

Jindal Stainless
Cost of Poor Quality

Jindal Stainless

1.8 Million Mt Stainless Steel.

Sales Turnover : Rs13,000 Crores/Annum

Hisar (HR/CR Products & Specialty Products)

Jaipur (HR/CR Products, Ferro-alloys, Power)

Vizag (Ferro-alloys)

Surabaya, Indonesia (CR Products)

Service Centers

- Jindal Stainless Steelway Limited India:
Gurgaon, Mumbai, Chennai, Vadodra
- Iberjindal S.L, Spain:
Valencia

Subsidiaries (Major)

- Austenitic Creation Pvt. Limited (ACPL)
- Jindal Architecture Limited (JAL)



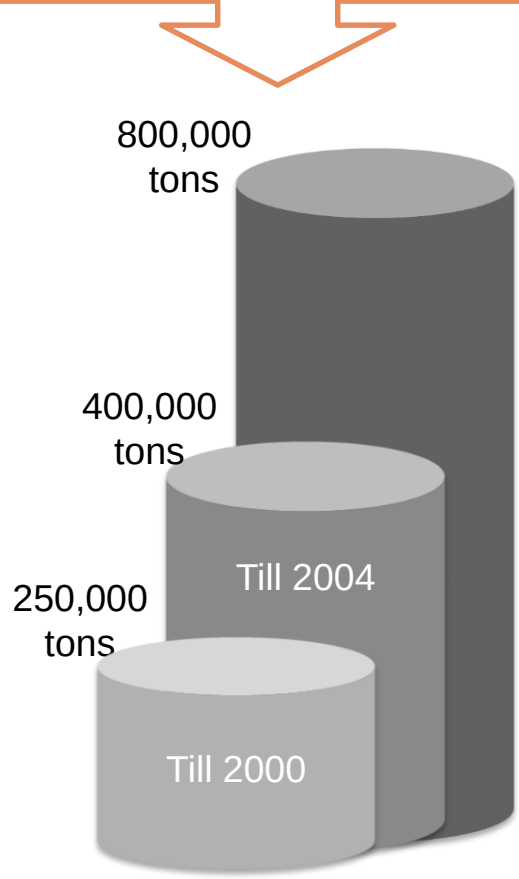
Hisar Cold Rolling Complex



India's fully Integrated Stainless Steel Plant, to produce Stainless Steel Slabs, Blooms, Hot Rolled Plates, Hot Rolled, Cold Rolled Coils & Specialty Steels with state-of-the-art facilities

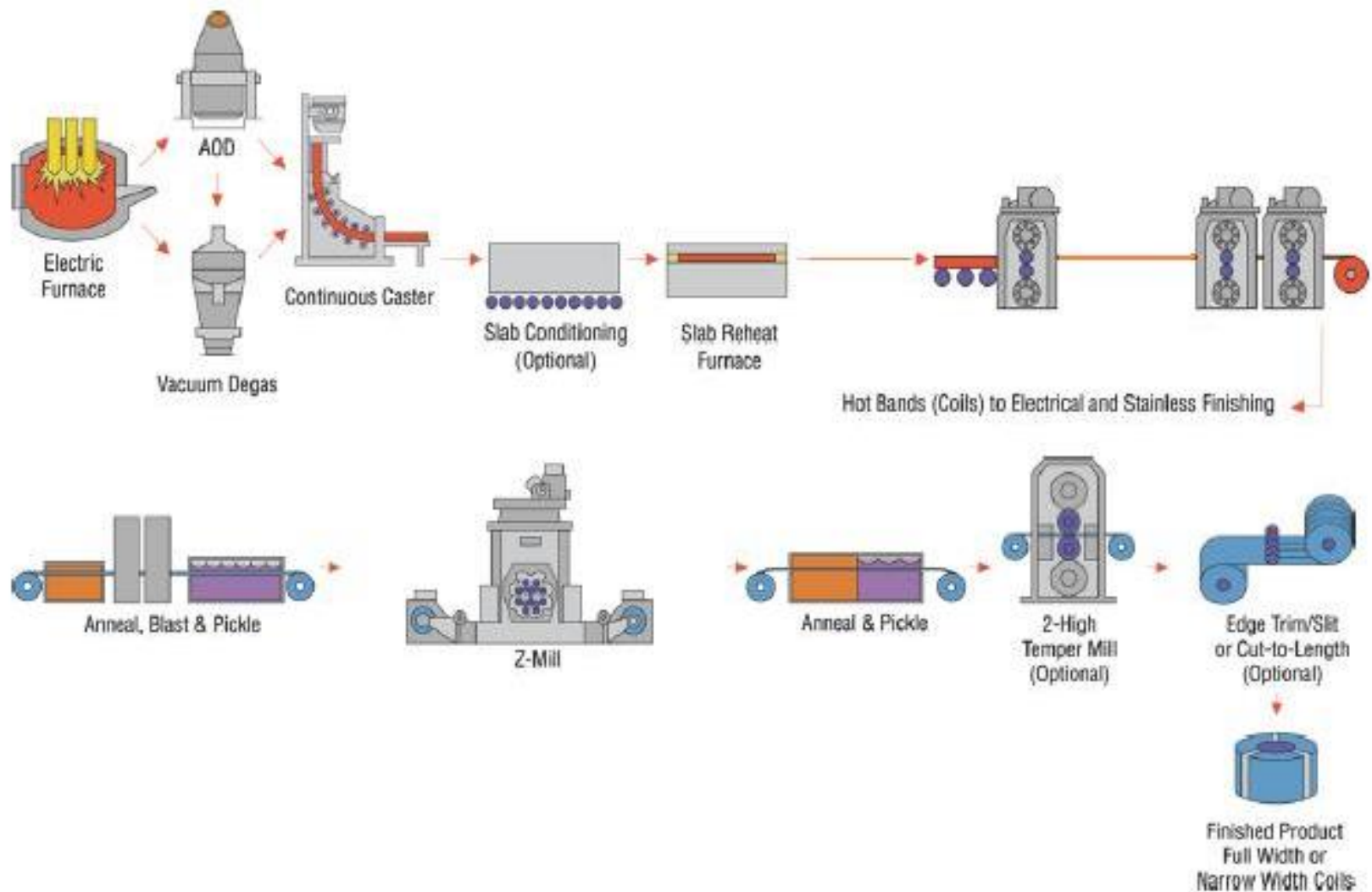
Facilities & Capacities

Modernized Hisar Plant with 800,000 tons
Stainless Steel capacity



Hisar Plant Facilities	Capacities (tons per annum)
SMS	800,000
HR-Steckel	720,000
HR-Tandem Strip Mill	300,000
HRAP & Plates Finishing	175,000
Cold Rolling	375,000
Specialty Products Division	25,000
Coin Blanking Division	10,000

Process Flow. Jindal Stainless, Hisar



CoPQ : Linkage for Lowering Cost & Reduce Waste



**Defining CoPQ
Cost of Poor
Quality**



**Evolution &
Components of
CoPQ**



**Relevance to
Steel Industry**



**Benchmarking
&
Improvement
Initiatives**



Outline

CoPQ : Cost of Poor Quality: ‘The Cost which would be eliminated if a company’s products and the processes in its business were perfect’.

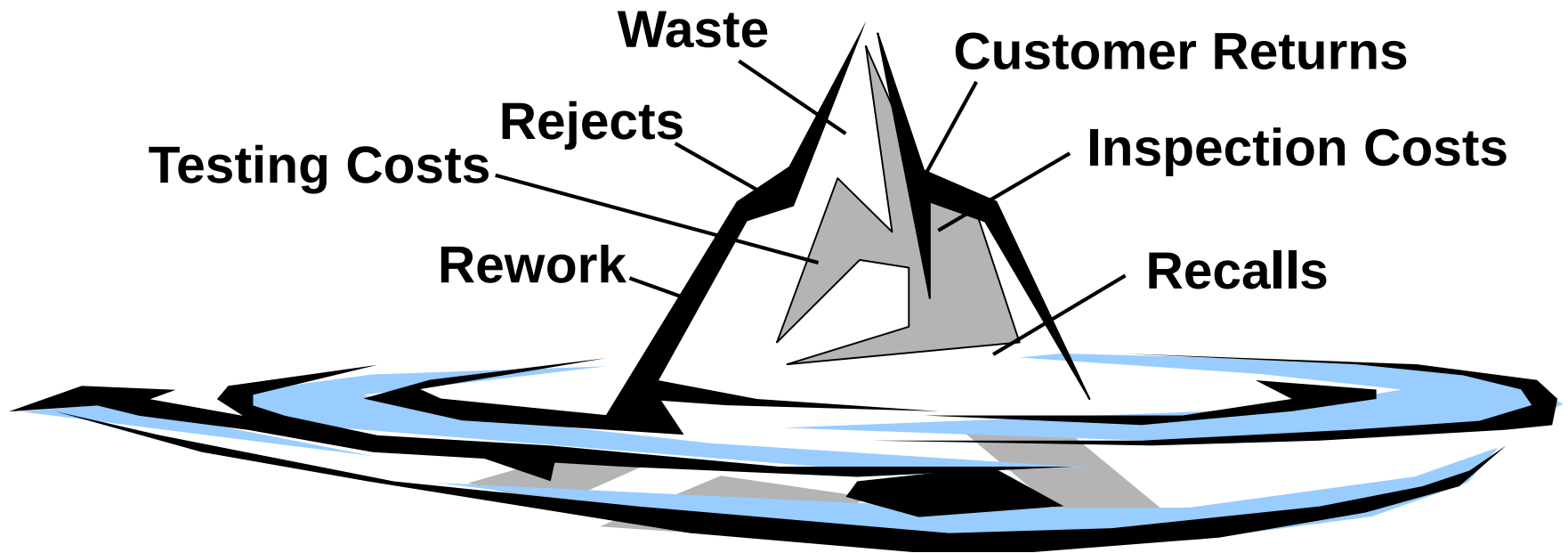
History:

- Fully developed by Dr. Joseph Juran, and can be read in great detail in his book Juran's Quality Handbook
- COPQ was popularized by IBM quality expert H. James Harrington in his 1987 book “Poor Quality Costs”



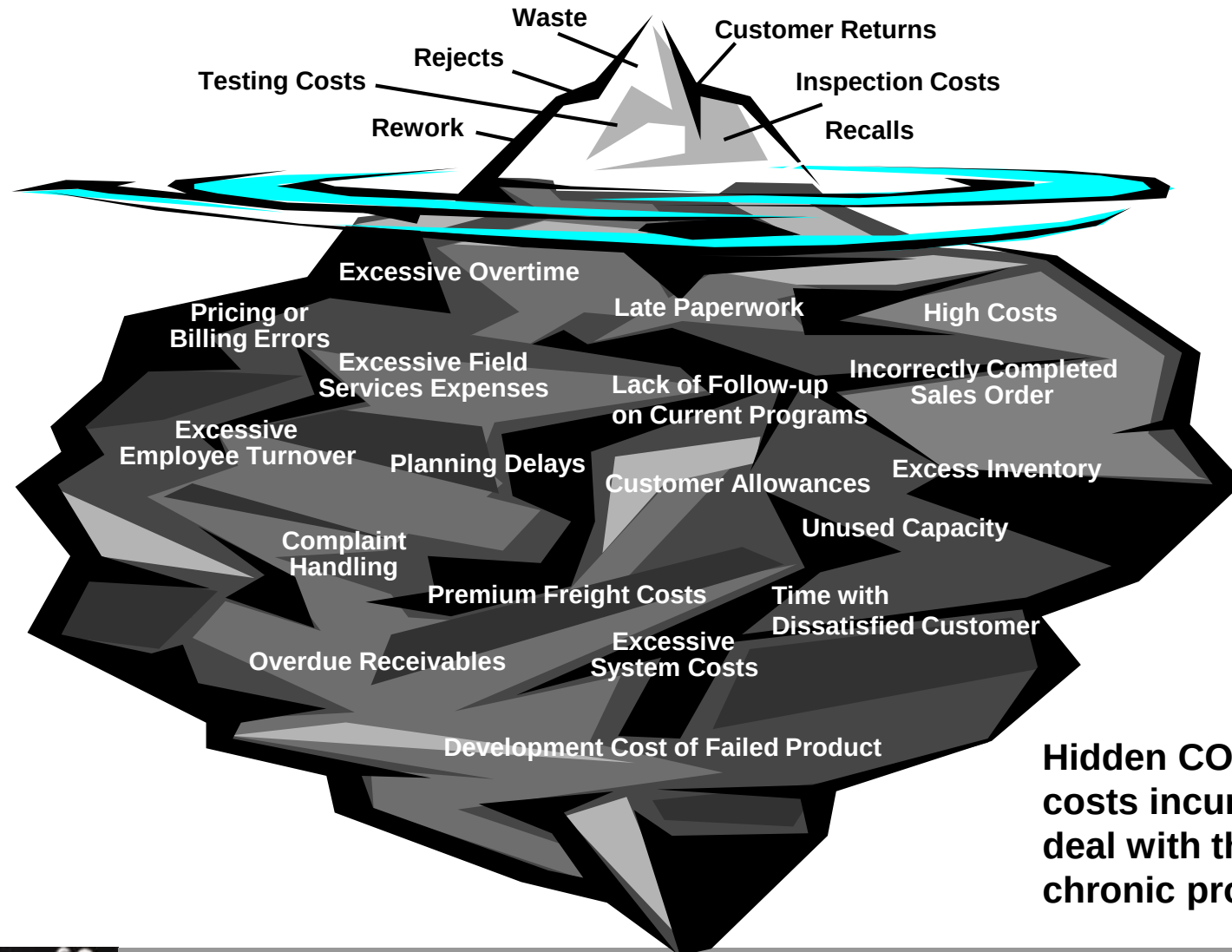
Traditional Cost of Poor Quality

When (poor) quality costs are initially determined, the categories that gets included are the visible ones as depicted in the iceberg below.



Cost of Poor Quality

As an organization gains a broader definition of poor quality, the hidden portion of the iceberg becomes apparent.



Evolution of CoPQ

Juran	1951	Discussed costs associated with poor quality and how it effects the company.
Feigenbaum	1998	He was the first to classify these costs into categories.
Bergman and Klefsjö	2010	They stated that poor-quality cost and quality costs are not good terms giving the impression that high quality costs, While it in fact is lack of poor quality that costs.
Sörqvist	2001	He defines COPQ as “the total losses caused by the products and processes of a company not being perfect”.
Harrington	1987	Defines CoPQ as “all the cost incurred to help the employee do the job right every time and cost of determining if the output is acceptable, plus any cost incurred by the company and the customer because the output did not meet Specifications and/or customer expectations”.
Krishnan	2006	Stated by Krishnan (2006) visible and invisible CoPQ can be visualized as an iceberg, where only a little amount of the costs can be seen and the rest is hidden under the water.
Gryna	1999	States that invisible COPQ is three or four times of visible costs. He has divided invisible COPQ into ten categories.

Sigma

6 sigma

5 sigma

4 sigma

3 sigma

2 sigma

CoPQ

<10% of sales

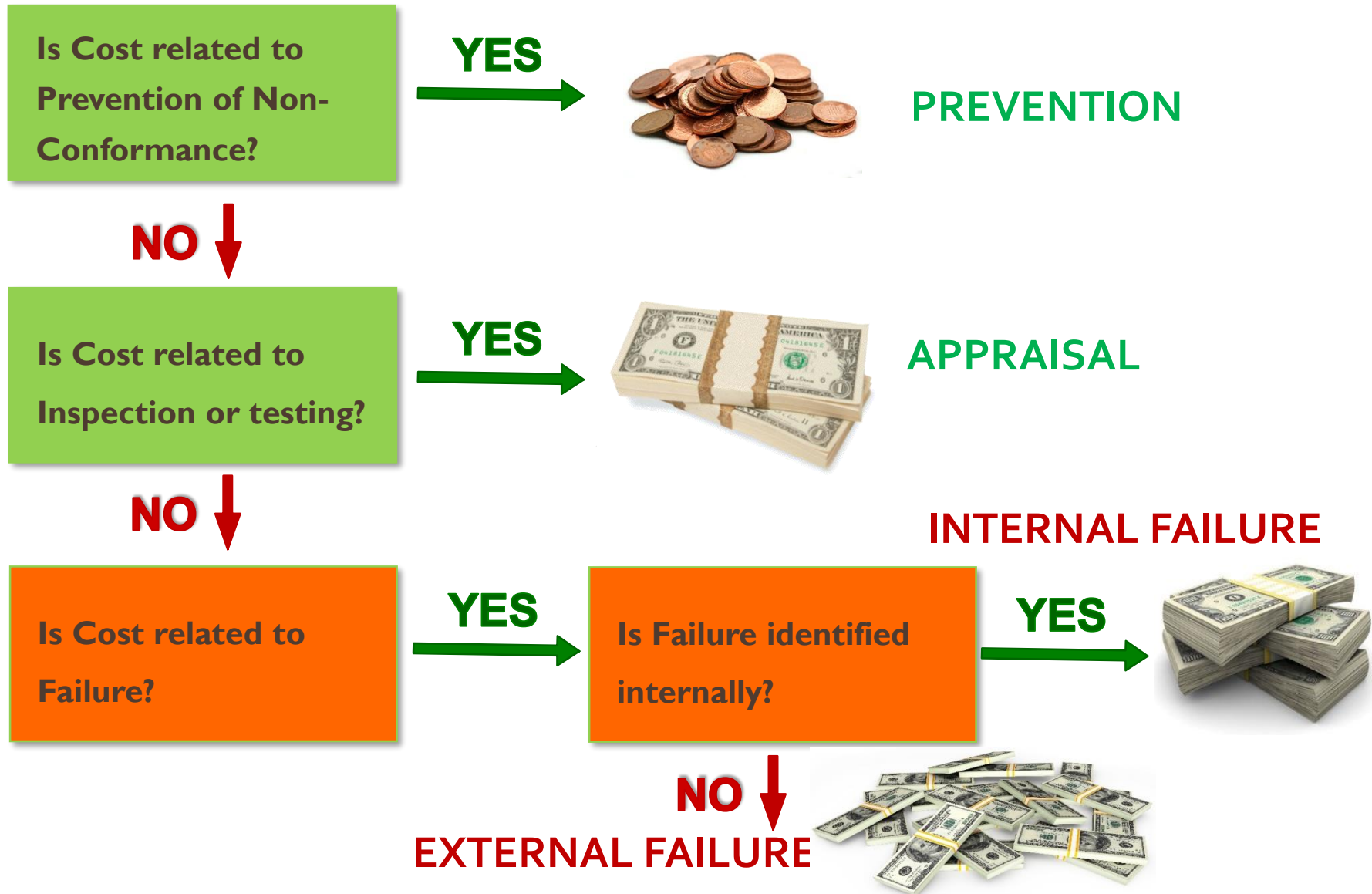
10-15% of sales

15-20% of sales

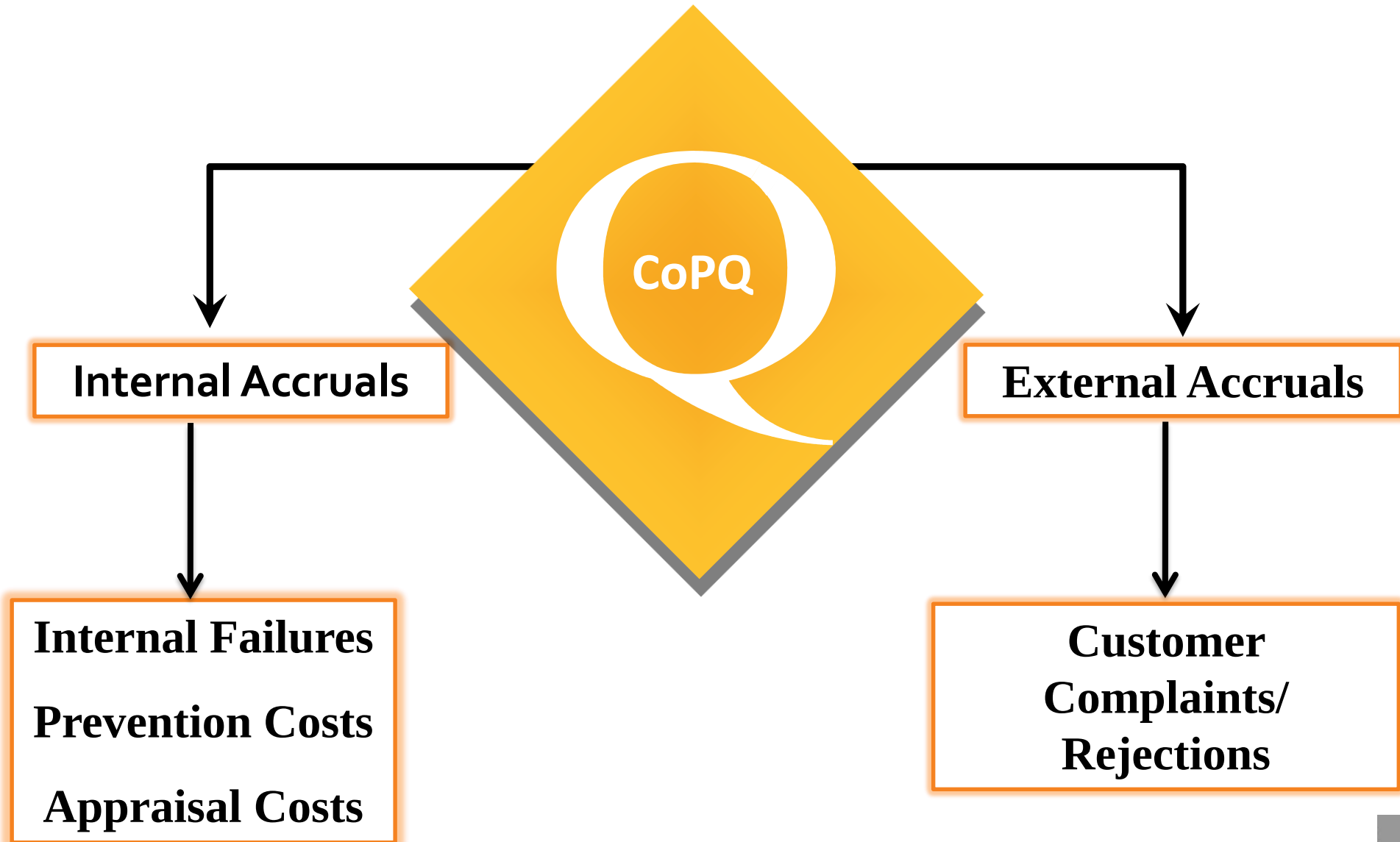
20-30% of sales

30-40% of sales

CoPQ Components



CoPQ Components



CoPQ Components

➤ Internal Accruals

➤ Internal Failures

- i) Additional Costs emerging due to Higher Consumptions, Waste Generations, Reworks etc.
- ii) Additional Costs due to failures occurring prior to delivery or Shipment of the product, or the furnishing of a service to the Customer.



Some Examples of Internal Failure Costs

✓ Scrap

✓ Rework

✓ Re-inspection

✓ Re-testing



➤ Preventive Costs

The costs of all activities specifically designed to **prevent** poor quality in products or services.

Examples are the costs of:

- New product review
- Quality planning
- Supplier capability surveys
- Quality improvement team meetings
- Quality improvement projects
- Quality education and training

➤ In the ideal situation, Prevention costs will be the largest portion of the Total Cost of Quality



CoPQ Components

➤ Appraisal Costs

The costs associated with **measuring, evaluating or auditing** products or services to assure conformance to standards & performance requirements.

These include the costs of:

- Inspection/test of purchased material
- In-process and final inspection/test
- Product, process or service audits
- Calibration of measuring and test equipment



These are all planned activities

Appraisal Costs should be the second largest category, but should not exceed Prevention costs



➤ External Accruals

- **External Failure Costs**

Failure costs occurring after delivery or shipment of the product — and during or after furnishing of a service — to the customer.

Examples are the costs of:

- ✓ Processing customer complaints
- ✓ Customer returns
- ✓ Warranty claims
- ✓ Product recalls

These are non-value added and reactive



➤ CoPQ Assessment

All these Costs Cannot be Zero

Take Targets against Bench-Marked Costs; Anything in excess of the Target becomes a CoPQ

Bench-Marking can be done:

- Best Cost ever achieved on Monthly basis
- Best Cost achieved in 3 best Months of previous Year
- Bench-Marking against Global Best, if one has access to this Data
- Out of Box Thinking



BENCH MARKING FOR EVALUATING COPO

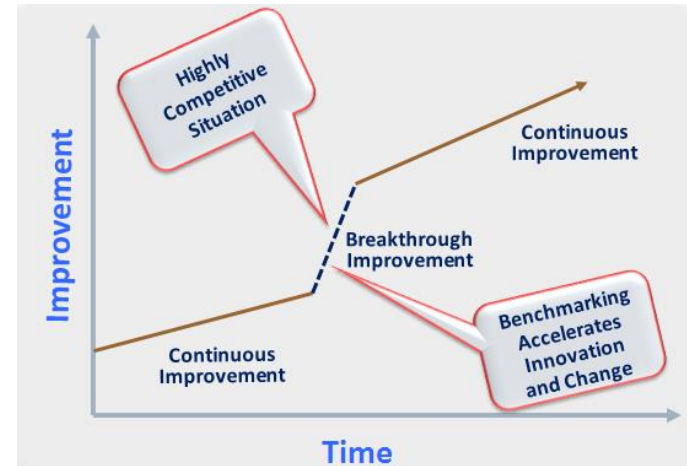


Assessing CoPQ: Benchmarking

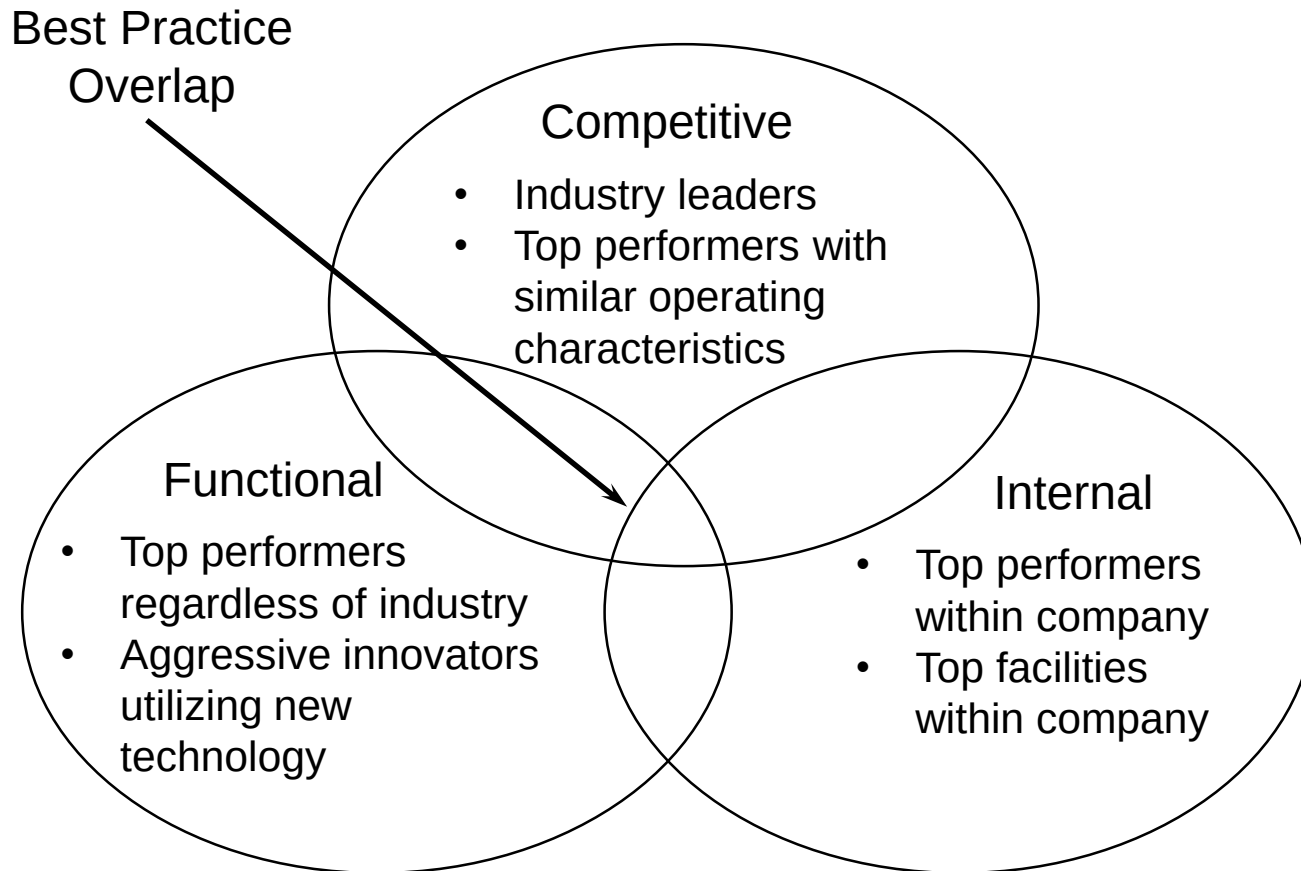
Benchmarking is a strategic and analytic process of continuously measuring an organization's products, services and practices against a recognized leader or a Target

History:

- The term “benchmarking” was originally a land surveyor's term used in topographical surveys
- A benchmark was a distinctive mark made on a rock, a wall, or building that served as a reference point in determining one's current position and altitude
- This was a sighting point from which additional measurements could be made



Benchmarking Methodology



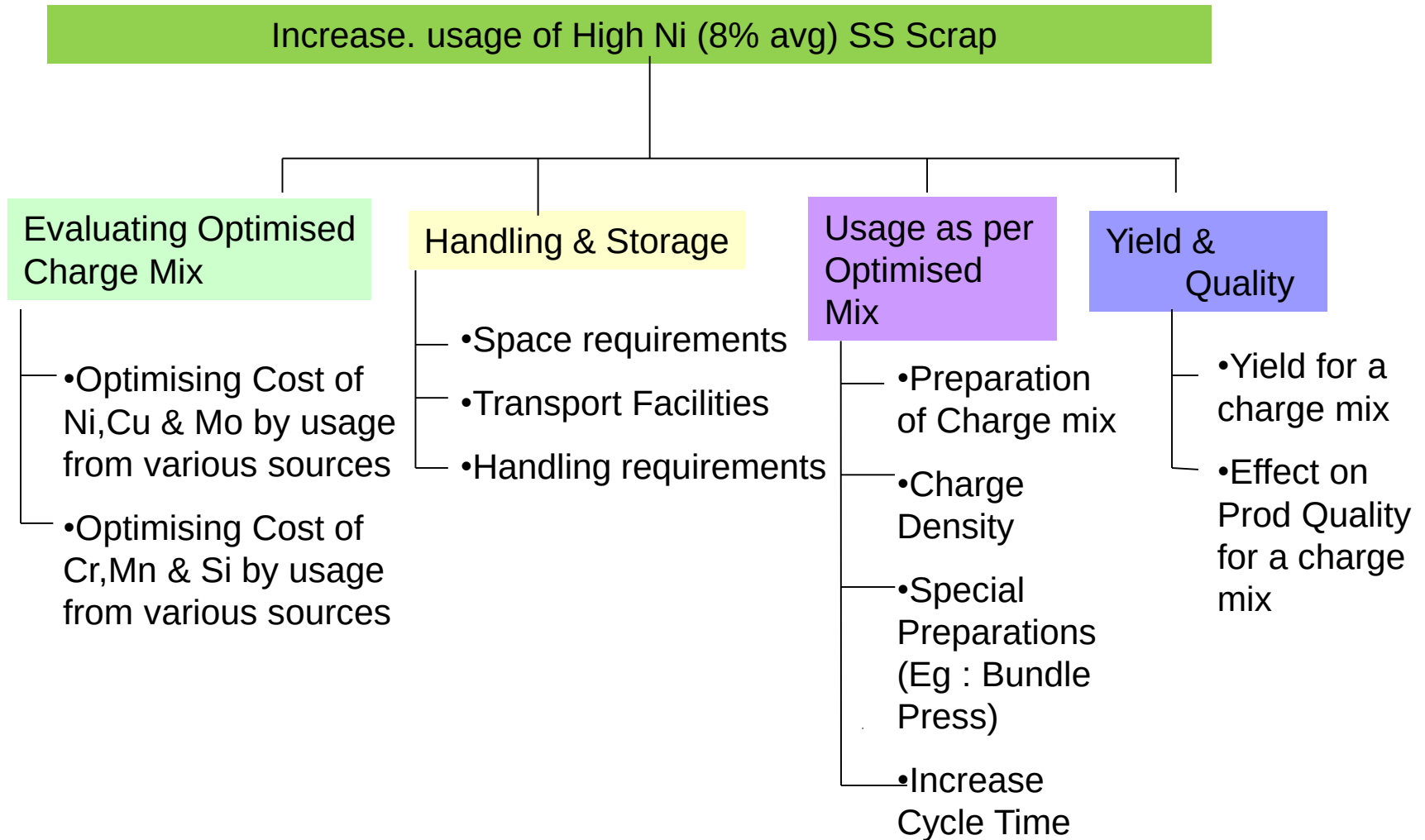
An Example of Benchmarking

To increase usage of high Ni (8% avg) SS Scrap to minimise Cost of Steel Making.
(Current level 35% of total Charge)

Impact/Magnitude of the Problem:

- Lack in Cost-competitiveness for 300 series stainless steel coils.**
unable to tap many important International Markets (German Quality at Chinese Prices)

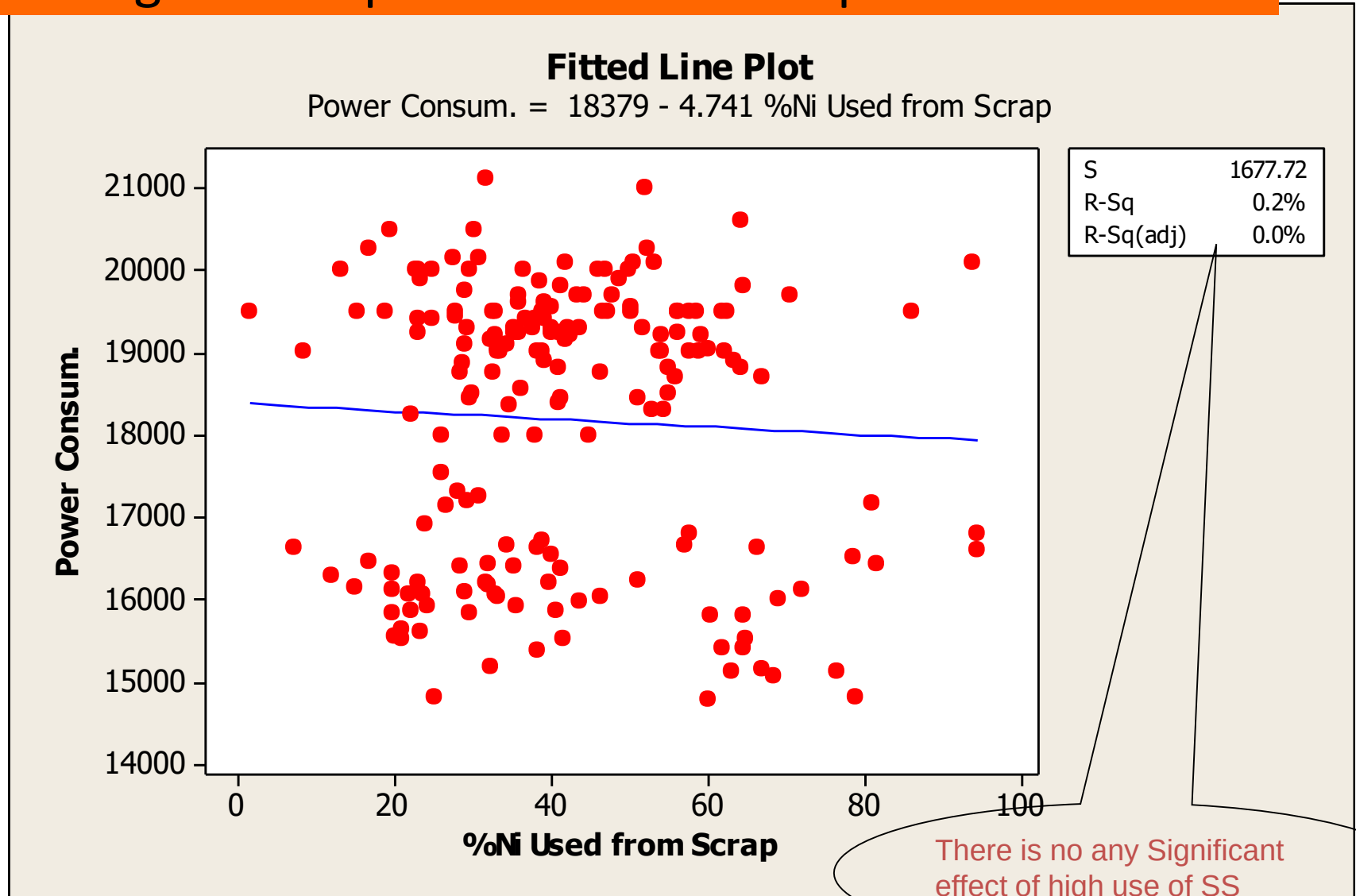
Logic Tree:



Constraints :

- Higher usage of SS Scrap led to higher Power Cost
- Non Availability of SS scrap
- Scrap Handling

High Usage of scrap Vs Power Consumption



% Ni from scrap vs scrap Availability

Regression Analysis: %Use from sc versus %Ni in Scrap, %Ni Availabi

The regression equation is

%Use from scrap = 16.9 + 2.29 %Ni in Scrap + 0.0100 %Ni Availability

Predictor	Coef	SE Coef	T	P
Constant	16.890	9.518	1.77	0.090
%Ni in Scrap	2.2938	0.6827	3.36	0.003
%Ni Availability	0.01001	0.01256	0.80	0.434

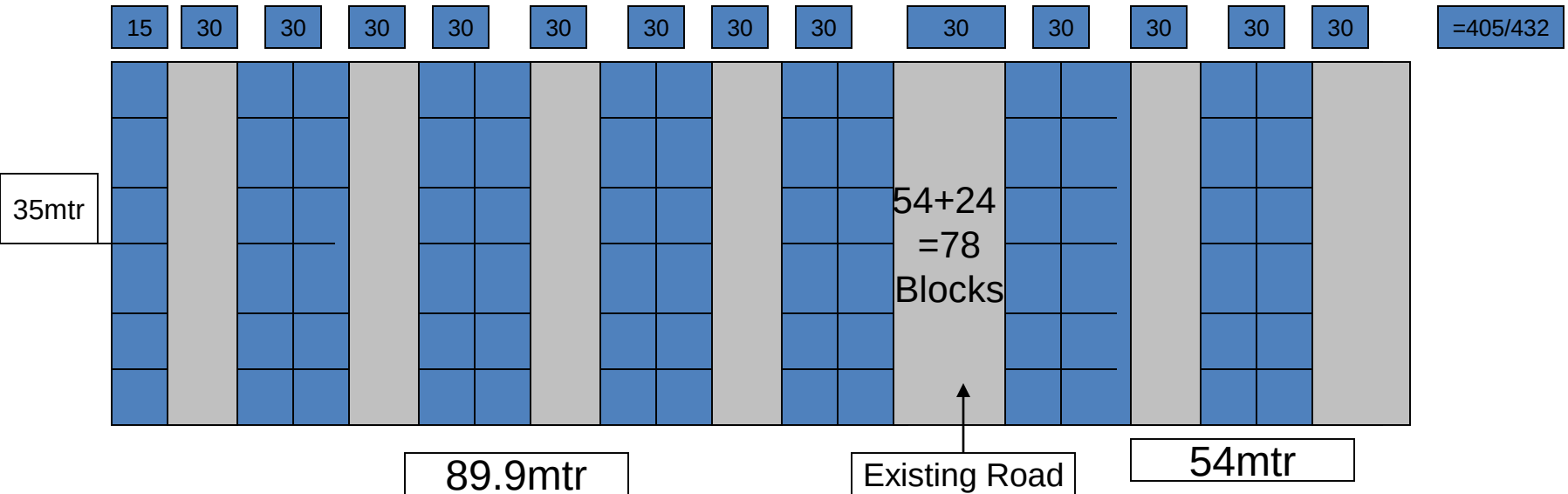
S = 20.6217 R-Sq = 41.2% R-Sq(adj) = 35.8%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	2	6548.6	3274.3	7.70	0.003
Residual Error	22	9355.6	425.3		
Total	24	15904.2			

Difference in %Ni between actual vs plan in
procured SS Scrap is Significant reason while
SS Availability is not a issue

Scrap Handling & Space Utilization



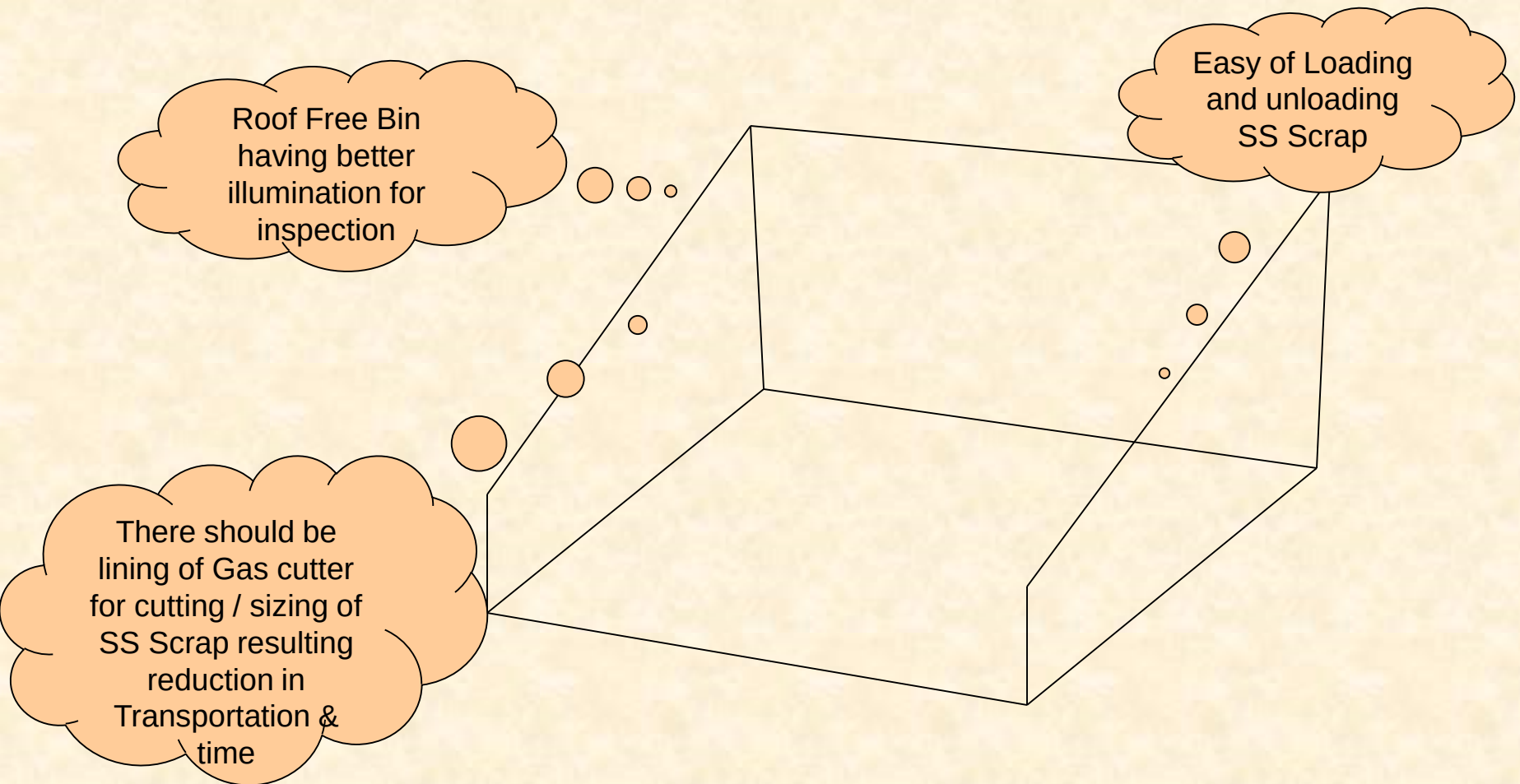
Size of Bins = 15 X 15 (Double of Size of Truck), Bins Possible = 78

Width of Road = 30 feet's

Domestic Truck Dimension = 17f X 7f (including engine)

Size of Bin may be adjusted according to requirement & material adjustment

Proposed Storage Bins



Size of Bin may be adjusted according to requirement & material adjustment

Benefits:

- **Usage of Scrap has been increased for 35 % to 65% giving benefits of Rs.1.45 Cr in 1st Year itself**
- **Availability of Identified & Proper Sized SS Scrap in Shop**
- **Model for Ni Consumption has been placed to optimize the scrap availability and its usage**

MAPPING COPOQ IN A STEEL PLANT MFG & NON MFG

Mapping CoPQ in Steel Melt Shop(Manufacturing)

1. Cost of Non-conformance (CoPQ) – Steel Melting Shops	Rs (in Lacs)
1.1 Internal failure costs	
Yield Loss	
Elemental Recovery Loss	
Power & Fuel	
Quality Defects	
Chrome Recovery	
Si Rate	
Slab Grinding due to Defect	
Subtotal (1)	
1.2 External failure costs	
Rejections at CRD	
Subtotal (2)	
1.3 Appraisal costs	
Raw Material Inspection Cost	
QA Cost at Lab/Slab Grinding	
Subtotal (3)	
2.1 Prevention costs	
Spares	
Slab Grinding as a Norm	
Chemistry Control	
Subtotal (4)	
Total CoPQ	



Mapping CoPQ in Hot Mills (Manufacturing)

1. Cost of Non-conformance (CoPQ) – Hot Rolling Mills	Rs (in Lacs)
1.1 Internal failure costs	
Scale Loss	
End Cut Loss	
Round Cut/Flat Misroll	
Power & Fuel	
Subtotal (1)	
1.2 External failure costs	
Rejections at CRD	
Customer Rejection	
Subtotal (2)	-
1.3 Appraisal costs	
Fuel Testing/Inspection	
QA Cost at Finishing	
Subtotal (3)	-
2.1 Prevention costs	
Grinding of Lifted slabs	
Excess Width in crack prone grades	
Spares	
Subtotal (4)	-
Total CoPQ	-

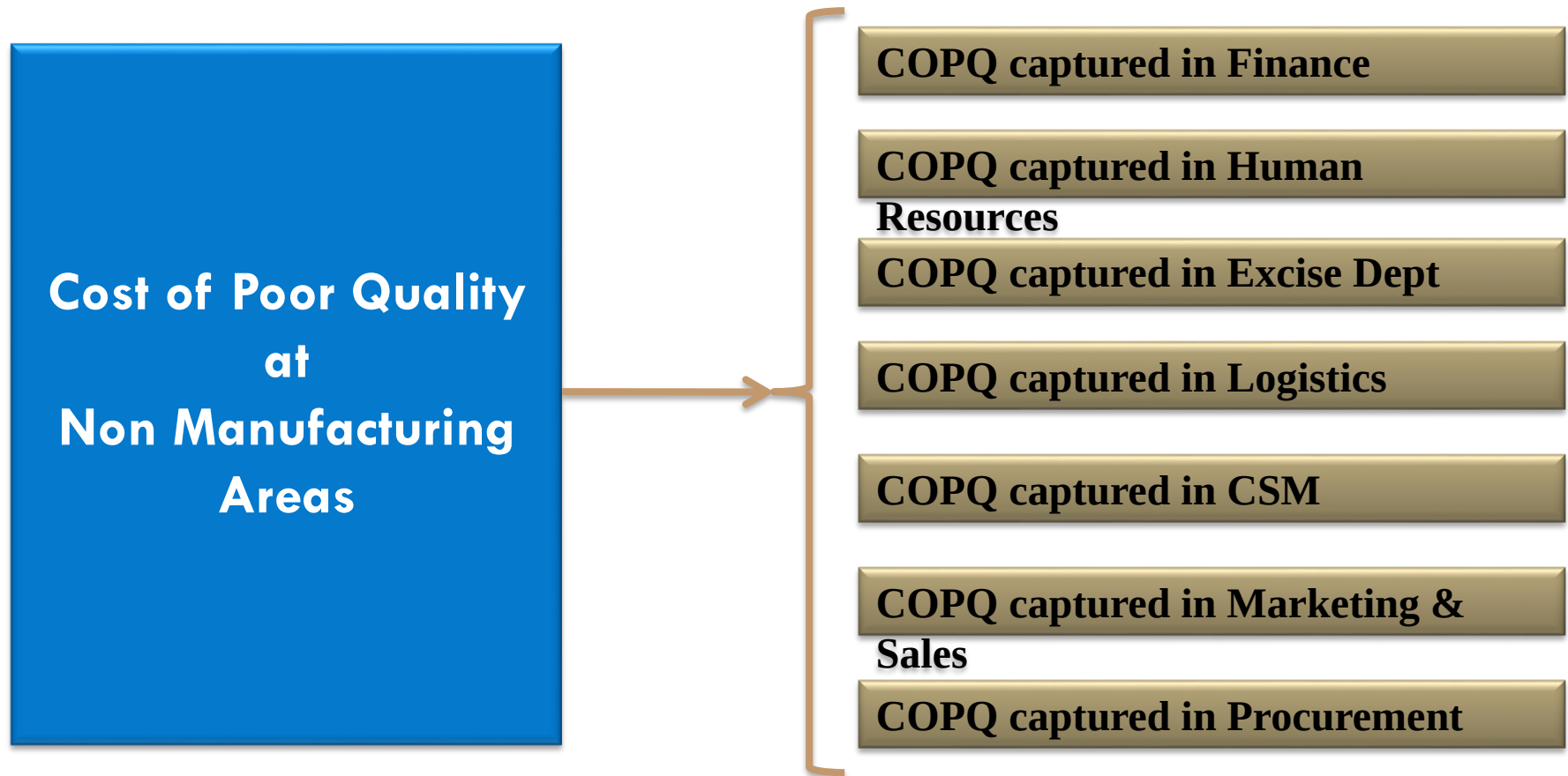


Mapping CoPQ in Cold Rolling Complex(Manufacturing)

1. Cost of Non-conformance (CoPQ) – Cold Rolling Division	Rs (in Lacs)
1.1 Internal failure costs	
Z Mills Defects	
AP Lines Defects	
Finishing Lines Defects	
Yield Loss	
Power & Fuel	
Subtotal (1)	
1.2 External failure costs	
Customer Complaints	
Subtotal (2)	-
1.3 Appraisal costs	
QA Cost at different Stages	
Subtotal (3)	-
2.1 Prevention costs	
Stores	
Coil Repair Grinding	
Leader End Joining	
Subtotal (4)	-
Total CoPQ	-



Mapping CoPQ in Steel Company(Non Manufacturing)



Mapping CoPQ in Finance (Non Manufacturing)

1. Cost of Non-conformance (CoPQ) – Finance	Rs (in Lacs)
1.1 Internal failure costs	
- Excess Cost of Finance (In Comparison of Industry Norms) - Issuance of Debit Notes - Bank Charges - Unutilized LCs - Interest on Overdue Debtors - Penal Interest on Overdrawn Funds	
Subtotal (1)	
1.2 External failure costs	
- Bad Debts - Overdue Accounts - Delay in Refund of Claims	
Subtotal (2)	
1.3 Appraisal costs	
- Internal Audit - Litigation Fees	
Subtotal (3)	
Total Non-conformance Cost	
2. Cost of Conformance	
2.1 Prevention costs	
Total Conformance Cost	



Mapping CoPQ in Taxation Deptt(Non Manufacturing)

1. Cost of Non-conformance (CoPQ) - Excise	Rs (in Lacs)
1.1 Internal failure costs	
· Wrong Documentation	
· Delay in filing refund claim (Assuming a lead time of 15 days from SOB date for provision of Documents for filing Rebate Claims, COPQ calculated towards interest @ 12% pa on account of delay)	
· Supply of goods to customers at NIL Excise duty -This results in locking up of the funds, for approx 4 months, which could only be liquidated thro' 'Export on Rebate' mechanism. COPQ calculated towards interest @ 12% pa for 4 months)	
· Unutilized funds lying in credit A/c at Jajpur/Hisar (COPQ calculated towards interest on unutilized funds @ 12% pa for 1 month)	
Subtotal (1)	

1.2 External failure costs	
· Accumulated credit -Owing to accumulated Cenvat Credits, the Purchase has been advised not to get the SAD credits transferred from Importer Dealers (and the Dealers must get the refund of the same from the Department), it is observed that around Rs 50 Lacs was received on this account during the month. This results in locking up of the funds, for approx 4 months, which could only be liquidated thro' 'Export on Rebate' mechanism. (COPQ calculated towards interest @ 12% pa for 4 months)	
· Delayed Cenvat Credit (owing to delay in Provision of BoEs by Imports Division- calculated towards interest @ 12% pa on blocked fund)	
· Non return of job work material within 180 days	
Subtotal (2)	

1.3 Appraisal costs	
· Merchants over Time Fees (for Export Clearances)	
· Professional charges/Fees	
· Litigation charges	
Subtotal (3)	
Total Non-conformance Cost	

2. Cost of Conformance	
2.1 Prevention costs	
Subtotal	
Total Conformance Cost	



Mapping CoPQ in Logistics(Non Manufacturing)

1. Cost of Non-conformance (CoPQ) - Logistics	Rs (in Lacs)
1.1 Internal failure costs	
- Skewed demand of vehicles resulting month-end crowding - Non-availability of right vehicle / containers (weight, fit-to-use) - Return of empty vehicles / containers due to last minute order cancellation / non-conformity of advance / firm plan. - Charges paid to transporters for detentions beyond specified period. - Delays due to timely non-availability of Way bills / statutory documents. - Detention cost for in bound vehicles due to inadequate / delayed documentation. - Dead freight due to non optimal utilization of vehicle / container capacity. - Delayed arrival of material - Receipt of defective material / short material quantity	
Subtotal (1)	
1.2 External failure costs	
- Delayed delivery to customers. - Wrong delivery at customer-end. - In-transit damages - Detention and demurrage at customer-end / port. - Port charges/ground rent in case of delayed SOB. - Additional expenses for diversion of vehicles from "Ship to Party" addresses.	
Subtotal (2)	
1.3 Appraisal costs	
- Container survey cost / pre placement inspection - Escorts charges for incoming material	
Subtotal (3)	
Total Non-conformance Cost	
2. Cost of Conformance	
2.1 Prevention costs	
Subtotal	
Total Conformance Cost	



Mapping CoPQ in Human Resources(Non Manufacturing)

1. Cost of Non-conformance (CoPQ) – Human Resource	Rs (in Lacs)
1.1 Internal failure costs	
- Recruitment of unsuccessful recruits - Failure to fill positions on time - Staff turnover beyond industry norms - Internal transfer of employees without proper orientation / training - Attrition of New Joinee within one year of joining - Low or nil ROI on employee training	
Subtotal (1)	
1.2 External failure costs	
Unable to attract prospective employees (low employer branding)	
Subtotal (2)	
1.3 Appraisal costs	
- HR Audits & Reviews - Reference Check of new hires - Litigation charges on absconding GETs & DETs	
Subtotal (3)	
Total Non-conformance Cost	
2. Cost of Conformance	
2.1 Prevention costs	
- HR & Personnel procedures - Training & Development of employees - Employee Appraisals & Promotion process - Employee Surveys	
Subtotal	
Total Conformance Cost	



Relevance of CoPQ

- Any reduction in CoPQ comes directly in Profit
- Tool for driving Improvements : PIPs
- Promotes the effective use of resources – Hidden factory concept ; factory within factory
- Maps the Performance : Showing the Mirror
- Provides incentives for doing the job right first time.



The ratio of the individual category costs to total costs varies widely. Many companies exhibit ratios which look like the following:

Quality Cost Category	Percent of Total
Internal Failure	25 to 40
External Failure	25 to 40
Appraisal	10 to 50
Prevention	0.5 to 5



Set Your Own Targets & Goals : Global Best.....

- ✓ Map performance with Self Best
- ✓ Take Stretch Targets.... Question Everything
- ✓ Evaluate Minimum Theoretical Consumptions required
- ✓ Use Statistical Tools to break the Myths
- ✓ Waste Minimization & Re-Use
- ✓ Process Innovation
- ✓ Introduce Value Provider Products



Thanks

