

Game Plan Cost of Poor Quality

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Poor quality has a cost, but it is often hidden therefore requiring a framework and a common approach to be able to tackle it at the GBU and Group levels.

1. Principles and definitions

1.1. Principles

The building blocks of CoPQ at Solvay are the following :

- a. **Cost of Customer Complaints** - financial compensations, return logistics
- b. **Cost of additional freight** caused by quality issues
- c. **Cost of Non Conforming Materials** (non Right First Time) - rework, scrapping, distress sales, storage, inventory, QC cost
- d. **Cost of adjustments during the production process** - additional QC, materials, utilities

- **Cost of Supplier Quality**

Not all components of CoPQ will be relevant or important for all GBUs, but this document aims to identify and define all building blocks; and to determine which ones will be mandatory (provided adequate means of calculation are available) and which ones will be optional according to GBU specificities.

1.2. Definitions

1.2.1. Scope

In terms of scope:

1. **Customer Complaints** : justified complaints only; any motive; for loss of sale and customer compensation, external customers only. Returned materials are handled as NC (see #3)
2. **Additional freight** : any freight cost incurred above the standard cost of the order caused by a quality issue and paid by Solvay (if paid by customer see #1); excluding complaints (see #1)
3. **Non-Conforming Materials** : finished products which do not meet sales specifications (regardless whether they can be reworked, downgraded or sold at concession); intermediates which do not meet internal specifications; raw materials made NC by Solvay; returns from customers confirmed as NC; any material declared NC by site QA/QC (eg, through contamination or unusual appearance, even if there is no specification)
4. **Adjusted materials** : materials which, even though exiting the production process as conform, have required one or more adjustments on top of what is specified in the SOP
5. **Supplier Quality** : related to any incidents for which the root cause lies entirely with the supplier (for example, failed production due to inadequate PRS is not a supplier issue)

Not all reporting is mandatory, we will differentiate the following:

- M: mandatory - reporting of these components will be mandatory provided adequate means of calculation are available
- O: optional - according to GBU specificities and priorities

1.2.2. The different types of costs

There are different types of impact that we will treat differently:

- E: impact on EBITDA - the total of these costs represents the baseline from which we can track any improvements which will increase our EBITDA
- C: impact on Cash - this cost represents the baseline from which we can track any improvements which will decrease our cash tied up in non value added inventory
- S: soft cost - this represents man-hours whose reduction would not necessarily lead to an actual reduction in fixed costs, but would free up time for more value added tasks

1.2.3. Detailed definitions

1.2.3.1. Cost of Customer Complaint

Component	Definition	Metric	Impact	Report
Loss of sale	CM lost in case of product return without replacement order	CM of returned product in k€ (time lag in case of replacement order)	E	M
Customer compensation	Non material credit notes linked to complaints	Amount in k€ of non material credit notes linked to complaints	E	M
Replacement freight	Any additional freight linked to complaint paid directly by Solvay*	Cost in k€ of freight for returning material and if applicable (depending on Incoterm) for sending initial order and/or replacement material	E	O
Employee time (incl QC)	Hours spent by Solvay employees on complaint processing	# of complaints x average # of hours per complaint (can vary according to complaint category)	S	O

1.2.3.2. Cost of additional freight

Component	Definition	Metric	Impact	Report
Expedited delivery	Any additional freight expended to meet promised delivery date or reduce delay due to quality issues	Cost in k€ of expedited delivery - cost in k€ of standard freight (incl. air freight)	E	O
Partial delivery	Cost of shipping LTL instead of FTL due to quality issues	Cost in k€ of delivery at LTL rate - cost in k€ of delivery at FTL rate	E	O
Multiple deliveries	Cost of shipping in multiple deliveries instead of a single delivery due to quality issues	Cost in k€ of multiple deliveries - cost in k€ of standard single delivery	E	O

1.2.3.3. Cost of Non Conforming Materials

Component	Definition	Metric	Impact	Report
Loss of sale	CM lost in case of order not fulfilled because of NC material	CM of unfulfilled order for sold out assets only, in k€	E	O
Disposal	Cost of destroying NC material	Cost of freight + cost of disposal + cost of product in inventory, in k€	E	M
Rework	Cost of reworking NC material	Cost of labor (production / QC)	S	O
Rework	Cost of reworking NC material	Cost of material losses and additional RM/ utilities	E	O
Concession sale	Loss of revenue when NC material sold at discount or downgraded	Delta between standard sale price of NC material and actual sale price , in k€	E	O
Storage	Cost of storing NC material	Amount of NC material stored in internal / external warehouses x unit cost, in k€ (incl. freight and handling)	E	O
Inventory	Amount of NC material in inventory	Amount of NC material in inventory in k€ (part of SMOG) - could be tracked separately (finance, supply chain)	C	M
Cost of inventory	Cost of capital of NC inventory	Metric above x WACC	C	O
Employee time (incl. QC)	Hours spent by Solvay employees on NC material processing	# of incidences x average # of hours per incidence (can vary according to NC category)	S	O

1.2.3.4. Cost of adjustments

Component	Definition	Metric	Impact	Report
Adjustment	Cost of adjusting material which has failed QC testing to bring it within specs	Additional RM/utilities	E	O
Adjustment	Cost of adjusting material which has failed QC testing to bring it within specs	Cost of labour (production / QC)	S	O

Loss of sale	CM lost due to wasted hours on sold out assets	# of hours wasted on adjustments* x average CM / hour for sold out assets only, in k€	E	O
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1.2.3.5. Cost of Supplier Quality

Component	Definition	Metric	Impact	Report
Employee time (incl QC)	Hours spent by Solvay employees on supplier quality issue processing	# of SCARs x average # of hours per SCAR (can vary according to complaint category)	S	O
Any component from building blocks 1-4	Any cost whose main root cause is demonstrated to lie with a supplier after investigation	Total amount for the period in Quality Notifications in SAP (or equivalent system) (differentiate between pending and closed, as past amounts can be revised)	Varies	O

1.3. Glossary

CoPQ	Cost of poor quality
FTL	Full truck load
KPI	Key performance indicator
LTL	Less than truckload
NC	Non conforming
PRS	Product requirement specification (for raw materials)
QC	Quality control
RM	Raw material
SCAR/QN	Supplier Corrective Action Request / Quality Notification (SAP)
SOP	Standard Operating Procedure

2. Provide guidance for calculation

2.1. How to calculate CoPQ

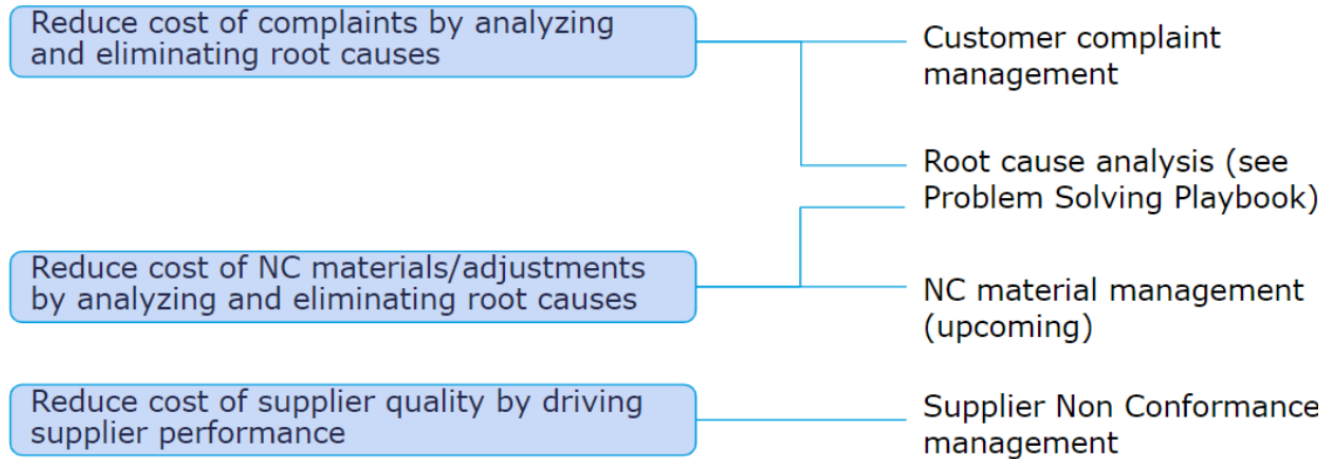
Work in progress.

2.2. How to Reduce CoPQ

The methods and best practices to reduce the Cost of Poor Quality are described in the Quality Playbooks. You can find the links to these Playbooks in the Useful Links section.

Levers

Playbooks



3. KPIs

- CoPQ is a lagging KPI which should be reported monthly (once reports are available):
 - CoPQ impacting EBITDA (mandatory elements at least)
 - CoPQ impacting Cash (mandatory element at least)
 - CoPQ impacting man-hours (optional)
- Other related lagging KPIs are
 - Conformity rate - see upcoming NC material management playbook
 - Customer Complaint Rate (CCR) - see customer complaint management playbook
- Leading KPIs to reduce CoPQ should be defined at GBU level according to the main root causes.

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