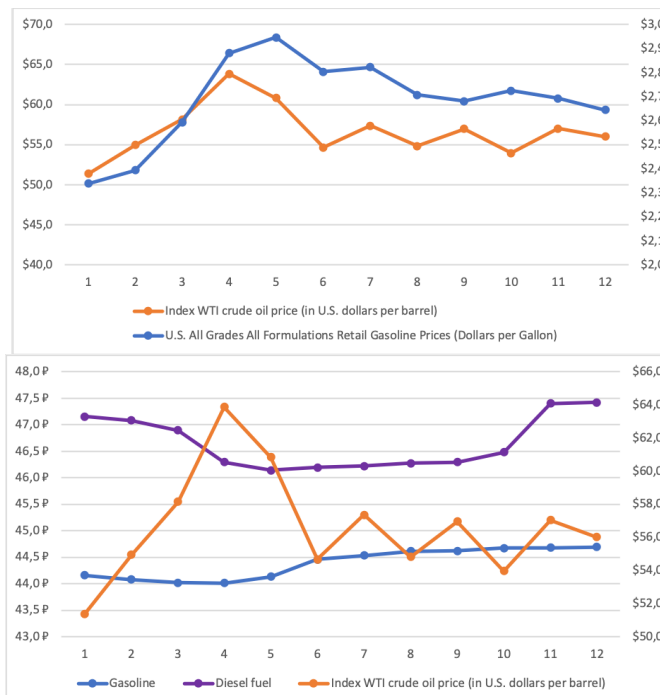
 If the shares of the part of the price, depending on commodity quotes ($Share_{Market}$) or currency rate ($Share_{Currency}$), are less than 10% *, then it is recommended not to take into account their impact in order to simplify the calculation.

* depends on the quality of master-data and management decisions

There are factors that may be on the border of DEF and IEF, and this applies primarily to changes in commodity indices ($Market$). Derivative products (processed products) are not traded on the exchange but can be a powerful external factor in price variation. The question is: "can we accurately measure the dynamics of these factors?" or "do we have accurate and independent market statistics?" and if so, then it can be attributed to DEF and calculate the savings from the historical price level, otherwise it will be IEF.

 Quotations of supplier's bids cannot be considered as market indicators. It can only be independent trade statistics.

A striking example of such a product is **Fuel**. Fuel (diesel and gasoline) in its pure form is not traded on commodity exchanges, however, in most countries of Europe and the USA, changes in oil quotes automatically affect the proportional change in fuel prices (see Fig. 3). Therefore, oil quotes on the commodity exchange ($Index$) are enough to determine the $Market$ value for fuel with high accuracy. But in some countries, there is no dependence between the exchange price of oil and fuel on the market, for example, in Russia (see Fig. 4). In addition, diesel still has seasonality. The share of the fuel component ($Share_{Market}$) in freight traffic is up to 30% and must be taken into account, so you can use the state statistics.



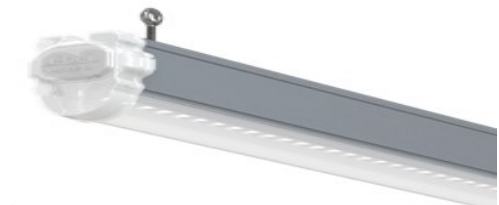
(fig. 3)

(fig. 4)

👉 In some cases, it is possible to use independent industry-specific market statistics to determine the direct economic factors (DEF) of processed products.

Case study: purchase of LED lights

- The price of the lamp in 2018 (P_{Y-1}) was fixed in the contract at 7 166 rubles.;
- 25% of the cost of the lamp ($Share_{Market}$) is the cost of the metal (aluminum), which is purchased at the prices of the London Metal Exchange (LME) in USD;
- The weighted average price in 2018 ($Index_{Y-1}$) was \$2 087 per ton;
- The weighted average price in 2019 ($Index_Y$) was \$1 805 per ton;
- 30% of the cost of the lamp ($Share_{Currency}$) is made up of imported electronic components (Nichia LEDs, etc.), purchased in USD, as well as 25% of the cost of aluminum, total $Share_{Currency} = 55\%$;
- The weighted average currency exchange rate in 2018 ($ExRate_{Y-1}$) was 62,9264 rubles for 1 USD;
- The weighted average currency exchange rate in 2019 ($ExRate_Y$) was 64,6184 rubles for 1 USD;
- No changes in fees, excise taxes or duties $\Delta Dues = 0$;
- The price of the lamp after a new bidding from January 1, 2019 (P_Y) was fixed at 6,763 rubles.



In this way:

$$Market = Share_{Market} * P_{Y-1} * \left(\frac{Index_Y}{Index_{Y-1}} - 1 \right) = 0,25 * 7166 * \left(\frac{1805}{2087} - 1 \right) = -242,07 \text{ rub.}$$

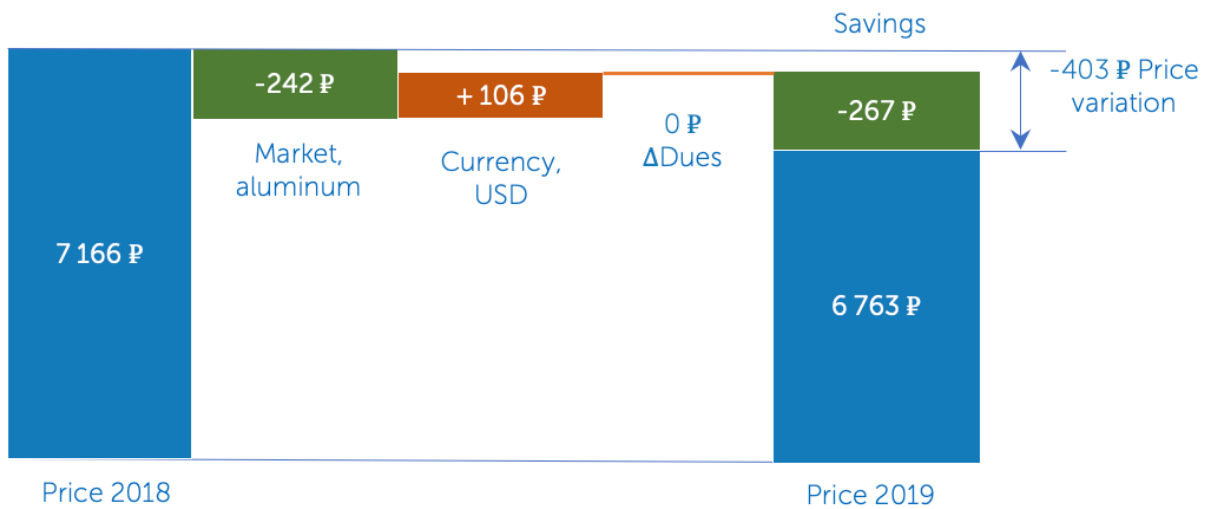


$$Currency = Share_{Currency} * P_{Y-1} * \left(\frac{ExRate_Y}{ExRate_{Y-1}} - 1 \right) = 0,55 * 7166 * \left(\frac{64,6184}{62,9264} - 1 \right) = +105,98 \text{ rub.}$$

$$S_{unit} = P_Y - P_{Y-1} - (Market + Currency + \Delta Dues) = 6763 - 7166 - (-242,07 + 105,98 + 0) = -267 \text{ rub.}$$

or

$$S_{unit}^{\%} = \frac{S_{unit}}{P_Y - S_{unit}} = \frac{-267}{6763 + 267} = -3,8\%$$



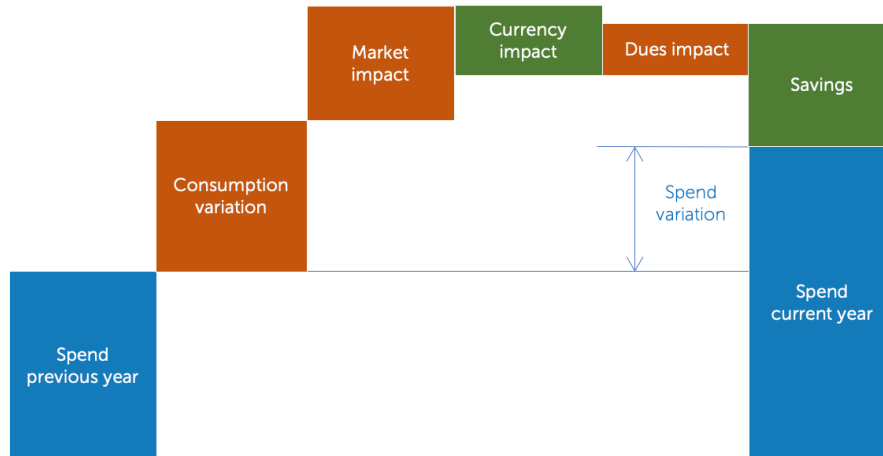
This example shows well that procurement savings and price variation are not the same things. A clear understanding of these factors will help the buyer to build a strategy for managing commodity and currency risks. Consider an example with currency dependence:

- **Contract in export currency (USD)** - all currency risks lie with the Purchaser;
- **Contract in local currency (Rubles)** - all currency risks lie with the Seller, and he can significantly overcharge;
- **Local currency contract (Ruble) with a currency clause** - an option that allows you sharing currency risks. At the same time, the form of a currency clause can be very complex (see example on page 92).

In some cases, it is possible to take into account direct economic factors (DEF) in the contract (dynamic price), this will reduce the number of bidding iterations with the supplier during growth and avoid losses during reduction.

3.1.4 Cost variation of recurring purchases

Having considered the structure of unit price variation from the historical level, it is possible to build a general scheme for the variation in spend:



In this way, the general formula for saving recurring purchases is as follows:

$$S_{Recurring}^{[1]} = C_Y - C_{Y-1} - Consumption - (Market + Currency + \Delta Dues) * Q_Y \quad (16)$$

where:

C_Y and C_{Y-1} – spend of the current and past comparable (-12 months) periods;

Consumption – variation in spend caused by variation in consumption;

Q_Y – quantity purchased in the current period.

The value for **Consumption** is defined as:

$$Consumption = (Q_Y - Q_{Y-1}) * P_{Y-1} \quad (17)$$

Formula for saving recurring purchases will be presented as:

$$S_{Recurring}^{[1]} = [P_Y - P_{Y-1} - (Market + Currency + \Delta Dues)] * Q_Y \quad (18)$$

or full formula:

$$S_{Recurring}^{[1]} = \left[\begin{array}{l} P_Y - P_{Y-1} - Share_{Market} * P_{Y-1} * \left(\frac{Index_Y}{Index_{Y-1}} - 1 \right) - \\ Share_{Currency} * P_{Y-1} * \left(\frac{ExRate_Y}{ExRate_{Y-1}} - 1 \right) - Dues_Y + Dues_{Y-1} \end{array} \right] * Q_Y \quad (19)$$

Case study: purchase of LED lights (continuation)

Additional conditions:

- Consumption in 2018 (Q_{Y-1}) amounted to 3 000 lamps;
- And in 2019 (Q_Y) - 5 000 lamps;

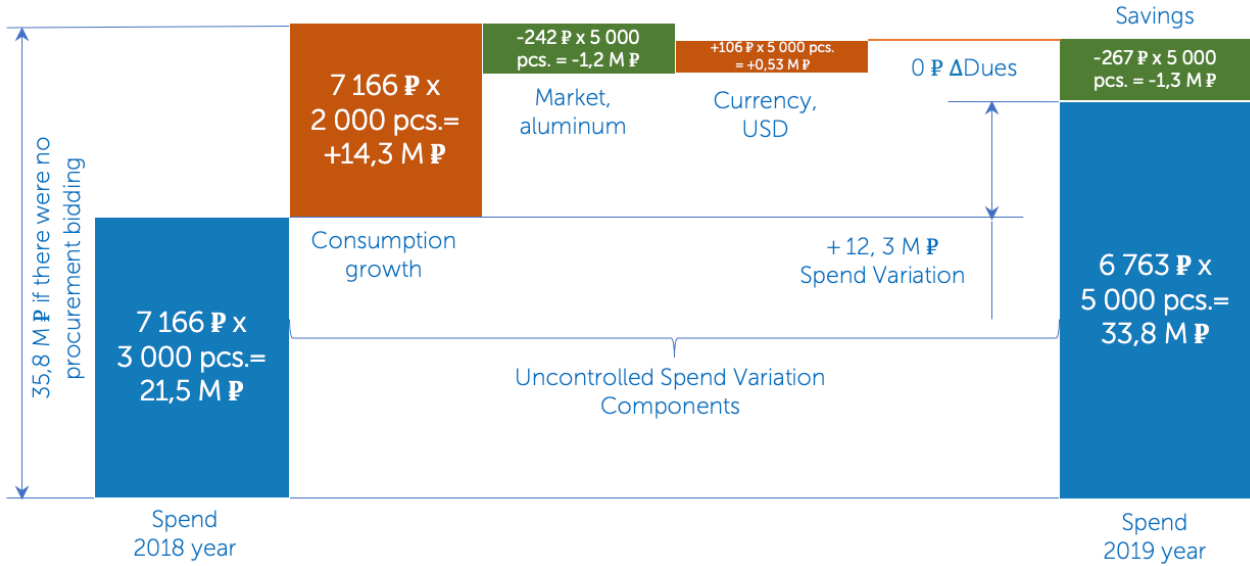
In this way, consumption grew by 2 000 pcs. and the increase in spend without the bidding would be:

$$Consumption = (Q_Y - Q_{Y-1}) * P_{Y-1} = (5000 - 3000) * 7166 = 14\,332\,000 \text{ rub.}$$



Consumption increased, but it could also decrease, this affects the variation in Spend, as well as Procurement Savings value, but not the share of Savings.

The scheme for spend variation is as follows:



In general, for all scenarios, recurring procurement savings:

#	SCENARIO	PROCUREMENT SAVINGS FORMULA
0	$DEF \approx 0$ and $IEF \approx 0$	$S_{Recurring}^{[0]} = (P_Y - P_{Y-1}) * Q_Y \quad (20)$
1	$DEF \neq 0$ and $IEF \approx 0$	$S_{Recurring}^{[1]} = (P_Y - P_{Y-1} - DEF) * Q_Y \quad (21)$
2	$IEF \neq 0$	$S_{Recurring}^{[2]} = (P_Y - P_{BIO}) * Q_Y \quad (22)$

The formula for % savings under various scenarios remains unchanged:

$$S_{Recurring}^{\%} = \frac{S_{Recurring}}{P_Y * Q_Y - S_{Recurring}} \quad (23)$$

A few examples:



Procurement parameters						Savings				
Weighted average previous comparable period	Direct economic factors	Indirect economic factors	Best initial offer price	Weighted average current period price	Current period quantity	Savings formula	Savings \$	Savings, %	Cost Reduction	Cost Avoidance
P_{Y-1}	DEF	IEF	P_{B10}	P_Y	Q_Y	$S_{Recurring}$				
\$100	\$---	\$---	\$110	\$70	1	$(P_Y - P_{Y-1}) * Q_Y$	-\$30	-30.0%	-\$30	\$---
\$100	\$---	\$---	\$110	\$105	1	$(P_Y - P_{Y-1}) * Q_Y$	+\$5	5.0%	+\$5	\$---
\$100	-\$10	\$---	\$90	\$85	1	$(P_Y - P_{Y-1} - DEF) * Q_Y$	-\$5	-5.6%	-\$5	\$---
\$100	-\$10	\$---	\$97	\$95	1	$(P_Y - P_{Y-1} - DEF) * Q_Y$	+\$5	5.6%	\$---	+\$5
\$100	+\$10	\$---	\$105	\$95	1	$(P_Y - P_{Y-1} - DEF) * Q_Y$	-\$15	-13.6%	-\$5	-\$10
\$100	+\$10	\$---	\$110	\$105	1	$(P_Y - P_{Y-1} - DEF) * Q_Y$	-\$5	-4.5%	\$---	-\$5
\$100	+\$10	\$---	\$115	\$115	1	$(P_Y - P_{Y-1} - DEF) * Q_Y$	+\$5	4.5%	\$---	+\$5
\$100	\$---	>0	\$110	\$105	1	$(P_Y - P_{B10}) * Q_Y$	-\$5	-4.5%	\$---	-\$5
\$100	-\$70	>0	\$78	\$75	1	$(P_Y - P_{B10}) * Q_Y$	-\$3	-3.8%	-\$3	\$---
\$100	+\$20	>0	\$150	\$145	1	$(P_Y - P_{B10}) * Q_Y$	-\$5	-3.3%	\$---	-\$5
7 166 P	-136 P	--- P	7 300 P	6 763 P	1	$(P_Y - P_{Y-1} - DEF) * Q_Y$	-267 P	-3.8%	-267 P	--- P
7 166 P	-136 P	--- P	7 300 P	6 763 P	5000	$(P_Y - P_{Y-1} - DEF) * Q_Y$	-1 335 000 P	-3.8%	-1 335 000 P	--- P

3.2 Savings new and one-off purchases

Saving new and one-off purchases is cost avoidance. It is not visible in P&L and may contain subjective factors; therefore, in some organizations, this type of saving is not taken into account. This demotivates the procurement team and can have a strong negative effect on company spend.

If the saving of new and one-off purchases is not taken into account, then the buyer is not interested in cutting prices, but quite the opposite. For example, the higher price of a new purchase in the first bidding will allow you declaring greater savings (cost reduction) in the next bidding. And for the company, this will mean a guaranteed overstatement of costs in the first bidding and a probable overstatement in subsequent ones, since a high base requires less effort to reduce costs.

3.2.1 Baseline for new and one-off purchases

Not all purchases have historical prices (baseline) of past comparable periods. The reasons are:

- the company purchases a new material or service that it has never purchased before;
- the company change needs, and specifications, accordingly. For example, a company purchased simple smartphones for employees before, but now smartphones with a contactless payment module (Near Field Communication, NFC) are required.

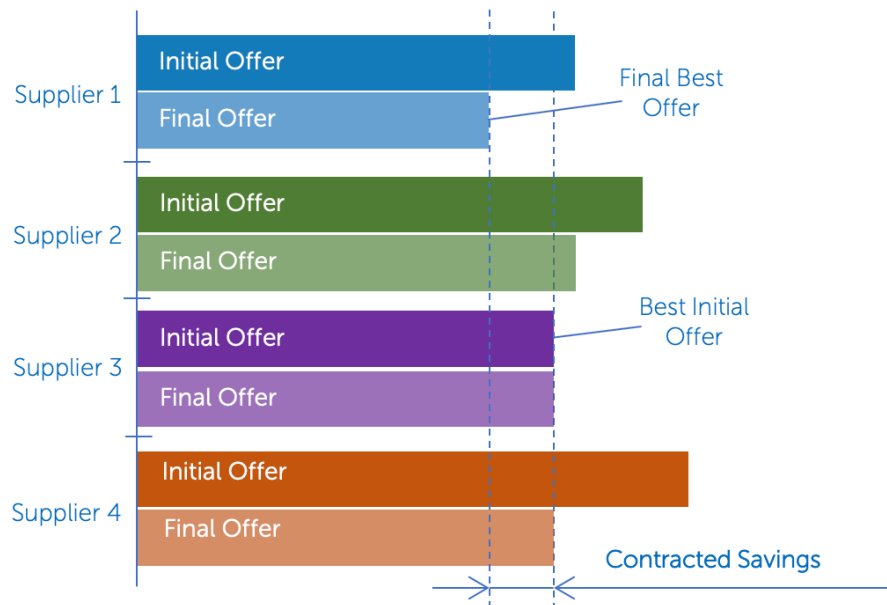
Estimation of the baseline for new and one-off purchases is most sensitive to critic, especially from the Finance side.

The purpose of the methodology of procurement savings calculation is not to show the highest possible savings, but to show the most reliable.

That is why it is necessary to choose the most conservative of all the possible estimation methods. What is the difference between shopping and professional procurement? The principle of retail purchase is simple: the consumer determines the need and is looking for a retailer with the best public offer (price), i.e. the selection process essentially consists in market monitoring. A professional buyer is less focused on the public offer and makes a



request for commercial proposals (RFP) first of all, then negotiates using savings leverages. As mentioned above (see page **Ошибка! Залкада не определена.**), the average level of bids has nothing similar with the average market price. Moreover, there are cases when a supplier increases the price of part of items, because they are either not sales priority for him or the supplier makes reserve for possible negotiations. Thus, like recurring purchases impacted by indirect economic factors (IEF), the **Best Initial Offer (BIO)** is taken as the baseline for calculating savings for new and one-off procurement projects.



Of course, only those offers that meet the required specifications are considered.

👉 All purchases of materials and services within an existing need (identical, similar, corresponding and substitution purchases) do not apply to cases of new procurement.

3.2.2 Baseline for new Single/Sole source suppliers

First of all, we need to differentiate between two types of suppliers [9]:

- **Single source supplier.** Although there are multiple options available, there is a decision to choose only one supplier. It can also be justified by the technical restrictions. An example would be choosing a software provider;
- **Sole source supplier.** There is no other option but to go with the supplier that is the only source for the product or service required by the organization.

In such a situation, the best price for a public or initial offer is taken as a base.

👉 A public offer (and even retail) may be lower than the initial offer of the supplier, *ceteris paribus*. Therefore, it should be considered.

3.2.3 Savings calculation of new and one-off purchases



Saving new and one-off purchases refers to cost avoidance, i.e. regarding those costs that might be without a professional procurement process:

$$\text{Savings} = \left(\text{Realized price} - \text{Price would have been if procurement hadn't been involved} \right) * \text{Quantity}$$

Based on the principles of calculating the baseline for new and one-off purchases, savings are determined by the following formula:

$$S_{\text{One-off}} = (P_Y - P_{\text{BIO}}) * Q_Y \tag{24}$$

where:

P_Y and Q_Y – price and quantity of the current period;

P_{BIO} – price of the best initial offer (BIO).

At the same time, the price of the best initial offer can be from any supplier and not necessarily a winner (see example).

Supplier	Cost of initial proposal (project / year), USD.	Cost of the final proposal (project / year), USD.
"Chamomile"	\$10,00	\$8,00
"Rose"	\$20,00	\$19,00
"Lily"	\$30,00	\$25,00
"Burdock"	\$9,00	\$9,00

For new Single/Sole source suppliers:

$$S_{\text{One-off}} = (P_Y - \text{MIN}\{P_{\text{IO}}; P_{\text{PO}}\}) * Q_Y \tag{25}$$

where:

P_{IO} – price of the initial offer (IO);

P_{PO} – price of the public offer (taking into account the present value of other conditions: payment terms, etc.).

Formula for % Savings:

$$S_{\text{One-off}}^{\%} = \frac{S_{\text{One-off}}}{P_Y * Q_Y - S_{\text{One-off}}} \tag{26}$$

Case Study: Purchasing Software Licenses

The choice of software for a trading company (cash registers software, customer service, customer orders).



- a choice between the three main competitors;
- terms of the project: 1st year development and test, 2nd year - "pilot", and 3rd year roll-out - the main stage;
- total number of licenses (Q_Y): 2 500;
- the price of the best initial offer (P_{BIO}) – \$550;
- final price (P_Y) – \$430;
- contract with fixed commercial conditions for 5 years.

In this project, licenses were purchased for the test operation and development only (15 licenses) during the 1st year, the 2nd year - the pilot in two hypermarkets (50 licenses) and the 3rd year - roll-out - the main volume of purchases - 2 435.

Savings (cost avoidance) of this project:

$$S_{One-off} = (P_Y - P_{BIO}) * Q_Y = (\$430 - \$550) * 2\,435 = -\$292\,200 \text{ or } -21,1\%$$

The validity of the commercial terms has to be consistent with the business objectives.

A few examples:

Procurement parameters							Savings				Savings registration			
Contract duration	Best initial offer price	Public offer price	Weighted average current period price	Qty in 1st year	Qty in 2nd year	Qty in 3rd year	Savings formula	Savings \$	Savings, %	Cost Reduction	Cost Avoidance	1st year	2nd year	3rd year
лет	P_{BIO}	P_{PO}	P_Y	$Q_Y^{[1]}$	$Q_Y^{[2]}$	$Q_Y^{[3]}$	$S_{One-off}$							
1	\$9		\$8	1			$(P_Y - P_{BIO}) * Q_Y$	-\$1	-11.1%	\$---	-\$1	-\$1	\$---	\$---
1	\$100		\$100	1			$(P_Y - P_{BIO}) * Q_Y$	\$---	0,0%	\$---	\$---	\$---	\$---	\$---
1	\$100		\$90	10			$(P_Y - P_{BIO}) * Q_Y$	-\$100	-10.0%	\$---	-\$100	-\$100	\$---	\$---
3	\$550		\$430	15	50	2435	$(P_Y - P_{BIO}) * Q_Y$	-\$292 200	-21,8%	\$---	-\$292 200	\$---	\$---	-\$292 200
1	\$110	\$105	\$100	1			$(P_Y - MIN\{P_{IO}; P_{PO}\}) * Q_Y$	-\$5	-4,8%	\$---	-\$5	-\$5	\$---	\$---

3.3 Savings at consumption reduction

This type of savings can be calculated for both **direct** and **indirect** purchases. In the case of **direct** purchases, savings may be due to a reduction in losses and write-offs, and to consumption policies in **indirect** purchases.

The period for calculating savings at consumption reduction may not correspond to the period of new commercial terms. At this way, consumption management policies can be applied before a bidding, after a bidding and out of bidding.

3.3.1 Baseline of consumption of regular purchases

For recurring purchases that use the lever to control consumption volumes, a quantitative consumption baseline within the perimeter, or specific consumption, must be determined.

$$q_{Y-1}^s = \frac{Q_{Y-1}}{Range_{Y-1}} \tag{27}$$



where:

q_{Y-1}^s – specific consumption of the previous comparable period;

Q_{Y-1} – total consumption of the previous comparable period;

$Range_{Y-1}$ – perimeter of consumption of the previous comparable period.

Case Study: roll-packer rink

The logistics operator opens warehouse distribution centers and equips the facilities with roll-packer rinks for pressing solid waste.

- Last year 3 warehouse centers were opened ($Range_{Y-1} = 3$);
- And each warehouse was equipped with roll-packer rink ($Q_{Y-1} = 3$);



Thus, the specific consumption of roll-packer rinks:

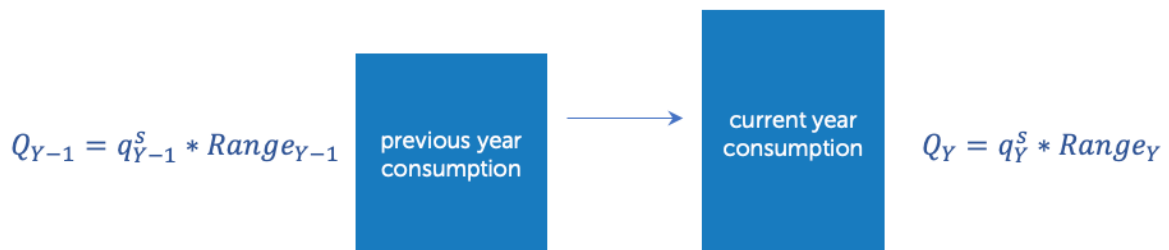
$$q_{Y-1}^s = \frac{Q_{Y-1}}{Range_{Y-1}} = \frac{3}{3} = 1 \text{ pcs./warehouse}$$

3.3.2 Consumption reduction

Total volumes of consumption are constantly changing and there are many reasons for this: fluctuations in consumer demand, variation in the volume of production, irregular orders and deliveries, etc. But there is a reason that must be considered separately within this methodology - **the impact of conscious reduction in consumption** (specific consumption) in order to cut spend (see paragraph 2.4).

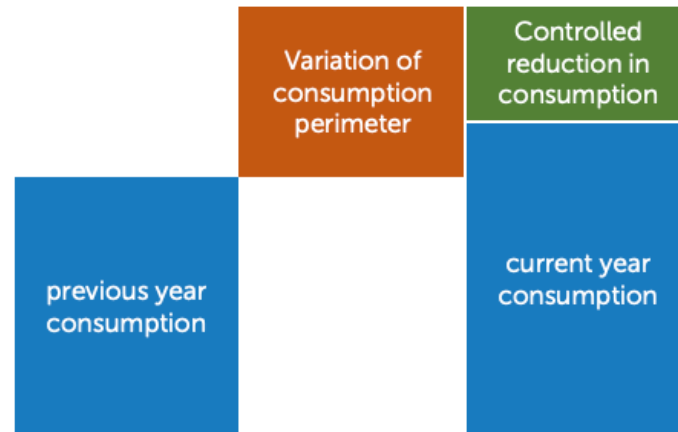
A controlled reduction in consumption can be calculated in cases of the purchase of identical, similar or corresponding materials or services. In case of substitution, the savings are calculated in complex of prices and volumes (see paragraph 3.4).

Its mean that total consumption changes due to changes in the perimeter of consumption ($Range$) and changes in specific consumption (q^s).



Controlled and uncontrolled consumption have to be considered separately.

👉 The situation in which the specific consumption does not change or grows ($q_Y^s \geq q_{Y-1}^s$) cannot be considered as a consumption reduction savings.



$$Q_{Savings} = Q_Y - Q_{Y-1} - \Delta Q \quad (28)$$

where:

Q_Y and Q_{Y-1} – quantity consumption of the current and previous comparable period (-12 months);

ΔQ – uncontrolled variation in consumption without the impact of a consumption control lever;

$Q_{Savings}$ – saving in quantity through targeted consumption management actions (can only be <0).

Variation of uncontrolled consumption is associated only with variation in the perimeter of consumption:

$$\Delta Q = q_{Y-1}^s * (Range_Y - Range_{Y-1}) = Q_{Y-1} * \left(\frac{Range_Y}{Range_{Y-1}} - 1 \right) \quad (29)$$

Therefore, savings in quantity are determined through Specific Consumption:

$$Q_{Savings} = q_Y^s * Range_Y - q_{Y-1}^s * Range_{Y-1} - q_{Y-1}^s * (Range_Y - Range_{Y-1}) \quad (30)$$

In sum:

$$Q_{Savings} = (q_Y^s - q_{Y-1}^s) * Range_Y = Q_Y - Q_{Y-1} * \frac{Range_Y}{Range_{Y-1}} \quad (31)$$

where:

q_Y^s and q_{Y-1}^s – specific consumption of the current and previous comparable period;

$Range_Y$ and $Range_{Y-1}$ – perimeter of consumption of the current and previous comparable period.

Case study: roll-packer rink (continuation).

A roll-packer rink is equipment designed to reduce the volume and costs of disposal solid waste. The cost analysis showed that a roll-packer rink is not paying off in warehouses with a low load, due to the high initial cost (38,000 Euro) and operating costs. In addition, waste operators have introduced an increased fee for compacted waste. The warehouse turnover level was calculated (at least \$100 M per year) at which the purchase of a roll-packer rink could be justified, i.e. a consumption policy was adopted for this equipment. And next year, only one warehouse opened (out of 5) was responding this criterion:



$$q_Y^s = \frac{Q_Y}{Range_Y} = \frac{1}{5} = 0,2 \text{ pcs./warehouse}$$

The savings in quantity is:

$$Q_{Savings} = (0,2 - 1) * 5 = 4 \text{ pcs.}$$

Or - 152 000 Euro.

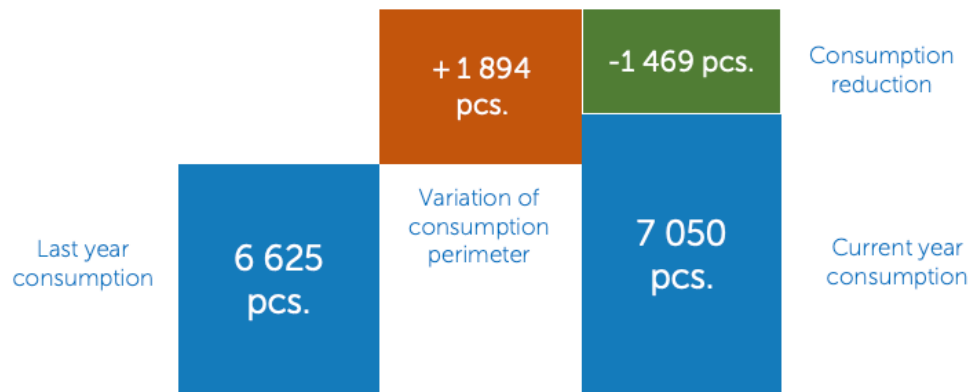
👉 If you have Purchase Request (PR) process in your company, whatever the form it exists, whether off-line procedure or implemented in a P2P (Purchase-to-Pay) system, then compliance with consumption policies should be build-in this process.

Case study: shopping trolleys for a hypermarket.

- Trading company actively developing opened 14 hypermarkets last year ($Range_{Y-1}$);
- Shopping trolleys are purchased under a national (centralized) contract, but there is no consumption policy;
- As a result, the purchase for 1 hypermarket (q_{Y-1}^s) is from 320 to 1270 units! This variation is due to a lack of consumption policies;
- The buyer, together with internal client (heads of cash department), identifies 3 types of hypermarkets by customer traffic and implemented the consumption policy for each type: type #1 (low traffic) - 350, type #2 (medium) - 400 and type #3 (high) - 450 shopping trolleys;
- Calculating the average historical consumption for each type of hypermarket, it turned out: type #1- 376, type #2 - 515 and type #3 - 487 trolleys;
- After the roll-out of this policy in the coming year, 18 hypermarkets were opened ($Range_Y$), respectively 5, 11 and 2 of each type.



	TYPE #1	TYPE #2	TYPE #3	TOTAL
Historical specific consumption (q_{Y-1}^s)	376	515	487	
Open last year ($Range_{Y-1}$)	3	5	6	14
Total ($Q_{Y-1} = q_{Y-1}^s * Range_{Y-1}$)	1 128	2 575	2 922	6 625
Consumption policy (q_Y^s)	350	400	450	
Hypermarkets open current year ($Range_Y$)	5	11	2	18
Total ($Q_Y = q_Y^s * Range_Y$)	1 750	4 400	900	7 050
Variation in business consumption $\Delta Q = q_{Y-1}^s * (Range_Y - Range_{Y-1})$	+752	+3 090	- 1 948	+1 894
Savings through consumption policy $Q_{Savings} = (q_Y^s - q_{Y-1}^s) * Range_Y$	- 130	- 1 265	- 74	- 1 469



3.3.3 Savings calculation at consumption reduction

Savings at consumption reduction:

$$S_{Consumption} = \left(Q_Y - Q_{Y-1} * \frac{Range_Y}{Range_{Y-1}} \right) * P_{Y-1} \quad (32)$$

Formula for % Savings:

$$S_{Consumption}^{\%} = \frac{S_{Consumption}}{Q_Y * P_{Y-1} - S_{Consumption}} \quad (33)$$

👉 Savings at consumption reduction are determined in prices of the previous period, since the price variation itself is determined by another type of savings.

Case study: shopping trolleys for a hypermarket (continuation).

In addition, the price of the trolley decreased from \$120 to \$110 in the example above. At this way, there are two types of saving:

Savings at consumption reduction:

$$\begin{aligned} S_{Consumption} &= \left[Q_Y^{[1]} - Q_{Y-1}^{[1]} * \frac{Range_Y^{[1]}}{Range_{Y-1}^{[1]}} + Q_Y^{[2]} - Q_{Y-1}^{[2]} * \frac{Range_Y^{[2]}}{Range_{Y-1}^{[2]}} + Q_Y^{[3]} - Q_{Y-1}^{[3]} * \frac{Range_Y^{[3]}}{Range_{Y-1}^{[3]}} \right] * P_{Y-1} = \\ &= \left[1750 - 1128 * \frac{5}{3} + 4400 - 2575 * \frac{11}{5} + 900 - 2922 * \frac{2}{6} \right] * \$120 = \\ &= [1750 - 1880 + 4400 - 5665 + 900 - 974] * \$120 = -1469 * \$120 = -\$176 280 \end{aligned}$$

$$S_{Consumption}^{\%} = \frac{S_{Consumption}}{Q_Y * P_{Y-1} - S_{Consumption}} = \frac{-\$176 280}{7 050 * \$120 + \$176 280} = -17,2\%$$

And the savings at the price reduction of recurring purchases:

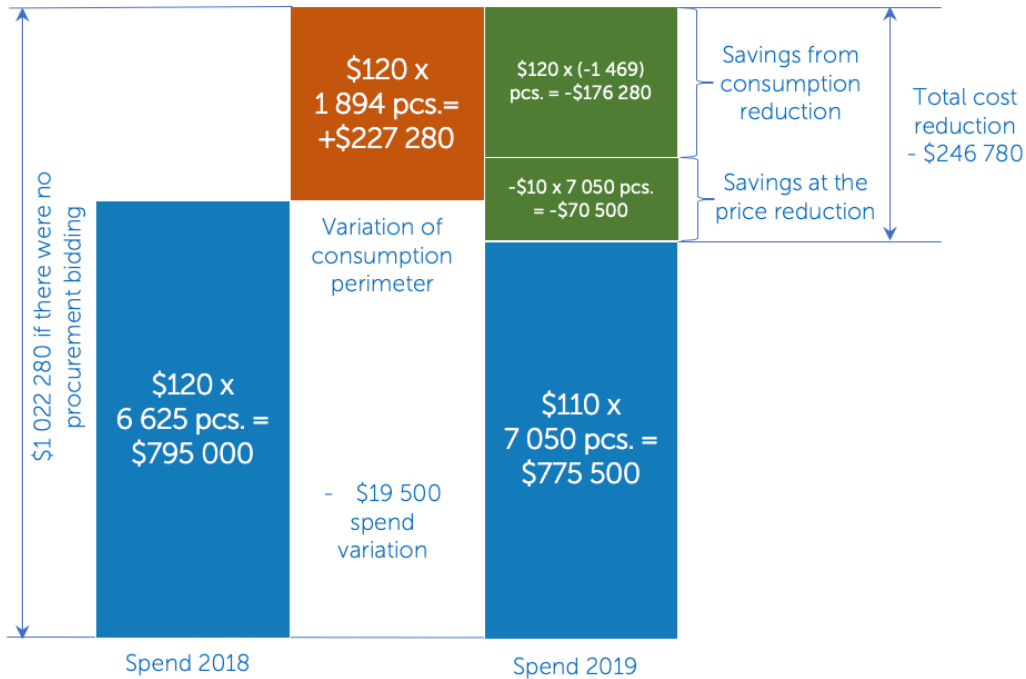
$$S_{Recurring} = (P_Y - P_{Y-1}) * Q_Y = (\$110 - \$120) * 7 050 = -\$70 500$$

Total savings:



$$S = S_{Consumption} + S_{Recurring} = -\$176\,280 - \$70\,500 = -\$246\,780$$

$$S\% = \frac{S}{Q_Y * P_Y - S} = \frac{-\$246\,780}{7\,050 * \$110 + \$246\,780} = \frac{-\$246\,780}{\$1\,022\,280} = -24,3\%$$



In the case of managing the volume of consumption of identical, similar or corresponding materials or services, the savings at consumption reduction are not linked with the savings at price reduction (in particular, the price may not change). But in substitution savings, prices and volumes are interrelated (see below).

Savings from consumption reduction refers to cost reduction.

Sometimes procurement teams face durable resistance of internal clients to new consumption policies. But this aspect lies more in the field of change management and ethics (see chapter 6) than procurement performance.

A few examples:

Procurement parameters						Savings				
Weighted average previous comparable period	Quantity in comparable period	Previous period consumption perimeter	Weighted average current period price	Current period quantity	Current period consumption perimeter	Savings formula	Savings \$	Savings, %	Cost Reduction	Cost Avoidance
P_{Y-1}	Q_{Y-1}	$Range_{Y-1}$	P_Y	Q_Y	$Range_Y$	$S_{Consumption}$				
\$10	100	1	\$7	90	1	$(Q_Y - Q_{Y-1} * \frac{Range_Y}{Range_{Y-1}}) * P_{Y-1}$	-\$100	-10,0%	-\$100	\$---
\$100	100	1	\$105	75	1		-\$2 500	-25,0%	-\$2 500	\$---
\$1 000	1	10	\$1 200	1	12		-\$200	-16,7%	-\$200	\$---
\$38 000	3	3	\$38 000	1	5		-\$152 000	-80,0%	-\$152 000	\$---
\$120	1 128	3	\$110	1 750	5		-\$15 600	-6,9%	-\$15 600	\$---
\$120	2 575	5	\$110	4 400	11		-\$151 800	-22,3%	-\$151 800	\$---
\$120	2 922	6	\$110	900	2		-\$8 880	-7,6%	-\$8 880	\$---



3.4 Substitution savings

Sometimes we do not buy the same materials or services. Instead, we find items having a longer life cycle or providing the same need for less.

In this case, it is quite difficult to take into account the qualitative difference by making changes to the calculation of the baseline (as is easily done with corresponding materials or services). Therefore, the approach is to consider the life cycle of different procurement items on a common perimeter, i.e. specific consumption.

The key factors for calculating substitution savings are:

- **a constant business need**, while the specification of the procurement item is so different that it is impossible to compare the consumption of 1 unit of historical material or service with 1 unit of new material or service;
- **an exact consumption perimeter within the need**, i.e. the new consumption of materials or services should be correlated with the same perimeter for historical materials or services. The perimeter can be defined in units of finished goods, area, in units of time or duty cycles. For example, as in the case of printing as a service, the total cost should be calculated for printing one sheet (or 1,000,000 sheets).

3.4.1 Substitution savings calculation

A few examples to illustrate:

- Purchase of more expensive milling cutters with a longer resource for the machine. Moreover, this substitution is exactly associated with an attempt to reduce costs.
- If a new production schedule were introduced, with an increase in work cycles to replace the cutting tool, this would mean a new need and would make the use of a current instrument (of less quality) impossible.
- Hypermarket security service. Current service is payed for a security post per an hour, a new service is payable as a fee for organizing the protection of a store and goods considering bonus or penalty as a part of the level of unknown losses.



When making substitution, it is usually required to revise the consumption policy. For example, if you start to purchase more expensive, but reusable gloves for employees, then employees should know that they should not throw them away after each use, as they did with ordinary on-off gloves. Otherwise, you will not have savings, but only an increase in total spend.

If the perimeter of consumption is fixed ($Range_Y = Range_{Y-1}$), then the substitution savings formula is simple:

$$S_{Substitution}^{ideal} = (P_Y * Q_Y) - (P_{Y-1} * Q_{Y-1}) \quad (34)$$

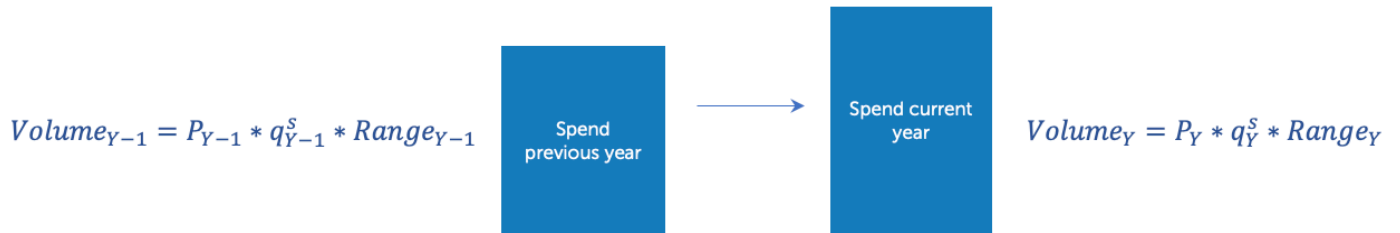
and the total consumption is associated with fixed perimeter of consumption:

$$Q = q^s * Range \quad (35)$$



q^s - specific consumption.

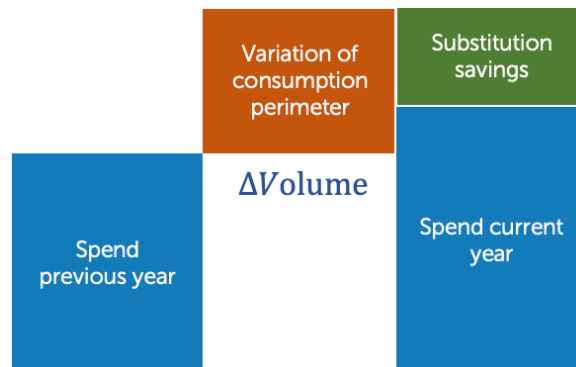
However, the perimeter of consumption most often changes in real business conditions, and therefore, the factor of consumption change due to variation in the consumption perimeter (ΔV) and substitution savings should be considered separately. For example, you have 100 workplaces in your office today ($Range_{Y-1}$) that you need to equip: a table, a chair, a computer ... and you can look for alternative solutions for them, but tomorrow there will be 150 workplaces ($Range_Y$).



$$S_{Substitution} = Volume_Y - Volume_{Y-1} - \Delta Volume \tag{36}$$

A natural change in spend is associated only with a variation of consumption perimeter:

$$\Delta Volume = P_{Y-1} * q_{Y-1}^s * (Range_Y - Range_{Y-1}) = P_{Y-1} * Q_{Y-1} * \left(\frac{Range_Y}{Range_{Y-1}} - 1 \right) \tag{37}$$



As a result:

$$S_{Substitution} = Q_Y * P_Y - Q_{Y-1} * P_{Y-1} * \frac{Range_Y}{Range_{Y-1}} \tag{38}$$

and

$$S_{Substitution}^{\%} = \frac{S_{Substitution}}{Q_Y * P_Y - S_{Substitution}} \tag{39}$$

Let's make a detailed analysis with the chairs example:



Case Study: Office Chairs.

Historically, the company bought inexpensive office chairs for its employees at a price of \$64;

- however, their design was not reliable that such a chair served no more than 2 years on average, i.e. 50 chairs had to be changed every year in the office of 100 workplaces;
- next year, the office had already 150 workplaces;
- through sourcing for an alternative solution more reliable chairs (with a metal base) were purchased, but more expensive at \$96, however, the resource of such chairs was 5 years, i.e. only 30 chairs will need to be changed on average every year, considering the growth in the number of workplaces.



When calculating the actual savings, the declared working resource must be confirmed either by test use or by warranty of the manufacturer.

The substitution savings for this example are:

$$S_{Substitution} = Q_Y * P_Y - Q_{Y-1} * P_{Y-1} * \frac{Range_Y}{Range_{Y-1}} = 30 * \$96 - 50 * \$64 * \frac{150}{100} = -\$1\,920$$

What figures will you see in P&L:

- Old chairs for 100 workplaces: annual purchase of 50 chairs for \$64 each = \$3 200;
- New chairs for 150 workplaces: annual purchase of 30 chairs for \$96 each = \$2 880;

P&L does not show a reduction in spend by \$1 920, but only by \$320. The reason is an increase in the perimeter of consumption, i.e. office workplaces growth from 100 to 150. This factor must be taken apart:

$$\Delta Volume = P_{Y-1} * Q_{Y-1} * \left(\frac{Range_Y}{Range_{Y-1}} - 1 \right) \tag{40}$$

or

$$\Delta Volume = \$64 * 50 * \left(\frac{150}{100} - 1 \right) = \$1\,600$$

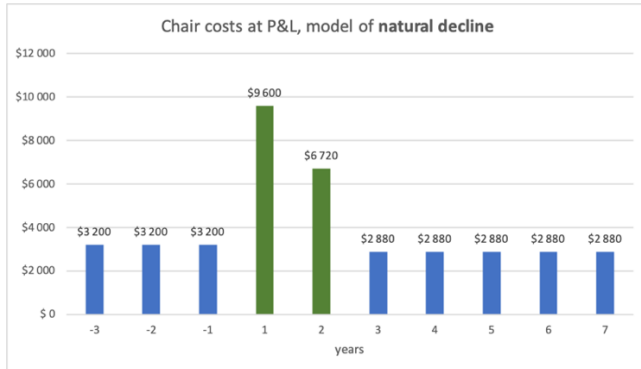
With an increase in workplaces from 100 to 150, spend should have grown from \$3,200 per year to \$4,800 if there weren't any new chairs purchased. The total expenses scheme is as follows:



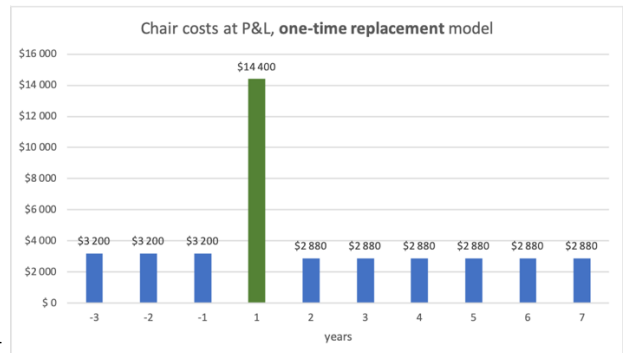
In fact, one-time upgrade to a new type of chair requires expenses. And here are two transition models:

- The model of **natural decline**, when old chairs become unusable, new ones are purchased to replace them;
- A **one-time replacement** model, while all old chairs are either disposed of or sold at residual value (this option was not considered).

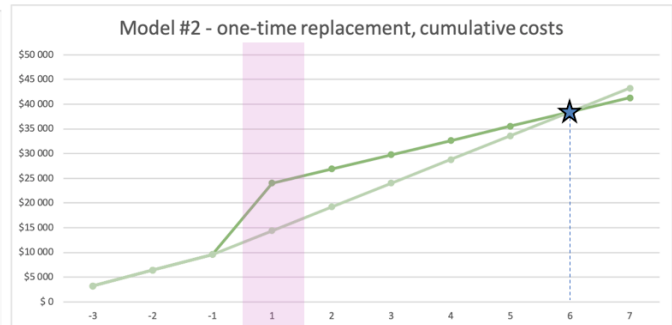
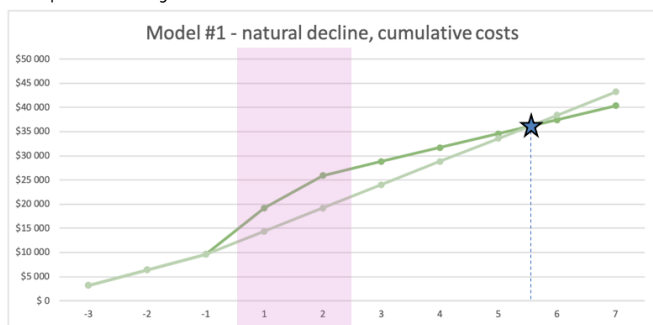
Thus, in P&L, the cost of chairs will be as follows:



or



The dynamics of cumulative costs shows the payback point of this substitution 5½ and 6 years, respectively, for model #1 and #2.



Simulation and comparison of costs before and after replacement clearly demonstrate the feasibility of switching to a new specification.



Conclusions:

- If the period of use of a new material or the term of the service is <1 year, then it is possible to compare the spend variation “year-to-year”.
- If the period of use of a new material or the term of the service is >1 year, then the feasibility of replacement should be considered in terms of payback periods;

Substitution saving affects cost reduction.

A few examples:

Procurement parameters						Savings				
Weighted average previous comparable period	Quantity in comparable period	Previous period consumption perimeter	Weighted average current period price	Current period quantity	Current period consumption perimeter	Savings formula	Savings \$	Savings, %	Cost Reduction	Cost Avoidance
P_{Y-1}	Q_{Y-1}	$Range_{Y-1}$	P_Y	Q_Y	$Range_Y$	$S_{Substitution}$				
\$10	100	1	\$9	100	1	$Q_Y * P_Y - Q_{Y-1} * P_{Y-1} * \frac{Range_Y}{Range_{Y-1}}$	-\$100	-10.0%	-\$100	\$---
\$10	100	1	\$11	90	1		-\$10	-1.0%	-\$10	\$---
\$10	100	1	\$12	90	1		+\$80	8.0%	+\$80	\$---
\$100	10	100	\$110	9	110		-\$110	-10.0%	-\$110	\$---
\$100	2	100	\$100	2	150		-\$100	-33.3%	-\$100	\$---
\$64	50	100	\$96	30	150		-\$1 920	-40.0%	-\$1 920	\$---

Substitution can cause a spend increase.

3.4.2. TCO approach at substitution savings calculation

The same need can be covered in different ways and sometimes it is required to compare capital costs and TCO with the cost of other units, for example, a service.

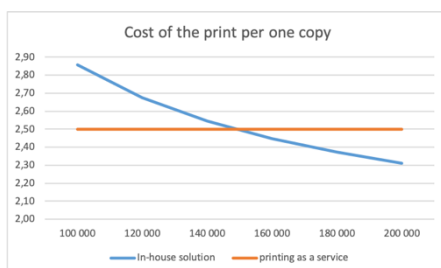
Case study: printing as a service.

In order to calculate the savings when switching to a printing as a service, it is necessary to take into account all expenses and bring them to a single period (1 year) and perimeter (100,000 sheets):

- purchase of the printer \$2 790. The depreciation and lifetime are 3 years; therefore, the annual costs will be **\$930**;
- quarterly maintenance at \$40 - **\$160 a year**;
- repair (historical data) - **\$460 a year**;
- 15 cartridges at \$48,15 each - **\$722,25 a year**;
- and 100,000 sheets of paper - **\$584,60 a year**.



Electricity costs can be ignored, since service equipment, in general, consumes the same power.



Total: \$2856,85 per year for 100,000 prints. – **2,86 cents** per one copy.

Printing as a service costs **2,50 cents**.

However, if the number of copies increases, the cost of one print in-house decreases that is comparable in costs with outsourcing at 150 thousand copies.



3.5 Rebate as savings

It should be noted right away that using a rebate is less effective compared to immediate discount on purchase price for several reasons:

- **Long-term lending to the supplier** - you pay more to your supplier during the year by the amount of the bonus at least, and sometimes longer (it is common practice when the purchaser receives a rebate several months later than the reporting year is over);
- **Risks of non-receiving rebates** - the risks can be diverse and depend on the rebate conditions, such as reaching the required volume of purchases or manipulating the volume by creating overstocks (due to unscrupulous buyer). Another risk is to lose rebate because of unreliable supplier.
- **Administration of the rebate** – extra-costs for control and management;
- **Infrastructure** – need a software or extra-function to control and accounting rebate.

👉 Purchaser may lose 1.5-3% of the total volume of rebates in an unstable market.

Therefore, the rebates should be considered together with the main procurement savings.

Let's look at the business meaning of a rebate:

- The price at which the supplier sells the material or service consists of three parts:



- With an increase in production, the value of fixed costs per unit of production decreases and, at a constant price, the supplier increases the margin per unit of production and gross margin, respectively:



- The rebate allows to share the additional profit received with the purchaser's company:



A rebate is justified when volumes can significantly affect the final price for the supplier and at the same time the buyer, realizing potential of future purchases, nevertheless cannot predict the volume extra-growth.

$$S_{Rebate} = (Cost\ of\ Risk_Y^{\%} + Rebate_{Y-1}^{\%} - Rebate_Y^{\%}) * C_Y + \Delta Cost\ of\ Capital_Y \quad (41)$$



where:

$Rebate_{Y-1}^{\%}$ – previous year's rebate (used only for recurring purchases, for new ones - 0%);

$Rebate_Y^{\%}$ – current year's rebate;

$Cost\ of\ Risk_Y^{\%}$ –risk assessment by supplier in the current year (%). The contracted savings takes into account risks of non-fulfillment of the conditions for receiving rebates and supplier reliability. When measuring realized savings, usually risks = 0%, except for cases when in order to receive rebate overstocks are specially created, that "freeze money" and may have risks of depreciation;

C_Y – the volume of expenses subject to rebate;

$\Delta Cost\ of\ Capital_Y$ – change in the value of funds that was "borrowed" to the supplier in the amount of the retro bonus compared to the previous year.

The formula for $\Delta Cost\ of\ Capital_Y$ is defined as:

$$\Delta Cost\ of\ Capital_Y = \sum_i C_i * (Rebate_Y^{\%} - Rebate_{Y-1}^{\%}) * \frac{(Date^{rebate} - Date_i^{payment} + 1)}{365} * WACC \quad (42)$$

where:

$Date^{rebate}$ – date of rebate receipt from the supplier to the purchaser's company account;



$Date_i^{payment}$ – date of payment to the supplier of the i^{th} delivery;

C_i – the amount of the i^{th} delivery;

Formula for % rebate savings:

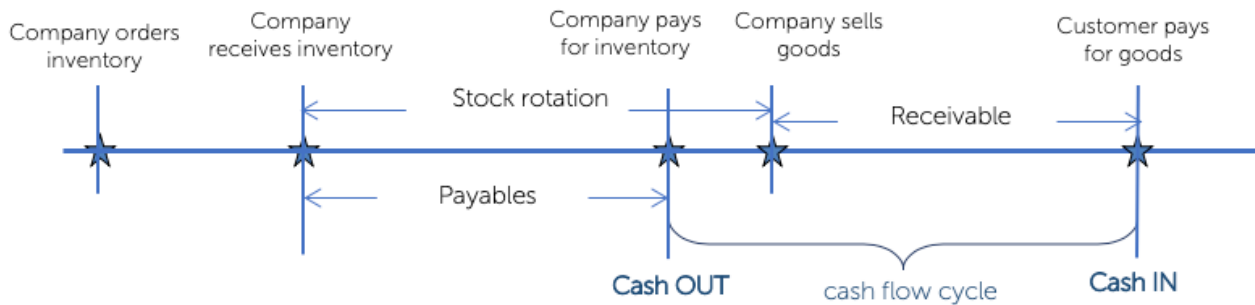
$$S_{Rebate}^{\%} = Cost\ of\ Risk_Y^{\%} + Rebate_{Y-1}^{\%} - Rebate_Y^{\%} + \frac{\Delta Cost\ of\ Capital_Y}{C_Y} \quad (43)$$

A few examples:

Procurement parameters						Savings				
Rebate of last year	Rebate of current year	Supplier risk assessment	Volume of purchases covered by the rebate, \$	Weighted average cost of capital in the current period	Change in the value of funds	Savings formula	Savings \$	Savings, %	Cost Reduction	Cost Avoidance
$Rebate_{Y-1}^{\%}$	$Rebate_Y^{\%}$	$Cost\ of\ Risk_Y^{\%}$	C_Y	$WACC_Y$	$\Delta Cost\ of\ Capital_Y$	S_{Rebate}				
7,00%	7,00%	0,50%	\$1 000 000	12,00%	+\$6 214	S_{Rebate}	-\$58 786	-6,5%	-\$58 786	\$---
5,00%	7,00%	2,00%	\$1 000 000	12,00%	+\$6 214	$(Cost\ of\ Risk_Y^{\%} + Rebate_{Y-1}^{\%} - Rebate_Y^{\%}) * C_Y + \Delta Cost\ of\ Capital_Y$	-\$43 786	-5,0%	-\$43 786	\$---
7,00%	5,00%	0,50%	\$1 000 000	12,00%	+\$1 775		-\$13 225	-1,5%	-\$13 225	\$---
							+\$23 225	+2,5%	+\$23 225	\$---

3.6 Working Capital Requirement (WCR)

Reducing working capital requirements (WCR) or increasing free cash (FC) can be a separate task, regardless of savings objectives. We will analyze the WCR nature, for this we consider the cash flow cycle:



The cash flow cycle characterizes the gap between the time we paid to the Supplier and the receipt of funds from the Client for the goods sold, considering the storage period of the Stock (or production cycle). This gap in time creates the working capital requirement (WCR) that can be covered by attracting borrowed funds or channeling our own funds. WCR shows the need of working capital to finance the company's business activity.

The presented scheme has variability:

- Payment to the supplier may occur in advance, i.e. turning into receivables;
- The customer can pay in advance for goods or services that increases accounts payable;
- When paying by cash, the debt periods are 0 (or almost 0);
- For OPEX and CAPEX, the Stock rotation period is usually 0.

The formula for the working capital requirement (WCR) is as follows:

$$WCR = Inventories + Accounts Receivable - Accounts Payable \quad (44)$$

👉 The working capital requirement is not summarized but determined for a specific time period. For example, there is a WCR calculated for a month, and there is a WCR calculated on a quarterly basis, but a quarter WCR is not the sum of WCR of each month. The most evident example is Inventories measurement.

So, for effective WCR management, it's necessary:

- Increase payments delay and avoid prepayment to Suppliers;
- Reduce the payments delay from Customers or get the Clients payments in advance as much as possible;
- Reduce the volume and rotation of the stock.

👉 Customer receivables and payables are not considered as a part of procurement KPI procurement. But the presented approaches are universal and make it possible.

👉 The result of Procurement performance can be not only a decrease in the working capital requirement (WCR), but also the free cash generated, i.e. WCR with a negative sign.

As noted above, the WRC management task may exist separately, along with the savings task. In this case, the price may generally depend on the terms of payment (see paragraph 3.7.1).



- Situation #1: the company is stable, and its own funds are sufficient. In such a case, obtaining the best price conditions may be a priority task and even by accepting a partial advance payment to the Supplier;
- Situation #2: the company is developing rapidly; own funds are not enough to ensure the planned growth. In this case companies need borrows. Bank borrowing funds can be expensive or limited. Then, the attraction of free cash from the Suppliers becomes a priority. In some cases, this can cause prices increase, but this must be a manageable and reasonable increase. For example, factoring services may be cheaper than borrowed funds from a bank.

👉 The best procurement practice shows that an increase in payments delay to the Supplier does not cause the price increase, since Procurement can use a wide range of leverage to savings and negotiate.

We will analyze the management performance of the Stock below (see paragraph. 3.8), and there we consider the methods for calculating accounts payable and receivables for purchasing:

3.6.1 "Photo" method (accounting method) of WCR calculation

As the name suggests, this method is used in the financial statements, and it is very simple: a "slice" (or "photo") of the situation is made for receivables and payables at the end of the periods (month, quarter, year):

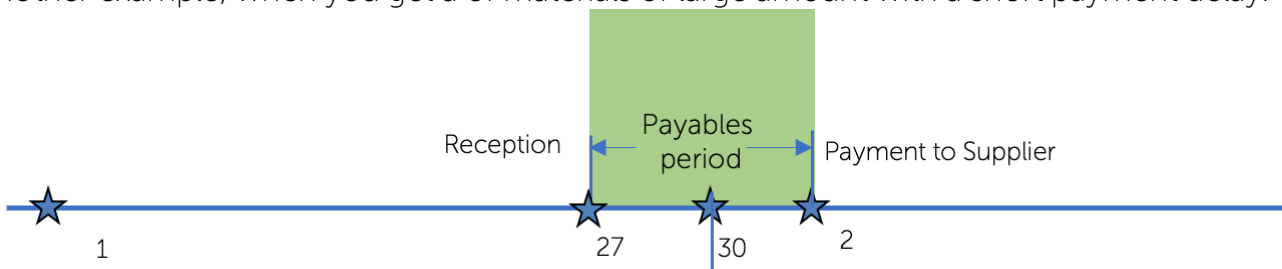
$$WCR_{last\ day} = Accounts\ Receivable_{last\ day} - Accounts\ Payable_{last\ day} \quad (45)$$

However, this method of calculation does not reflect the fullness of activity. See example: you paid the Supplier in advance at the beginning of the month (i.e. you have a need for working capital), and materials are delivered by the end of the month:



According to this method $WCR_{last\ day} = 0$ during the month, that is not true, since you needed funds for 20 days before receiving the materials due to advance payment.

Another example, when you get a of materials of large amount with a short payment delay:





In this case, $WCR_{last\ day} = - Invoice\ Amount$, i.e. show a large amount of free cash in the reporting month, which is also not true. In fact, you did not have these funds for a month before reception.

3.6.2 "Film" method (business method) of WCR calculation

The "film" method is the most accurate and correct from a business point of view, it shows the working capital requirement as the difference between the average weighted receivables and payables for the period.

$$WCR_{WA} = Accounts\ Receivable_{WA} - Accounts\ Payable_{WA} \quad (46)$$

So, for the first example, WCR_{WA} will be equal to (if the prepayment is \$150 000):



$$WCR_{WA} = Volume * (Date^{reception} - Date^{payment}) / 30 = \$150\ 000 * (27 - 7) / 30 = \$100\ 000$$

where:

Volume – invoice amount with VAT;

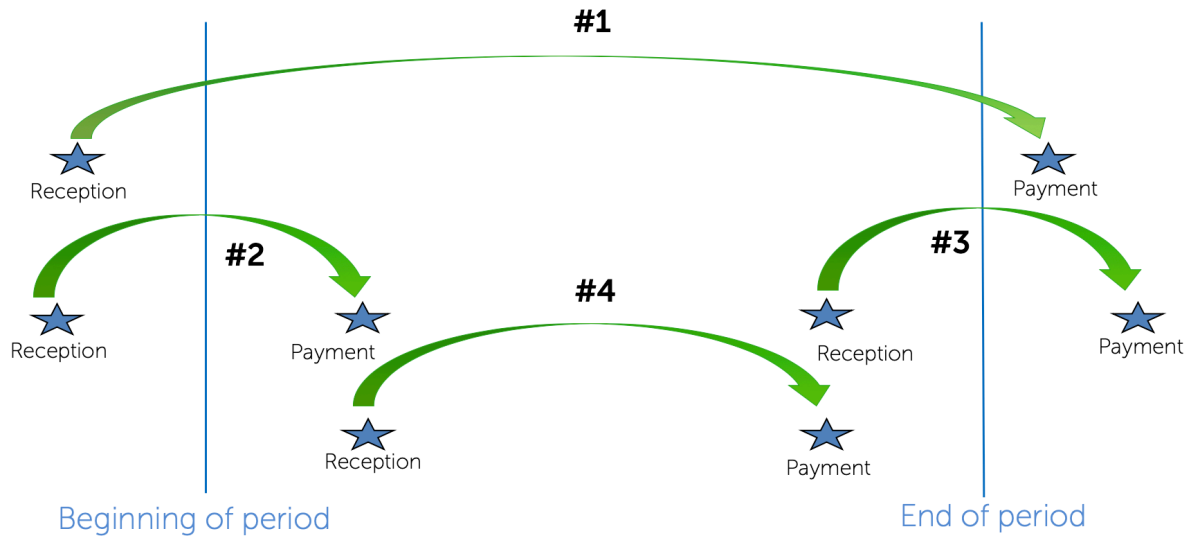
Date^{reception} – date of reception;

Date^{payment} – date of payment.

In this example, the month average working capital requirement was \$100 000.

To calculate WCR_{WA} for the period, you need to consider 4 scenarios of accounts receivables and 4 scenarios of accounts payable.

- for accounts payable:



Common formula:

$$\begin{aligned}
 \text{Accounts Payable}_{WA} &= \\
 &= \sum_i \text{Volume}_i^1 + \frac{\sum_j \text{Volume}_j^2 * (\text{Date}_j^{\text{payment}} - \text{Date}_{\text{first}})}{(\text{Date}_{\text{last}} - \text{Date}_{\text{first}} + 1)} \\
 &+ \frac{\sum_k \text{Volume}_k^3 * (\text{Date}_{\text{last}} - \text{Date}_k^{\text{reception}} + 1)}{(\text{Date}_{\text{last}} - \text{Date}_{\text{first}} + 1)} + \frac{\sum_l \text{Volume}_l^4 * (\text{Date}_l^{\text{payment}} - \text{Date}_l^{\text{reception}})}{(\text{Date}_{\text{last}} - \text{Date}_{\text{first}} + 1)}
 \end{aligned} \tag{47}$$

where:

$\text{Volume}^1, \text{Volume}^2, \text{Volume}^3$ and Volume^4 – invoice amounts for the first, second, third and fourth scenarios with VAT;

$\text{Date}_{\text{first}}$ – the first day of the period (month, quarter, year);

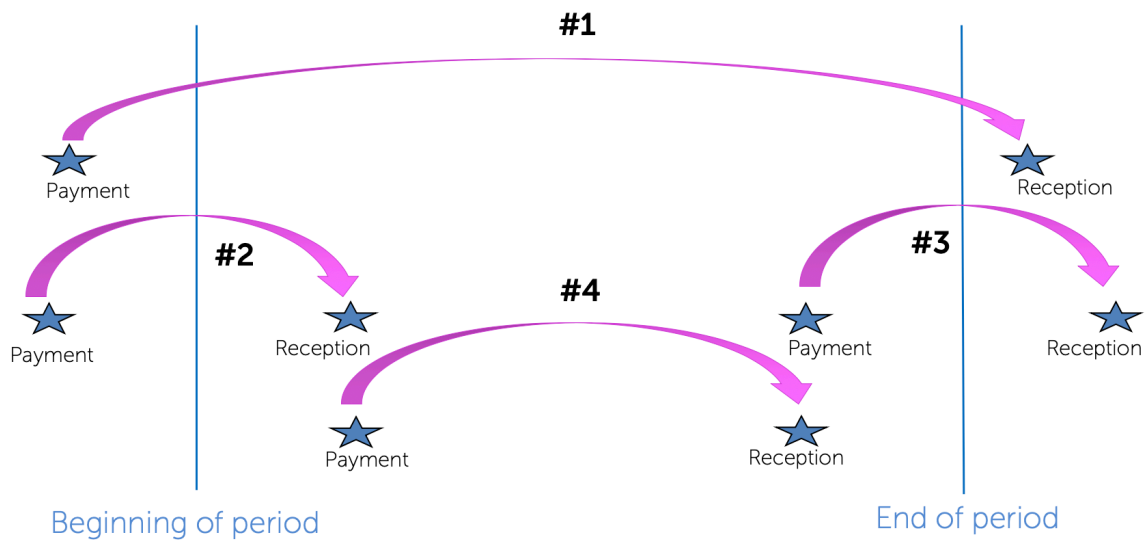
$\text{Date}_{\text{last}}$ – the last day of the period

$\text{Date}_j^{\text{payment}}$ – payment date for j^{th} delivery;

$\text{Date}_k^{\text{reception}}$ – reception date for k^{th} delivery;

👉 A general mistake in calculating WCR is using available data on the amount of payments, receptions or advances. In fact, we are talking about current payables or receivables, some of which may not be reflected in the postings of a given period (scenario #1)!

Similarly, for accounts receivable:



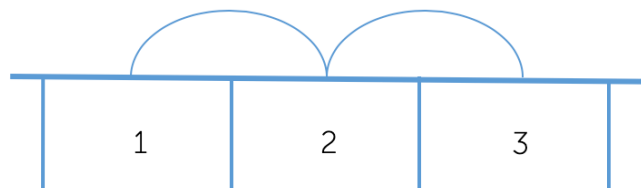
Common formula:

*Accounts Receivable*_{WA}

$$= \sum_i Volume_i^1 + \frac{\sum_j Volume_j^2 * (Date_j^{reception} - Date_{first})}{(Date_{last} - Date_{first} + 1)} + \frac{\sum_k Volume_k^3 * (Date_{last} - Date_k^{payment} + 1)}{(Date_{last} - Date_{first} + 1)} + \frac{\sum_l Volume_l^4 * (Date_l^{reception} - Date_l^{payment})}{(Date_{last} - Date_{first} + 1)} \quad (48)$$

👉 Invoices amounts must be accounted VAT inclusive. Since this is the amount of cash flow, not cost accounting.

It is also necessary to clarify the time definition, in fact calendar period are always longer than the periods of financial transactions, for example, if the delivery was February 01, and payment was February 03, then:

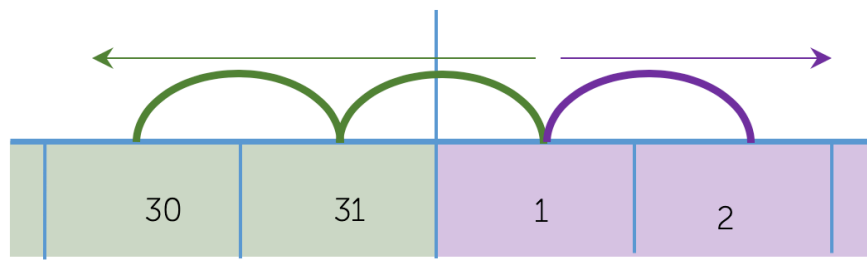


- Calendar period $Date_{last} - Date_{first} + 1 = 3 - 1 + 1 = 3$ days;
- And payable period $Date^{payment} - Date^{reception} = 3 - 1 = 2$ days.

In fact, this is a calculation for the scenario #4 (payments within the period). But when payments and acceptance are in different periods (scenarios #2 and #3), it is necessary to take into account the day between the periods in one of the scenarios, for example, in the 3rd:

$$+ \frac{\sum_k Volume_k^3 * (Date_{last} - Date_k^{payment} + 1)}{(Date_{last} - Date_{first} + 1)}$$

For the case, when the delivery was on January 30th, and the payment was on February 02nd (in another period), then:



- In January this is scenario #3 $Date_{last} - Date_k^{reception} + 1 = 31 - 30 + 1 = 2$ days;
- In February this is scenario #2 $Date_j^{payment} - Date_{first} = 2 - 1 = 1$ day.

So, 3 days of payment delay are taken into account in different periods of 2 days in January and 1 day in February, and the "transition" day is taken into account precisely in the scenario #3.

This calculation method WCR_{WA} can be easily implemented in any reporting systems such as Excel, BI or Hyperion.

👉 Further, we consider only the "film" method of measuring WCR (weighted average measurement) as the most accurate and reflecting real business situations. Understanding both WCR measuring methods will help you find a common language with Finance.

👉 The presented method describes in detail the calculation of WCR in the procurement situation. The same 8 scenarios are possible in the case of sales and payments received from the customer for the goods or services. The total working capital requirement is expressed by the formula (44).

3.6.3 Prepay / payment delay in days

Terms of payment (Delay/Advance payment) for a single delivery is determined by the formula:

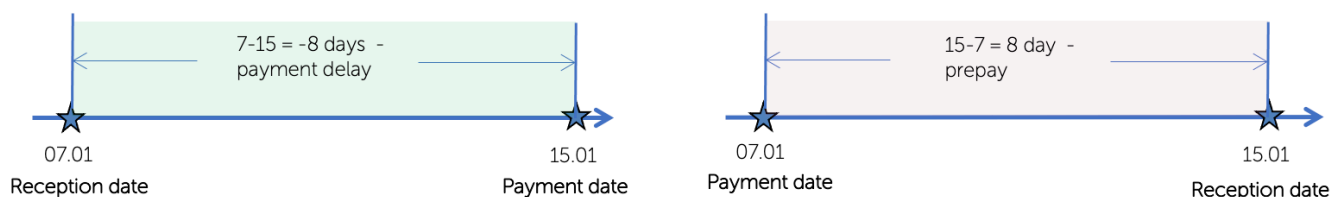
$$Tense_{one-off} = Date^{reception} - Date^{payment} \tag{49}$$

where:

$Tense_{one-off}$ – payment delay (-)/ prepay (+) in calendar days;

$Date^{reception}$ – reception date of the delivery;

$Date^{payment}$ – delivery payment date.



- If $Tense > 0$ – hence this is the average advance period;



- If $Tense < 0$ – this is the average term of payment delay.

To calculate the realized savings, the realized payment delay figures of the past and current years are taken.

To calculate the expected (contractual) savings, the realized figures of the previous year and contractual payment conditions are taken.

$$Tense = Date^{reception} - \sum_i Share_i^{payment} * Date_i^{payment} \tag{50}$$

where:

$Tense$ – payment delay (-)/ prepay (+) in calendar days;

$Share_i^{payment}$ – share of the i-th payment from the total amount within the delivery;

$Date_i^{payment}$ – date of the i-th payment within a certain delivery.

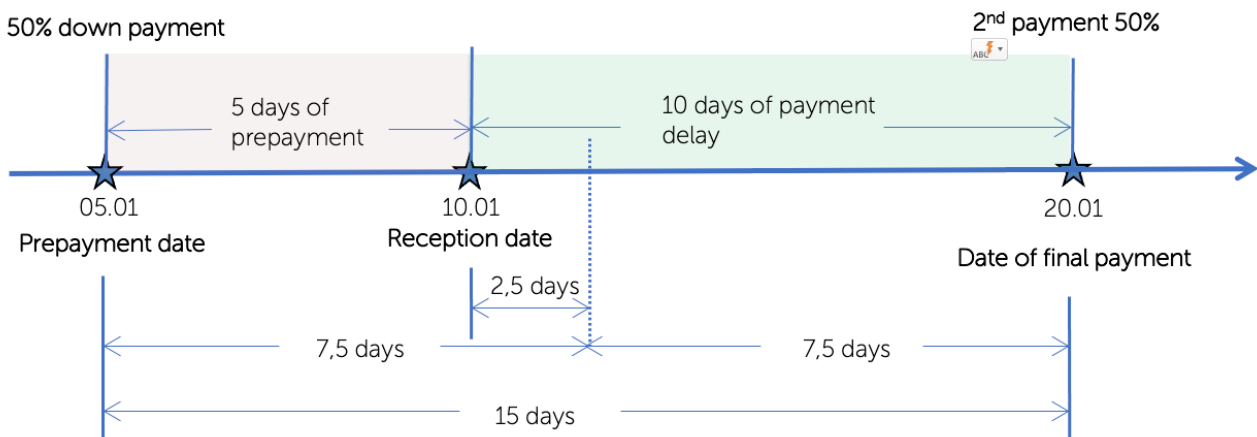
For example:

$Date^{reception}$ – reception date is January 10th;

$Share_1^{payment}$ and $Share_2^{payment}$ – payment for delivery in two equal payments: 50% down payment and 50% post-payment;

$Date_1^{payment}$ – date of down payment is January 05th;

$Date_2^{payment}$ – final payment date is January 20th.



$$Tense_{one-off} = Date^{reception} - Share_1^{payment} * Date_1^{payment} - Share_2^{payment} * Date_2^{payment}$$

$$Tense_{one-off} = 10 - 0,5 * 5 - 0,5 * 20 = 10 - 2,5 - 10 = -2,5$$

Thus, the resulting terms of payment within the framework of this delivery is 2.5 days of delay.

The resultant payment terms for a period across all payments (either within a particular vendor or SKU) is calculated from the weighted average working capital requirement received over that period.

$$WCR_{WA} = Accounts\ Receivable_{WA} - Accounts\ Payable_{WA} \tag{51}$$



$$Tense = \frac{WCR_{WA} * (Date_{last} - Date_{first} + 1)}{Volume} \quad (52)$$

where:

WCR_{WA} – the working capital requirement, calculated for the precise period;

$Date_{first}$ – the first day of the period;

$Date_{last}$ – the last day of the period;

$Volume$ – the amount of all invoices for 8 scenarios for the precise period, i.e. the sum of all accounts payable and receivables in the period;

- If $Tense > 0$ – therefore, this is the average **prepay period**;
- If $Tense < 0$ – this is the average term for **payments delay**.

If the task is to separately measure the average prepay period (receivable period), then the expression will look as follows:

$$Tense_{receivable} = \frac{Accounts\ Receivable_{WA} * (Date_{last} - Date_{first} + 1)}{Volume_{receivable}} \quad (53)$$

where:

$Volume_{receivable}$ – the sum of all accounts receivable for 4 scenarios.

Similarly, to measure the average term for payments delay (payable period):

$$Tense_{payable} = \frac{Accounts\ Payable_{WA} * (Date_{last} - Date_{first} + 1)}{Volume_{payable}} \quad (54)$$

where:

$Volume_{payable}$ – the sum of all accounts payable for 4 scenarios.

3.6.4 Variation of WCR

One of Procurement KPI can be an achievement of a certain level of WCR, but more often it is an improvement of indicator of the previous period, i.e.:

$$\Delta WCR = WCR_Y - WCR_{Y-1} \quad (55)$$

where:

WCR_Y – working capital requirement of the current year;

WCR_{Y-1} – working capital requirement of a comparable period (-12 months) previous year;

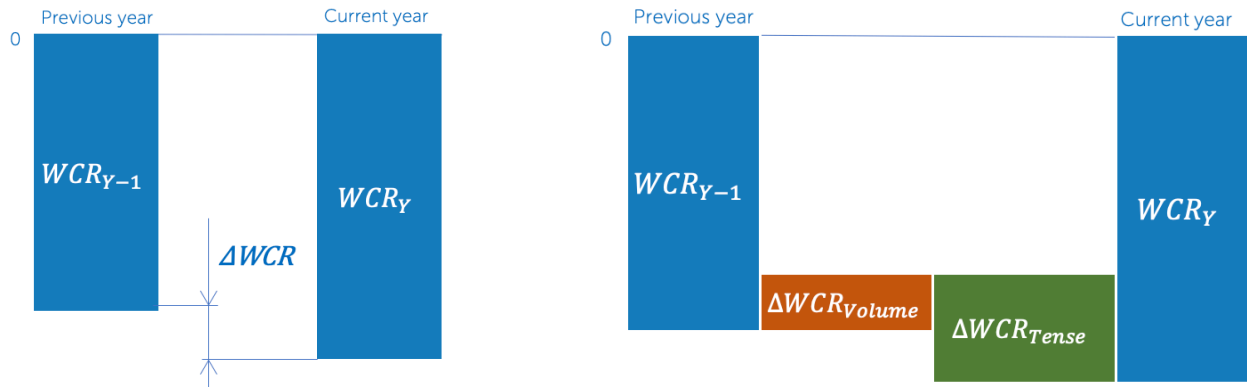
3.6.5 Measuring of the Procurement contribution to WCR variation

 WCR may change not only due to changes in payment terms, but also due to changes in the volume of purchases.

It is also possible that Procurement has done a great job of increasing payment delay, but the purchasing volume has fallen, and the effect will be imperceptible at the level of the overall



result. To measure the impact of Procurement to the result of a change in WCR accurately, it is necessary to isolate the factor of the variation in the purchasing volume.



$$\Delta WCR_{Tense} = WCR_Y - WCR_{Y-1} - \Delta WCR_{Volume} \tag{56}$$

Change in working capital requirements due to variation in the purchases volume:

$$\Delta WCR_{Volume} = WCR_{Y-1} * \left(\frac{Volume_Y}{Volume_{Y-1}} - 1 \right) \tag{57}$$

And WCR change due to procurement impact:

$$\Delta WCR_{Tense} = WCR_Y - \frac{Volume_Y}{Volume_{Y-1}} * WCR_{Y-1} \tag{58}$$

The formula for the % of payment terms impact to the change in WCR is:

$$\Delta WCR_{Tense}^{\%} = \frac{\Delta WCR_{Tense}}{|WCR_{Y-1} + \Delta WCR_{Volume}|} = \frac{WCR_Y * Volume_{Y-1} - WCR_{Y-1} * Volume_Y}{|WCR_{Y-1} * Volume_Y|} \tag{59}$$

Example: WCR change.

Buyers did a great job of increasing payment delay to suppliers. However, this did not lead to a significant increase in free cash (WCR < 0) due to a decrease in production volumes. It is required to measure the Procurement impact to the change of WCR:

- the working capital requirement in 2019 WCR_Y amounted to $-\$18,5$ M;
- in 2018 WCR_{Y-1} amounted to $-\$17,8$ M;
- the volume of purchases in 2019 and 2018 reached to $\$830,0$ M and $\$938,0$ M, respectively.

Calculation:

$$\Delta WCR_{Tense} = WCR_Y - \frac{Volume_Y}{Volume_{Y-1}} * WCR_{Y-1} = (-18,5) - \left(\frac{830}{938} \right) * (-17,8) = -\$2,75M$$

And

$$\Delta WCR_{Tense}^{\%} = \frac{(-18,5) * 938 - (-17,8) * 830}{|(-17,8) * 830|} = -17,5\%$$

In sum:

- working capital requirements (WCR) overall **decreased** by $\$0,7$ M;



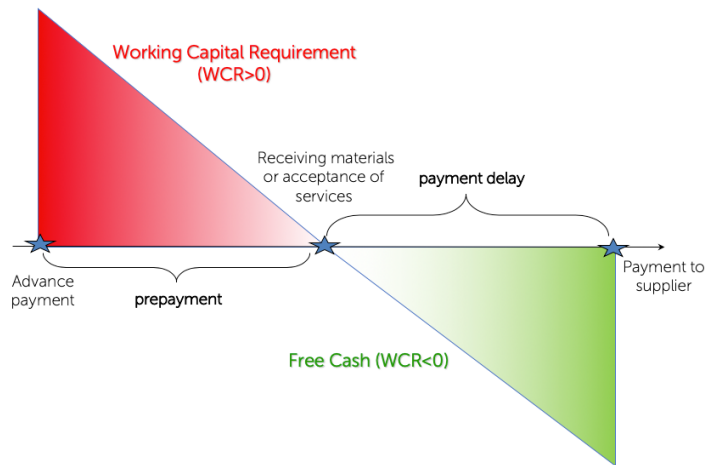
- production fall in volumes **increased** WCR by \$ 2.05 M, since the company works with the majority of suppliers on a payment delay basis (WCR is negative);
- therefore, maintaining positive dynamics of decreasing WCR became possible only through efforts to improve the terms of payment, and this contribution can be measured as a **decrease** in WCR by \$ 2.75 M.

A few examples:

				Variation in WCR due to the Procurement impact		
Sum of all accounts in previous comparable period	Working capital requirement in previous comparable period	Sum of all accounts in current period	Working capital requirement in current period	WCR change formula as Procurement impact	Change, \$	Change, %
$Volume_{Y-1}$	WCR_{Y-1}	$Volume_Y$	WCR_Y	ΔWCR_{Tense}		
\$1 000 000	\$10 000	\$1 000 000	\$8 000	$WCR_Y - \frac{Volume_Y}{Volume_{Y-1}} * WCR_{Y-1}$	-\$2 000	-20,0%
\$1 000 000	-\$10 000	\$1 000 000	-\$8 000		+\$2 000	+20,0%
\$1 000 000	-\$10 000	\$1 000 000	-\$12 000		-\$2 000	-20,0%
\$900 000	\$10 000	\$1 000 000	\$10 000		-\$1 111	-10,0%
\$1 000 000	\$10 000	\$900 000	\$10 000		+\$1 000	+11,1%
\$938 000 000	-\$17 800 000	\$830 000 000	-\$18 500 000		-\$2 749 467	-17,5%

3.7 Savings in cash flow

Variation in terms of payments significantly affects the working capital requirement (WCR) of the company.



- With a lack of working capital, the company is forced to borrow funds from banks or other sources, as well as refuse profitable investment programs, which leads to financial expenses;
- With free funds available, early reduction of the debt burden, the slide to self-financing and increased investment in profitable development projects are possible.

This type of savings affects the Net Cash Flow (NCF) and refers to cost reduction. For a single procurement project, savings are calculated over a time period of up to 12 months.

👉 Managing of supplier’s payment terms can be an independent project in itself. In any case, WCR and payment terms should be monitored regularly.



The savings from variation of payment terms for recurring purchases are estimated by the formula:

$$S_{WCR_recurring} = \frac{(Tense_Y - Tense_{Y-1})}{365} * Volume_Y * WACC_Y \quad (60)$$

where:

$Tense_Y$ – payment delay / advanced measured in the current period;

$Tense_{Y-1}$ – payment delay / advanced measured in a comparable period last year;

$Volume_Y$ – transactions amount in the current period with VAT.

Percentage savings formula:

$$S_{WCR_recurring}^{\%} = \frac{S_{WCR_recurring} * 365}{|Tense_{Y-1} * Volume_Y * WACC_Y|} \quad (61)$$

The use of the modulus (the absolute value) in the denominator is necessary for the correct display of the dynamics of expenses, since the payment term ($Tense$) can be either positive (advance) or negative (post-payment).

In the case of new and one-time purchases, payment terms may be subject to negotiation. For example, a concession in the price by the supplier can be exchanged for the best payment terms for him. Therefore, the effect of managing the terms of payment for new purchases will be represented by the formula:

$$S_{WCR_one-off} = \frac{(Tense_Y - Tense_{BIO})}{365} * Volume_Y * WACC_Y \quad (62)$$

where:

$Tense_{BIO}$ – payment terms for the best initial offer;

Formula % savings for new and one-off purchases:

$$S_{WCR_one-off}^{\%} = \frac{S_{WCR_one-off} * 365}{|Tense_{BIO} * Volume_Y * WACC_Y|} \quad (63)$$

For example:



$Tense_Y = 20$ days (prepay)

$Tense_{Y-1} = 0$ days

$Volume_Y = \$150\,000$

$WACC_Y = 8\%$



$$S_{WCR, recurring} = \frac{(20 - 0)}{365} * \$150\ 000 * 0,08 = \$658$$

so, this is an increase in financial expense!

This type of savings refers to Cost Reduction. S_{WCR} impact can be both positive and negative.

Case study: WCR calculation of a large company.

- Volume purchases - \$1,1 B a year with VAT;
- Number of invoices 300 000;
- 6 500 active suppliers;
- ERP system – Oracle OeBS V11 + P2P (iProcurement).

Reporting is implemented by the method of processing and visualizing data received from an ERP system through SQL queries. The request identifies and processes 4 scenarios for advance payments and 4 scenarios for post-payment.

June 2018 WCR calculation example:

XXPORU1504 Report on actual payments delay

BU: RU001
Supplier:
Entity:
Date from: 01.06.2018
Date by: 30.06.2018

Entity	Request #	Request amount	Reception amount	Reception #	Reception date	Payment delay from date	Invoice date	Supplier	Payment delay at contract	Sum of lines of invoice (without VAT)	Request for payment #	Request for payment (with VAT)	Payment date planned	Actual payment date	Advance amount in request	Request for payment in advance amount	Request for payment in advance #	Actual payment in advance date	Scenario	WCR
00046 Kazan 2	2815	\$640,96	\$640,96	2418	13.06.2018	19.06.2018	05.06.2018		A42	\$640,96	1209197	\$756,33	02.08.2018						Delay #3	-\$453,80
00011 SPB	2817	\$1 213,84	\$1 213,84	1975	18.06.2018	18.06.2018	15.06.2018		A42	\$1 213,84	1181654	\$1 432,34	02.08.2018						Delay #3	-\$620,88
00036 Bamaul 1	2818	\$664,62	\$664,62	2007	14.06.2018	14.06.2018	06.06.2018		A63	\$664,62	1185975	\$664,62	02.08.2018						Delay #3	-\$376,62
00016 Omak	2820	\$59,69	\$59,69	3288	30.06.2018	30.06.2018	30.06.2018		A16	\$170,75						70,44	1153388	21.06.2018	Advance #4	\$21,13
00016 Omak	2820	\$9,23	\$9,23	3289	30.06.2018	30.06.2018	30.06.2018		A16	\$170,75						10,89	1153388	21.06.2018	Advance #4	\$3,27
00016 Omak	2820	\$101,83	\$101,83	3290	30.06.2018	30.06.2018	30.06.2018		A16	\$170,75						120,16	1153388	21.06.2018	Advance #4	\$36,05
00036 Bamaul 1	2824	\$231,34	\$231,34	2026	09.06.2018	16.06.2018	09.06.2018		A63	\$231,36	1190390	\$272,99	02.08.2018						Delay #3	-\$203,19
00009 Samara 1	2825	\$152,54	\$152,54	2162	20.06.2018	20.06.2018	15.06.2018		A42	\$152,54	1190147	\$180,00	02.08.2018						Delay #3	-\$66,00
00023 Krasnoyarsk 1	2826	\$103,38	\$103,38	1848	18.06.2018	24.06.2018	14.06.2018		A42	\$104,04	11359986	\$122,77	09.08.2018						Delay #3	-\$53,20
00023 Krasnoyarsk 1	2826	\$23,87	\$23,87	1856	15.06.2018	15.06.2018	15.06.2018		A30	\$23,87	1178234	\$22,69	19.07.2018						Delay #3	-\$14,77
00023 Krasnoyarsk 1	2826	\$54,76	\$54,76	1858	15.06.2018	22.06.2018	15.06.2018		A30	\$54,76	1344305	\$64,62	26.07.2018						Delay #3	-\$34,46
00036 Bamaul 2	2828	\$52,02	\$52,02	2427	22.06.2018	22.06.2018	22.06.2018		A63	\$52,02	1213326	\$61,38	26.07.2018						Delay #3	-\$18,42
00009 Samara 1	2832	\$973,89	\$973,89	1749	14.06.2018	14.06.2018	31.05.2018		A42	\$973,89	1164728	\$970,92	19.07.2018						Delay #3	-\$383,59
00009 Samara 2	2833	\$3,85	\$3,85	1870	08.06.2018	08.06.2018	08.06.2018		A42	\$3,85	1153501	\$4,54	26.06.2018	26.06.2018					Delay #4	-\$3,03
00033 Ufa 2	2834	\$1 095,14	\$1 095,14	1854	19.06.2018	19.06.2018	22.05.2018		A45	\$1 095,14	1178256	\$1 292,26	02.08.2018						Delay #3	-\$516,91
00033 Ufa 2	2837	\$112,20	\$112,20	1828	13.06.2018	13.06.2018	13.06.2018		A30	\$112,20	1178291	\$112,20	19.07.2018						Delay #3	-\$63,82
00010 SPB Kolontay	2840	\$213,96	\$213,96	2503	04.06.2018	25.06.2018	04.06.2018		A42	\$213,95	1387961	\$252,46	09.08.2018						Delay #3	-\$227,22
00006 Sokolniki	2841	\$8 286,83	\$8 286,83	1882	19.06.2018	19.06.2018	11.06.2018		A42	\$8 286,83	1178214	\$9 778,46	12.07.2018						Delay #3	-\$3 911,38
00028 Noginsk	2842	\$2 004,13	\$668,04	4151	26.06.2018	26.06.2018	26.06.2018		A42	\$668,04	1179695	\$788,28	09.08.2018						Delay #3	-\$131,38
00006 Sokolniki	2844	\$40,43	\$40,43	1881	18.04.2018	12.06.2018	18.04.2018		A42	\$40,43	1178279	\$47,71	12.07.2018						Delay #1	-\$47,71
00015 Krasnodar 2	2845	\$853,00	\$853,00	2150	06.06.2018	15.06.2018	06.06.2018		A42	\$862,55	1190156	\$862,55	05.07.2018	05.07.2018					Delay #3	
00006 Sokolniki	2847	\$163,79	\$163,79	1878	23.05.2018	20.06.2018	23.05.2018		A42	\$163,79	1213336	\$193,27	26.07.2018						Delay #1	-\$193,27
00023 Krasnoyarsk 1	2849	\$273,79	\$273,79	2949	22.06.2018	22.06.2018	21.06.2018		A15	\$273,79	1344623	\$323,08	12.07.2018						Delay #3	-\$86,92
00009 Samara 1	2854	\$1 125,54				21.06.2018			A15						\$1 125,54	\$1 125,54	1153387	21.06.2018	Advance #3	\$375,18
00003 Krasnogorsk	2856	\$791,34	\$791,34	2021	20.06.2018	20.06.2018	19.06.2018		A30	\$791,26	1185955	\$933,69	05.07.2018	05.07.2018					Delay #3	-\$342,35
00006 Sokolniki	2857	\$42,31	\$42,31	1883	08.02.2018	12.06.2018	08.02.2018		A42	\$42,31	1178213	\$42,31	26.07.2018						Delay #1	-\$42,31
00006 Sokolniki	2861	\$2 127,92	\$2 127,92	1887	18.06.2018	19.06.2018	18.06.2018		A42	\$2 127,92	1178258	\$2 510,95	02.08.2018						Delay #3	-\$1 004,38
00015 Krasnodar 2	2862	\$2 071,60	\$2 071,60	2394	06.06.2018	19.06.2018	06.06.2018		A42	\$2 071,60	1209204	\$2 444,48	02.08.2018						Delay #3	-\$2 037,07
00023 Krasnoyarsk 3	2863	\$32,31	\$32,31	1757	16.06.2018	16.06.2018	16.06.2018		A30	\$32,31	1174419	\$35,12	19.07.2018						Delay #3	-\$19,06
00032 New Riga	2864	\$321,15	\$321,15	1620	20.04.2018	07.06.2018	20.04.2018		A42	\$321,15	1153448	\$378,96	19.07.2018						Delay #1	-\$378,96
00003 Krasnogorsk	2865	\$1 173,54	\$1 173,54	1614	15.05.2018	07.06.2018	15.05.2018		A42	\$1 173,40	1153459	\$1 384,62	19.07.2018						Delay #1	-\$1 384,62
00032 New Riga	2866	\$408,94	\$408,94	1619	23.05.2018	07.06.2018	25.05.2018		A42	\$408,94	1153449	\$482,56	19.07.2018						Delay #1	-\$482,56

In fact, you need date of reception, invoice amount with VAT and date of actual payment only to calculate WCR.

- Using a logical operator, 1 out of 8 scenarios is determined;
- WCR is calculated according to the formula of the corresponding scenario.



Reducing financial expenses in 2018:

$$S_{WCR_recurring} = \frac{(Tense_Y - Tense_{Y-1})}{365} * Volume_Y * WACC_Y = \frac{(-18,7 + 11,1)}{365} * 1\,100 * 0,08 = -\$1,83\,M$$

and

$$S_{WCR_recurring}^{\%} = \frac{S_{WCR_recurring} * 365}{|Tense_{Y-1} * Volume_Y * WACC_Y|} = \frac{-1,83 * 365}{|-11,1 * 1\,100 * 0,08|} = -68,5\%$$

A few examples:

Procurement parameters					Savings				
Sum of all accounts in previous comparable period	Payment terms in previous comparable year	Sum of all accounts in current period	Payment terms in current year	Weighted average cost of capital	Savings formula	Savings \$	Savings, %	Cost Reduction	Cost Avoidance
$Volume_{Y-1}$	$Tense_{Y-1}$	$Volume_Y$	$Tense_Y$	$WACC_Y$	$S_{WCR_recurring}$				
\$900 000	30,0	\$1 000 000	15,0	7%		-\$2 877	-50,0%	-\$2 877	\$---
\$900 000	15,0	\$1 000 000	30,0	7%		+\$2 877	+100,0%	+\$2 877	\$---
\$900 000	15,0	\$1 000 000	-15,0	12%	$\frac{(Tense_Y - Tense_{Y-1})}{365} * Volume_Y * WACC_Y$	-\$9 863	-200,0%	-\$9 863	\$---
\$900 000	-15,0	\$1 000 000	-30,0	12%		-\$4 932	-100,0%	-\$4 932	\$---
\$120 000	0,0	\$150 000	20,0	8%		+\$658	---	+\$658	\$---
\$900 000 000	-11,1	\$1 100 000 000	-18,7	8%		-\$1 832 329	-68,5%	-\$1 832 329	\$---

3.7.1 Comprehensive bids estimation with various payment terms

Some companies make request for proposal (RFP/RFQ) with an option for a supplier to offer different payment terms (payment delay or advance payment). This is not a good practice because:

- the working capital requirement (WCR) managing may be a strategic issue being a part of procurement policy (in this case, a pure mathematical approach cannot be applied: that is, the savings from the additional "discount" cannot be directly compared with the value from cutting the payment delay or moving to advance due to such a discount). Approval of exceptions creates a negative precedent that could cause financial losses that goes beyond the scope of a single deal;
- by using this opportunity, suppliers can manipulate commercial conditions by declaring an unreasonably high and obviously unacceptable price on those payment terms that are not interesting to them. For example, the price is \$100 with an advance payment, and \$150 if payment delay.



However, in some cases (in particular, for expensive projects), the terms of payment may become a subject to negotiation, and the buyer has to understand well the effect of changing payment terms on the total price. The formula for cost of capital is:

$$\text{Cost of Capital} = \frac{\text{Tense}}{365} * \text{Volume} * \text{WACC} \quad (64)$$

where:

Tense - payment delay (-)/ prepay (+) in days.

So, knowing the **WACC** indicator of the company, the buyer can calculate the impact of change in payment term on the total price. For example, **WACC = 12%**:



Purchases for \$100 with a delay of 0 days or for \$101 with a delay of 30 days are equivalent for a company at first sight. But from the point of view of financial management, access to funds is limited and therefore reducing the working capital requirement due to payments delay can be a priority, because the company receives \$100 as free cash.

General formula for the present price:

$$P_{\text{present}} = P * \left[1 + \left\{ \sum_i \frac{\text{Tense}_i}{365} * \text{Share}_i \right\} * (1 + \text{VAT}) * \text{WACC} \right] \quad (65)$$

Где:

P – price in the offer / price-list without VAT;

Tense_i – terms of payment (payment delay (-)/ prepay (+)) of the i-th payment relative to the date of acceptance in calendar days;

Share_i – share of the i-th payment, the sum of all shares must be equal to one $\sum_i * \text{Share}_i = 1$ (100%);

VAT – value added tax

WACC – buyer's weighted average cost of capital.

Case study: comprehensive assessment of suppliers' proposals, taking into account the terms of payment.

- Two suppliers offer equipment at a price of P - \$10,000 without VAT;
- VAT – 20%;
- WACC** – 12%;
- % prepayment (down payment): Supplier 1 - 50%, Supplier 2 - 30%;
- Production/delivery time after prepayment: Supplier 1 - 60, Supplier 2 - 15 calendar days;
- Terms of payment delay of the second part of the cost: Supplier 1 - 0 days (delivery immediately after payment of the 2nd part), Supplier 2 - 30 calendar days;

Thus, the present price, taking into account the terms of payment, will be:



Supplier 1:

$$P_1^{present} = P_1 * \left[1 + \left\{ \frac{t_1^{prepay}}{365} * Share_1^{prepay} - \frac{t_1^{postpayment}}{365} * (1 - Share_1^{prepay}) \right\} * (1 + НДС) * WACC \right] =$$

$$= 10\,000 * \left[1 + \left\{ \frac{60}{365} * 0,5 - \frac{0}{365} * (1 - 0,5) \right\} * (1 + 0,2) * 0,12 \right] = \$10\,118,36$$

Supplier 2:

$$P_2^{present} = P_2 * \left[1 + \left\{ \frac{t_2^{prepay}}{365} * Share_2^{prepay} - \frac{t_2^{postpayment}}{365} * (1 - Share_2^{prepay}) \right\} * (1 + НДС) * WACC \right] =$$

$$= 10\,000 * \left[1 + \left\{ \frac{15}{365} * 0,3 - \frac{30}{365} * (1 - 0,3) \right\} * (1 + 0,2) * 0,12 \right] = \$9\,934,90$$

The difference in offers is **1,8%**.

Payment terms can and should be one of negotiating subject.

Another important tool is factoring for suppliers. The use of this tool increases competition among suppliers and makes financing conditions more predictable. In some cases, the factoring rate is lower than the cost of the company's capital (and even more than a bank loan), which makes its use mutually beneficial and helps to avoid manipulation by suppliers.

3.8 Stock management savings

Let's repeat the definition according to International Accounting Standards (IAS2) [2]:
inventories are assets:

- held for sale in the ordinary course of business (including finished products);
- in the process of production for such sale (work-in-progress, WIP); or
- in the form of materials or supplies to be consumed in the production process or in the rendering of services.



Stock measurement is determined by the formula:

$$Stock = P_{SKU_1} * Q_{SKU_1} + P_{SKU_2} * Q_{SKU_2} + \dots + P_{SKU_n} * Q_{SKU_n} \quad (66)$$

where:

P_{SKU_i} - price of the i^{th} item (determined by the enterprise accounting policy);

Q_{SKU_i} - quantity of the i^{th} item.

Stock impact the working capital requirement (WCR), as already mentioned (see general formula (44)). Contribution to changes in working capital requirements due to stock changes:



$$\Delta WCR_{Stock} = Stock_Y - Stock_{Y-1} \tag{67}$$

where:

$Stock_Y$ – average stock of the current period;

$Stock_{Y-1}$ - average stock of the previous comparable period.

In general, the cost of the money “frozen” in stock for the period is determined by the formula (taken into account in P&L):

$$Cost\ of\ Capital_{Stock} = \frac{Date_{last} - Date_{first} + 1}{365} * Stock * WACC \tag{68}$$

where:

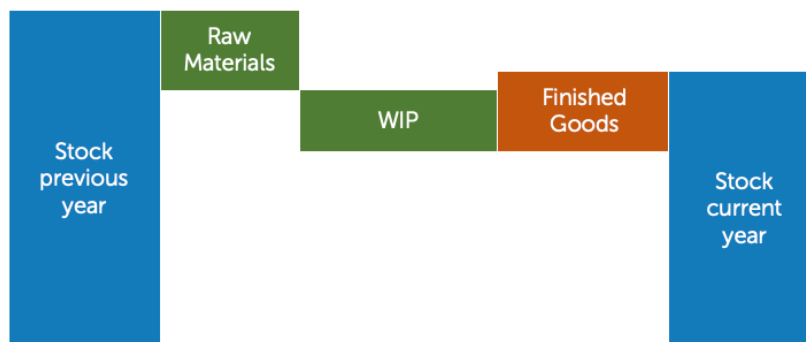
$Stock$ – average stock in the period (determined by the enterprise accounting policy);

$Date_{first}$ – the first day of the billing period;

$Date_{last}$ – the last day of the billing period;

In particular, financial expenses per year will be as follows:

$$Cost\ of\ Capital_{Stock} = Stock * WACC \tag{69}$$



Sure, savings should be calculated as a result of specific actions taken by the buyer, and not as an impact of external factors (for example, supply disruption).

$$S_{Stock} = \frac{Date_{last} - Date_{first} + 1}{365} * (Stock_Y - Stock_{Y-1}) * WACC_Y \tag{70}$$

For year

$$S_{Stock} = (Stock_Y - Stock_{Y-1}) * WACC_Y \tag{71}$$

where:

$Stock_{Y-1}$ and $Stock_Y$ – average stock of the previous comparable and current period, according to the enterprise accounting policy

% contribution to reducing inventory costs:

$$S_{Stock}^{\%} = \frac{S_{Stock}}{Stock_{Y-1} * WACC_Y} \tag{72}$$



A few examples:

Stock previous comparable period	Stock current period	Weighted average cost of capital	Savings				
			Savings formula	Savings \$	Savings, %	Cost Reduction Cost Avoidance	
$Stock_{Y-1}$	$Stock_Y$	$WACC_Y$	S_{Stock}				
\$100	\$50	12%	$(Stock_Y - Stock_{Y-1}) * WACC_Y$	-\$6	-50,0%	-\$6	
\$100	\$150	12%		+\$6	+50,0%	+\$6	
\$1 000 000	\$900 000	12%		-\$12 000	-10,0%	-\$12 000	
\$900 000	\$1 000 000	12%		+\$12 000	+11,1%	+\$12 000	

This type of savings affects the EBITDA of the income statement and is a Cost Reduction. Moreover, the change in stock itself affects cash flow.

3.9 Impact of savings on the cash flow statement

Procurement savings of materials and services being part of cost of goods sold (COGS), inventory, and operating expenses (OPEX) affect the EBITDA of the income statement (P&L). But the savings from the recurring purchases of materials and services that make up the company's capital costs, as well as payment terms improvement and stock management, affect the Net Cash Flow (NCF) statement of cash flows (CFS).

Let's consider this impact in more detail. The cash flow statement (CFS), is a financial statement that summarizes the amount of cash and cash equivalents entering and leaving a company. The cash flow statement measures how well a company manages its cash position, meaning how well the company generates cash to pay its debt obligations and fund its operating expenses.

The main components of the cash flow statement are:

- Cash from operating activities;
- Cash from investing activities;
- Cash from financing activities.

Let's take an Amazon's Cash Flow Statement example.

- Net result of cash from operating activities is affected by:
 - (a) savings from operating activities affecting EBITDA;
 - (b) changes in operating assets and liabilities, namely, changes in working capital requirements (WCR), consisting of changes in stock, receivables and payables.
- Net result of cash from investing activities is affected by all types of savings (c) from the procurement of materials and services that make up the capital costs of the company;
- Net result of cash from financial activities may be indirectly affected by WCR management, which helps reduce the company's debt burden (d) or open up new opportunities for profitable investments.



AMAZON.COM, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(in millions)

	Year Ended December 31,		
	2016	2017	2018
CASH, CASH EQUIVALENTS, AND RESTRICTED CASH, BEGINNING OF PERIOD	\$ 16,175	\$ 19,934	\$ 21,856
OPERATING ACTIVITIES:			
Net income	(a) 2,371	3,033	10,073
Adjustments to reconcile net income to net cash from operating activities:			
Depreciation of property and equipment and other amortization, including capitalized content costs	8,116	11,478	15,341
Stock-based compensation	2,975	4,215	5,418
Other operating expense, net	160	202	274
Other expense (income), net	(20)	(292)	219
Deferred income taxes	(246)	(29)	441
Changes in operating assets and liabilities:			
Inventories	(b) (1,426)	(3,583)	(1,314)
Accounts receivable, net and other	(3,436)	(4,780)	(4,615)
Accounts payable	5,030	7,100	3,263
Accrued expenses and other	1,724	283	472
Unearned revenue	1,955	738	1,151
Net cash provided by (used in) operating activities	17,203	18,365	30,723
INVESTING ACTIVITIES:			
Purchases of property and equipment	(c) (7,804)	(11,955)	(13,427)
Proceeds from property and equipment incentives	1,067	1,897	2,104
Acquisitions, net of cash acquired, and other	(116)	(13,972)	(2,186)
Sales and maturities of marketable securities	4,577	9,677	8,240
Purchases of marketable securities	(7,240)	(12,731)	(7,100)
Net cash provided by (used in) investing activities	(9,516)	(27,084)	(12,369)
FINANCING ACTIVITIES:			
Proceeds from long-term debt and other	(d) 618	16,228	768
Repayments of long-term debt and other	(327)	(1,301)	(668)
Principal repayments of capital lease obligations	(3,860)	(4,799)	(7,449)
Principal repayments of finance lease obligations	(147)	(200)	(337)
Net cash provided by (used in) financing activities	(3,716)	9,928	(7,686)
Foreign currency effect on cash, cash equivalents, and restricted cash	(212)	713	(351)
Net increase (decrease) in cash, cash equivalents, and restricted cash	NCF 3,759	1,922	10,317
CASH, CASH EQUIVALENTS, AND RESTRICTED CASH, END OF PERIOD	\$ 19,934	\$ 21,856	\$ 32,173



4 Synthesis of calculation formulas for procurement savings

SAVINGS	PROCUREMENT SAVINGS FORMULA	AUXILIARY FORMULAS	% SAVINGS FORMULA		COST REDUCTION	COST AVOIDANCE
Recurring purchases (DEF ≈ 0 и IEF ≈ 0)	$S_{Recurring}^{[0]} = (P_Y - P_{Y-1}) * Q_Y$ (20)	---				---
Recurring purchases (DEF ≠ 0 и IEF ≈ 0)	$S_{Recurring}^{[1]} = (P_Y - P_{Y-1} - DEF) * Q_Y$ (21)	(11), (13), (14) AND (15)	(23)			
Recurring purchases (IEF ≠ 0)	$S_{Recurring}^{[2]} = (P_Y - P_{BIO}) * Q_Y$ (22)	---			---	
New and One-off purchases	$S_{One-off} = (P_Y - P_{BIO}) * Q_Y$ (24)	(25)	(26)		---	
Consumption reduction	$S_{Consumption} = (Q_Y - Q_{Y-1} * \frac{Range_Y}{Range_{Y-1}}) * P_{Y-1}$ (32)	---	(33)			---
Substitutions	$S_{Substitution} = Q_Y * P_Y - Q_{Y-1} * P_{Y-1} * \frac{Range_Y}{Range_{Y-1}}$ (38)	---	(39)			---
Rebate savings	$S_{Rebate} = (Cost\ of\ Risk_Y^{\%} + Rebate_{Y-1}^{\%} - Rebate_Y^{\%}) * C_Y + Cost\ of\ Capital_Y$ (41)	(42)	(43)			
From variation of payment terms for recurring purchases	$S_{WCR_recurring} = \frac{(Tense_Y - Tense_{Y-1})}{365} * Volume_Y * WACC_Y$ (60)	(47), (48), (51) AND (52)	(61)			---
From variation of payment terms for new purchases	$S_{WCR_one-off} = \frac{(Tense_Y - Tense_{BIO})}{365} * Volume_Y * WACC_Y$ (62)		(63)		---	
Stock management	$S_{Stock} = \frac{Date_{last} - Date_{first} + 1}{365} * (Stock_Y - Stock_{Y-1}) * WACC_Y$ (70)	(71)	(72)			
WORKING CAPITAL REQUIREMENT MANAGEMENT						
Variation in working capital requirements due to Procurement contribution	$\Delta WCR_{Tense} = WCR_Y - \frac{Volume_Y}{Volume_{Y-1}} * WCR_{Y-1}$ (58)	(47), (48) AND (51)	(59)		---	---

Where:

- P_Y – weighted average current period price in local currency;
- P_{Y-1} – weighted average previous comparable period price in local currency;
- Q_Y – quantity purchased in the current period;



- Q_{Y-1} – quantity purchased in the previous comparable period;
- DEF – impact of direct economic factors on the price see formulas (11), (13), (14) AND (15);
- P_{BIO} – price of the best initial offer (BIO).
- $Range_Y$ – perimeter of consumption of the current period;
- $Range_{Y-1}$ – perimeter of consumption of the previous comparable period;
- $Rebate_{Y-1}^{\%}$ – previous year's rebate (used only for recurring purchases, for new ones - 0%);
- $Rebate_Y^{\%}$ – current year's rebate;
- $Cost\ of\ Risk_Y^{\%}$ – risk assessment by supplier in the current year (%);
- C_Y – the volume of expenses covered by the rebate;
- $Cost\ of\ Capital_Y$ – the cost of funds that was “borrowed” to the supplier in the amount of the rebate.(42);
- $Tense_Y$ – payment delay (-) / advanced (+) measured in the current period;
- $Tense_{Y-1}$ – payment delay (-) / advanced (+) measured in a comparable period last year;
- $Tense_{BIO}$ – payment terms for the best initial offer;
- $Volume_Y$ – transactions amount in the current period with VAT. (not equal to purchase turnover);
- $WACC_Y$ – weighted average cost of capital in current period;
- $Date_{first}$ – the first day of the billing period;
- $Date_{last}$ – the last day of the billing period;
- $Stock_Y$ – average stock of the current period;
- $Stock_{Y-1}$ – average stock of the previous comparable period;
- WCR_Y – working capital requirement of the current year;
- WCR_{Y-1} – working capital requirement of a comparable period (-12 months) previous year;



5 Analysis and reporting of procurement savings

Once the methods for calculating procurement savings are described, it is necessary to implement them. All procurement projects should be grouped in a single accounting and reporting system for procurement savings. To implement the Procurement Savings Tracking, there are three approaches:

1. Manual analytics, consolidation and reporting in Excel (see [Annex #4](#));
2. Manual analytics in Excel, consolidation and reporting in special systems;
3. Automated analytics, consolidation and reporting in special programs.

The choice of a method depends on many factors:

- data volume (number of items, deliveries, suppliers, projects);
- the quality of the available master-data in the ERP system:
 - high granularity level - availability of details at the SKU level by price, quantity and dates;
 - low granularity level – not for all periods or for all SKUs (for example, only for catalog items);
 - no granularity in ERP, but other sources where the data can be obtained from (suppliers, scans of accounts, paper invoices ...);
 - data without granularity.
- skills and resources of procurement teams;
- funds for implementation.

Automated analytics and procurement savings tracking is the best solution. However, high-quality and high granularity level of data (current and past periods) at the SKU level are required for its accurate operation. This data can be obtained from suppliers in the form of electronic invoices. If the data is incomplete or there is no detailed data, then it is possible to use tools with self-learning algorithms for reconstruction and data enrichment based on Artificial Intelligence (AI) in procurement.

If automation is not available, then a manual process of procurement savings tracking remains possible. Obtaining detailed data at the SKU level may require significant resources (primarily time) and it is possible to use probabilistic analysis methods that reduce the accuracy of the final data. Some accurate data may be obtained from suppliers. To implement this approach, basic analytical skills and resources are required. Therefore, for large companies with a developed procurement department, it is recommended either to create a dedicated procurement analytics function or outsource this task.



6 Ethical issues and procurement savings

When speaking about ethics in procurement, first of all, we are talking about an independent position of buyers in the issue of selecting suppliers, but ethical behavior in data analytics is no less important. Unethical behavior in data analytics that affects procurement savings (namely, the deliberate manipulation of such data) can cause serious economic damage to the company [5] and permanently undermine the credibility of the procurement function.

6.1 Manipulation at measuring the baseline

Determining of prices baseline, volumes and terms of payment can be not an easy task at all (see Example on page 34). Sometimes accurate data can't be obtained, or it takes a huge resource for that, and buyers have to do approximal calculation (Pareto rule). There is a temptation to take into account data that seems more profitable and convenient from the point of view of procurement saving, and vice versa, ignore data that underestimates the baseline.

If there are master-data of low quality, there are also risks of errors in measuring the baseline.

Solutions in this matter may be:

- dedicated business intelligence function in the procurement department;
- digitalization - improving the quality of master data and transparency;
- outsourcing procurement analytics functions.

6.2 Time frame distortion

6.2.1 The short term focus

In many companies savings are tracked for a period of 12 months (or less) regardless of how long the contract period is. This provides the opportunity for unethical procurement to design a payment structure that shows higher saving during the reporting period, but has higher costs in long term perspective. For example, a buyer may focus on price "here and now" purchasing equipment, while the total cost of ownership (subsequent maintenance and repair) can be ignored and, as a result, significantly overstated by the supplier.

6.2.2 The long term focus

Sometimes investments in equipment need to be made for continues operation or to avoid foreseeable costs, but there is no year over year savings to be had. In this case it can be tempting to forecast the costs of inaction and use this cost avoidance in the saving calculation. Don't do that!

The estimation of avoidance of losses may be a valuable tool in making the investment decision, but they can't be included in savings.



For example: this year we replaced the compressor of the refrigeration unit (for a cold warehouse): the repair cost was \$25 000. You can “forecast” repair costs increasing every year and other risks of goods spoilage only to justify buying of a new refrigeration equipment for \$200 000, for example.

6.3 Only reporting wins

The methods described in this methodology determine the presence of direct economic factors (DEF), such as: commodity and currency indices, as well as changes in duties and excise taxes. Buyers cannot manage these variations, and an adjustment is always made in the calculation of procurement savings if growth of indices identified. Growing indices is a challenge for the buyer and give chance for the supplier to increase the price. But a long-term falling market also gives opportunities: the buyer has to identify and use them in the benefit of the company.

The ethical issue is to assess an increasing or falling index impact properly on the final price and procurement savings.

Another example may be related to the management of the consumption volume (the third lever to obtain procurement savings). It's not enough just to prescribe the rules of consumption, it is necessary to monitor their compliance by introducing controls into the approval process (for example, in a P2P tool). The ethical behavior consists in responsible and consistent application of accepted consumption policies.

6.4 Budgeted budget savings

This is not an inaccuracy! Procurement savings and deviating from the budget are two different things and should never be combined. There are several main arguments in support of this position:

- the budget is just a hypothesis, it is not accurate, but it is often overestimated, and it is impossible to compare planned indicators with realized figures of consumption;
- The reasons for deviating from the budget and procurement savings are different. For example, when consumption grows, budget overruns occur, although in reality savings can grow;
- identified savings should already be budgeted;
- budget savings do not inspire confidence in anyone and cannot be an incentive to motivate the procurement team.

So why do companies still use the budget as a baseline for calculating savings? The answer is obvious: tracking savings is hard.

The ethical problem comes when procurement also has a hand in setting the budget. If you expect the cost to be X. Simply submit a budget for $X \cdot 1.10$ and ta-da... You met your 2020 savings goals in October 2019 with the stroke of a pen.

That is why this method cannot be considered as savings, and it is not given in this document.

6.5 Inflation trick



For the same reasons as the budget, some organizations use the inflation indicator to adjust the baseline price of previous periods. It's easier and since, as a rule, you always have inflation, the task of achieving savings is simplified.

In reality, inflation may have nothing similar with price variation. Inflation represents an aggregate index of consumer basket prices variation, but not vice versa. For example, you purchase imported components in euro and the national currency appreciates by 10% at some point, that is a direct economic factor (DEF) contributing to a reduction in the purchase price. At the same time buyers adjust prices with inflation, that is not correct.

As in the case of calculating procurement savings from the budget, this approach cannot be credible because it does not reflect real savings (or lack thereof).

In fact, procurement should track direct (DEF) and indirect (IEF) economic factors. The first ones (commodity and currency indices, as well as changes in duties, excise taxes and fees) can be accurately measured and taken into account in the historical baseline. The second ones cannot be measured, i.e. an inflation impact on prices increase of a particular product or service cannot be accurately measured. However, in some cases, the impact identified of indirect factors on price changes cannot be denied.

The advantage of this methodology is an assessment needed of indirect factors, that serves as a trigger for the transition from the historical baseline to the baseline of current bids for procurement savings calculation.

Procurement teams should be as critical as possible in assessing indirect factors, and if the arguments cannot be confirmed by calculations revealing direct links (for example, the impact of general inflation on a particular item procured, such factors should not be taken into account in calculating savings.



7 BIBLIOGRAPHY

1. **Jeffrey K. Liker.** The Toyota Way. 14 Management Principles from the World's Greatest Manufacturer. 2004.
2. **IFRS Foundation.** INTERNATIONAL ACCOUNTING STANDARD 2. ifrs.org. [Online] 2019. <http://eifrs.ifrs.org/eifrs/bnstandards/en/IAS2.pdf>.
3. **UTi IMS.** How Much Is Your Inventory Really Costing You? utiims.com. [Online] 2015. <https://www.utiims.com/how-much-inventory-cost>
4. **GEP.** Getting Procurement Savings to the Bottom Line. gep.com. [Online] 2017. <https://www.gep.com/white-papers/getting-procurement-savings-bottom-line>
5. **Ron Larimer.** The 3 most common procurement ethics issues regarding savings. ronlarimer.com. [Online] 2019. <http://www.ronlarimer.com/common-procurement-ethics-issues/>
6. **Andrey Germanchuk.** Procurement Saving vs Budget. VGProcurement.com. [Online] 2019. https://vgprocurement.com/blog_4_en.html
7. **Sievo.** Spend Analysis 101. Sievo.com. [Online] 2019. <https://sievo.com/resources/spend-analysis-101>
8. **Alexandra Twin.** Total Cost of Ownership – TCO. Investopedia.com. [Online] 2019. <https://www.investopedia.com/terms/t/totalcostofownership.asp>
9. **Jean-Louis Moreau.** How do you negotiate with Single/Sole source suppliers? jlmoreau.com. [Online] 2018. <https://jlmconsultant.com/negotiation-single-source>



Annexes

Annex #3 Currency clause example

The parties agreed that the prices of imported Goods indicated in this Price Agreement are subject to change depending on the indicators that determine such prices, namely, the Parties agreed that the base indicator (for the currency component) will be the value **XX, XXXX** rubles for 1 Euro according to the official Central Bank rate for **DD.MM.YYYY**. The value in rubles (for the currency component) can be adjusted if, during the term of the Agreement, the official exchange rate of the Central Bank changes by more than $\pm 15\%$ (fifteen percent) compared with the base indicator, namely: if the EURO rate differs by more than ± 15 on the day of placing the order compared with the base indicator, the prices will be increased or decreased by the difference between the upper or lower threshold of the agreed corridor and the official exchange rate on the day the order is signed. In this case, the EURO rate is determined by the following formula:

- if the upper threshold of the agreed corridor is exceeded (base rate in rubles + more than 15% for one EUR), the following formula is applied: rate for calculation = (official exchange rate set by the Central Bank of Russia - value of the upper threshold of the agreed corridor) + basic indicator of the EUR rate;
- if the base rate gets below the lower threshold of the agreed corridor (base rate in rubles minus more than 15% for one EURO), the following formula is applied: rate for calculation = base indicator of the EURO rate - (value of the lower threshold of the agreed corridor minus the official exchange rate established by the CBR).

If the average nominal value of the official EURO exchange rate deviates from the base indicator of the EURO rate by more than 20 (twenty)% during the 2 (two) consecutive months, then the parties reserve the right to agree on a new base rate indicator (for the currency component). In this case, the new base indicator is determined by the following formula:

- if the base indicator in rubles is exceeded + more than 20%: a new base indicator = (average 2-month nominal value of the official exchange rate set by the Central Bank of Russia minus the value of the upper threshold of the agreed corridor) + basic indicator of the EUR rate;
- if the base indicator in rubles is down more than 20%: a new base indicator = a new base indicator of the EURO rate - (the value of the lower threshold of the agreed corridor minus the average 2-month nominal value of the official exchange rate established by the CBR).