



**EFESO**  
MANAGEMENT CONSULTANTS

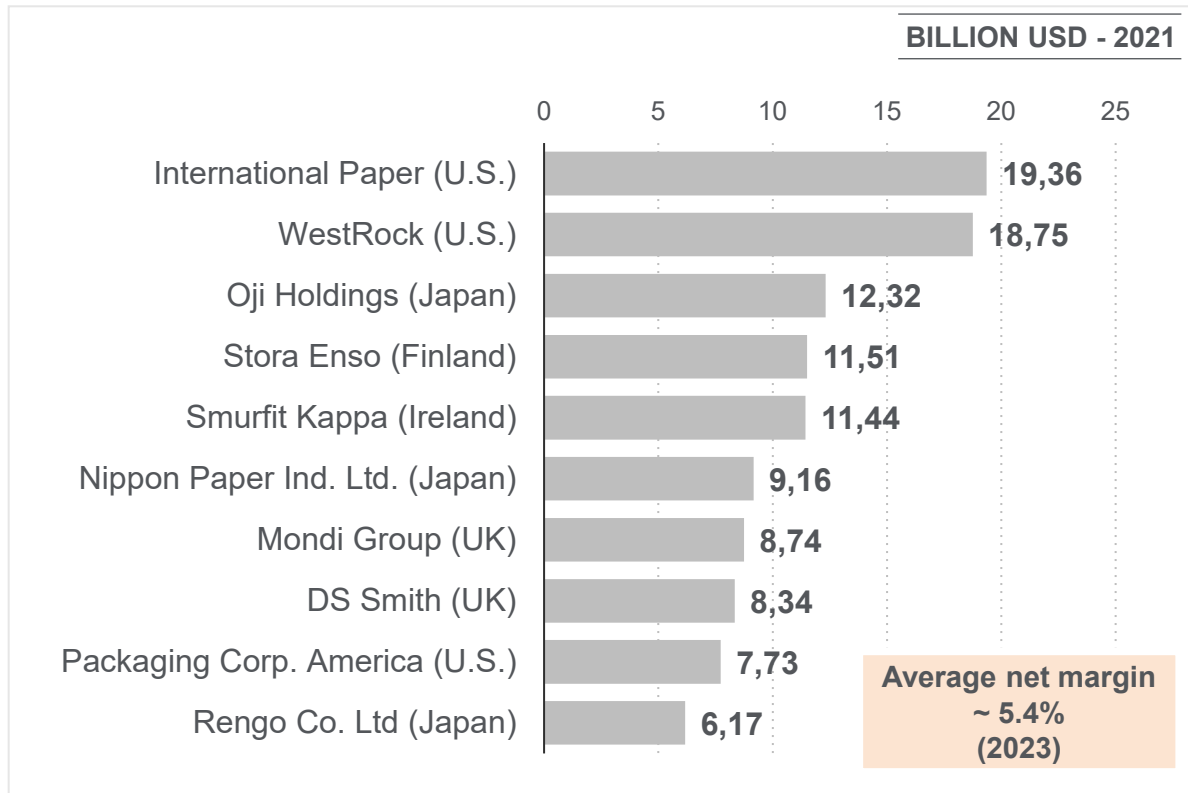
# OPTIMIZING PACKAGING COSTS

Sustainable and cost-effective solutions for packaging and carbon efficiency

SUSTAINABILITY  
**INSIGHT**

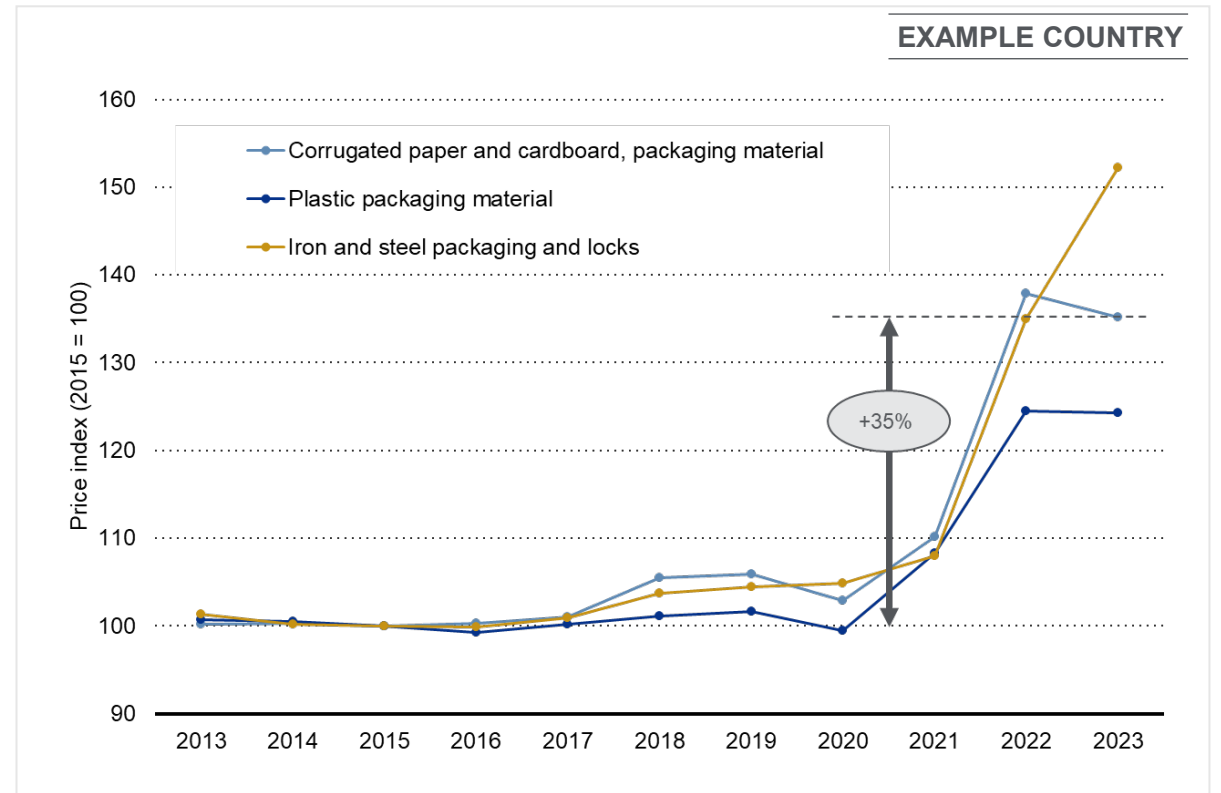
The packaging industry: global players with multi-billion turnover. Typical packaging producer price indexes show significant increases over the past three years

## Revenue of leading paper packaging firms



» Paper packaging industry includes corrugated case material (container board) and carton board applications

## Producer price index of packaging in Germany



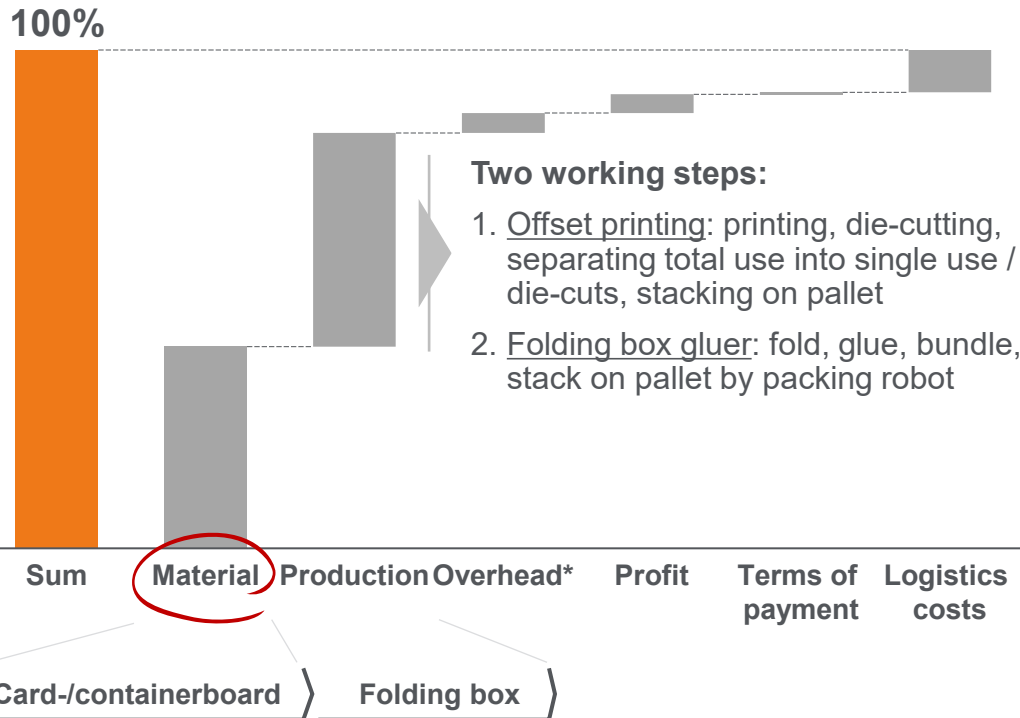
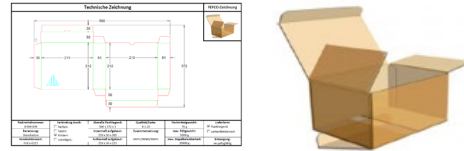
» Price index of corrugated and cardboard packaging material increased by 35% within three years



# Typical cost structure of cardboard packaging boxes: examples from 'bottom-up' case studies show the significance of material costs from upstream processes

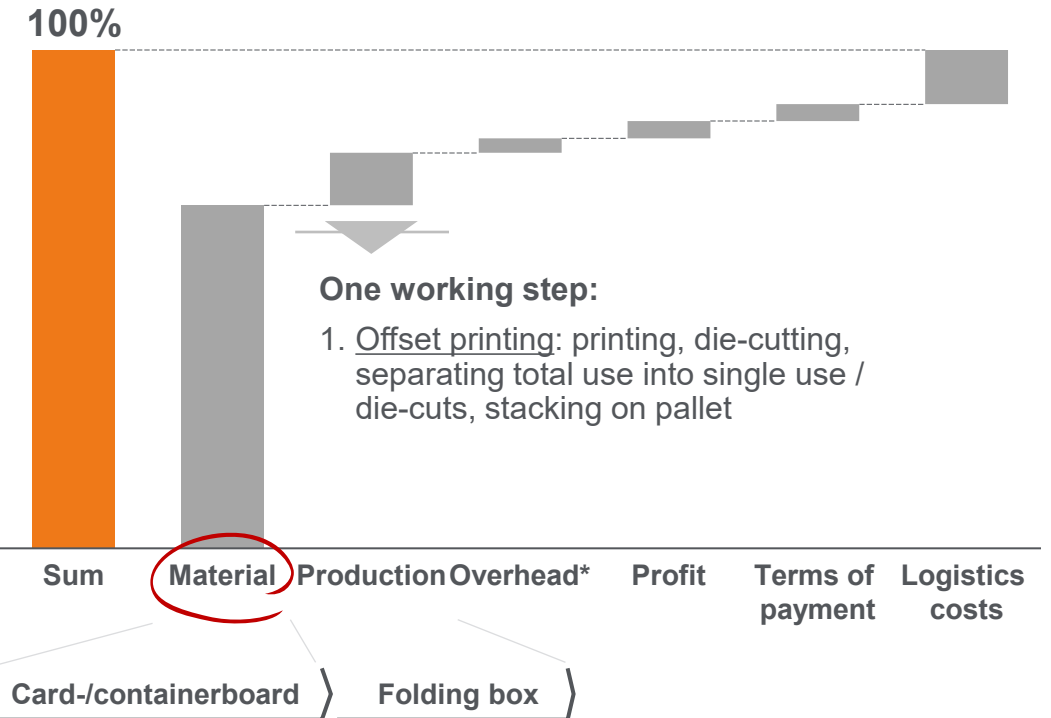
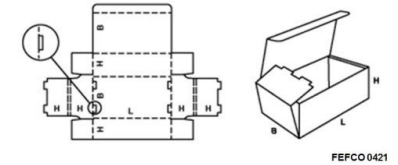
## General packaging / transportation container

### Die-cut cardboard



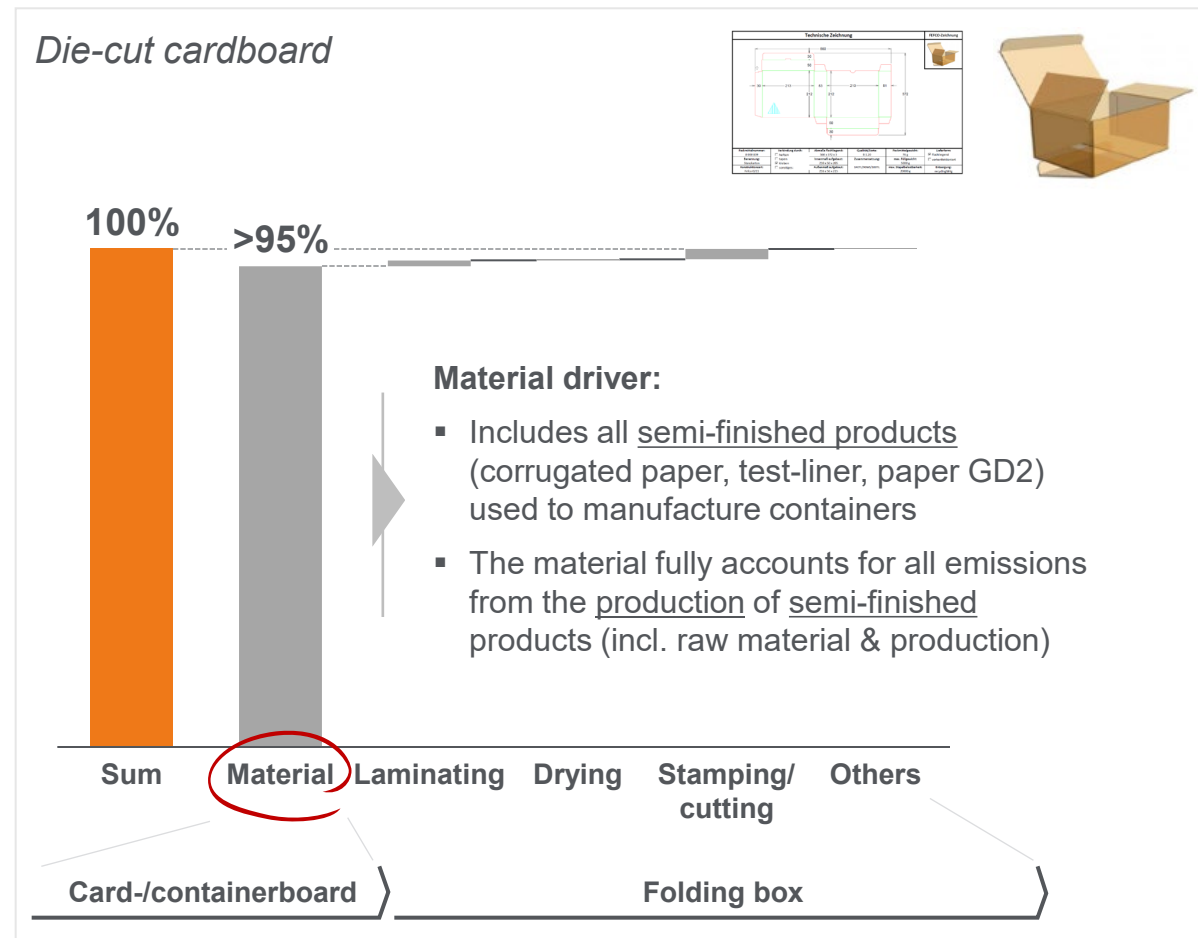
## Product-specific container

### Flip cover box with 2-color printing

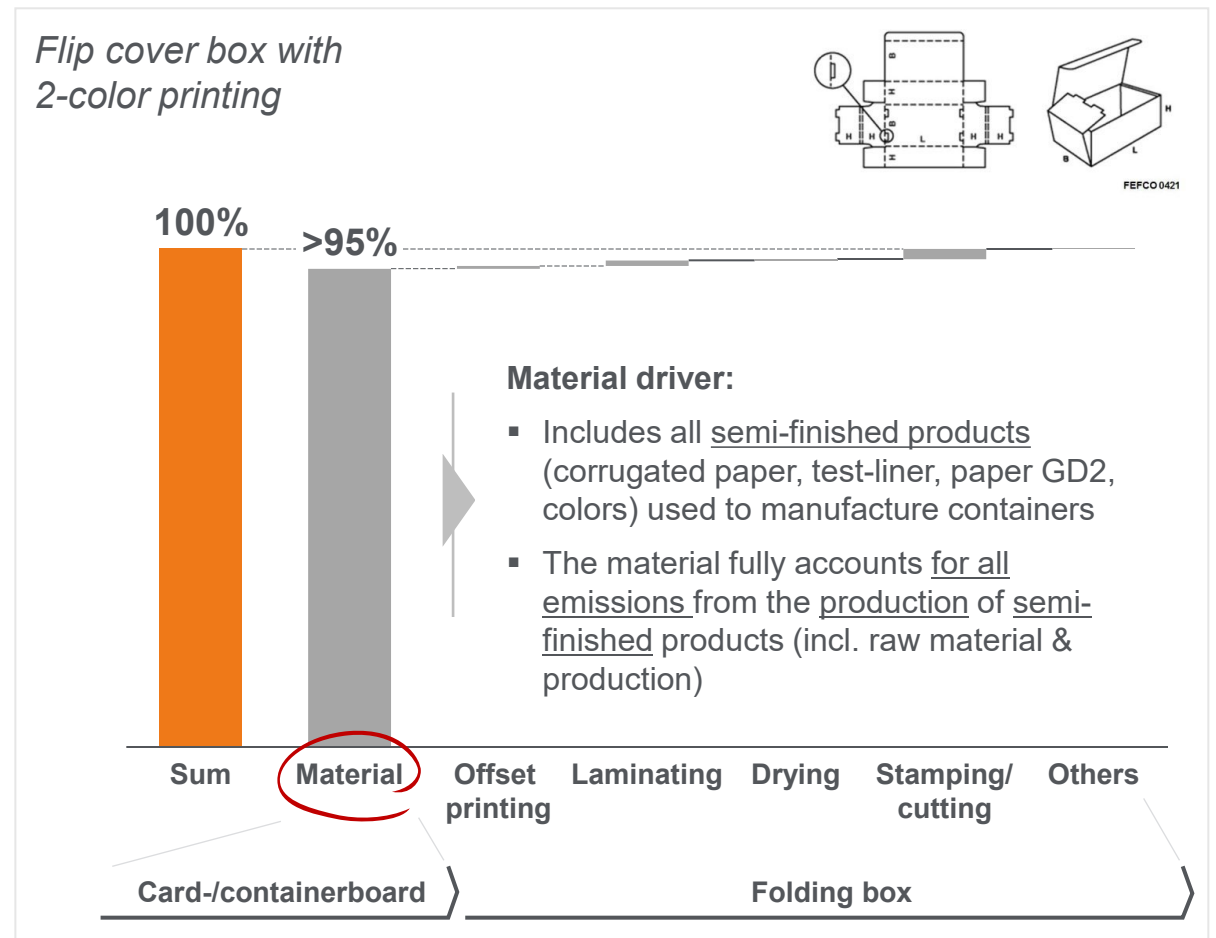


# Typical CO<sub>2</sub>e emission structure of packaging cardboard boxes – examples from case studies show significance of material impact from upstream processes

## General packaging / transportation container



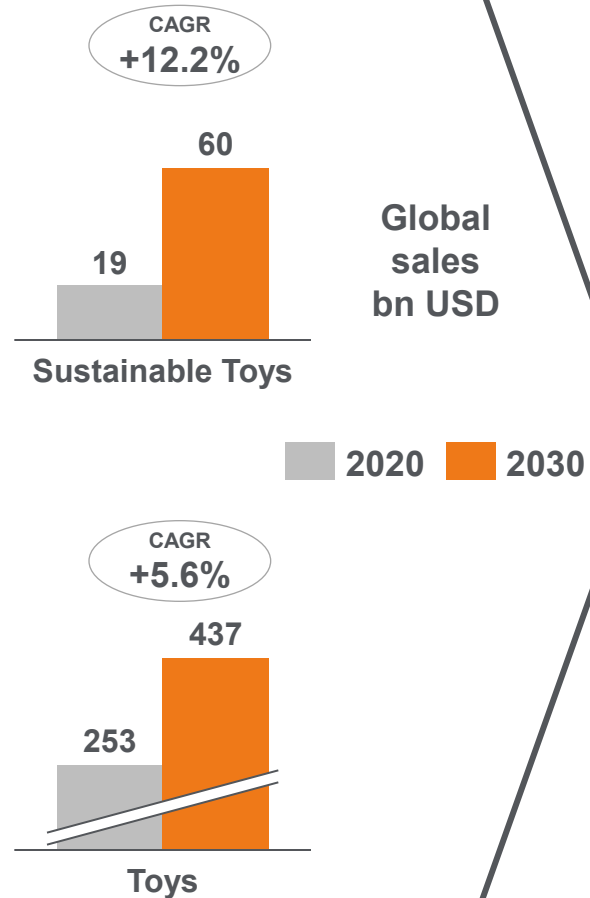
## Product-specific container



# Case study: The global toy industry is facing societal pressure and is having to address 'mega trends' in consumer behavior

## Global toy industry perspectives\*

- **Growth of sustainable toy sales** up to 2030 by ~12%, and **outpacing overall growth of toy sales growth** by ~ 5.6%
- The shift towards sustainable toys is driven by **consumer perception** on **environmental impact** of toys on our planet
- In response, toy-making companies are heavily engaged in **adapting the business setting**
- New **materials** and **packaging** concepts are key while a **continued cost focus** remains crucial to the bottom line



## 'Global nameplate retail client's' view\*\*

### Sustainable materials

'The most challenging mission before us is to make all 'core' products from **sustainable materials** by 2030.'

### Sustainable packaging

It's our aim that by 2025 all **packaging** will be from **renewable** or **recycled materials**, and will be made as efficiently as possible, and easy for consumers to recycle.'

Impact on **product** and **packaging** design and **costing**?



\*Source: EFESO research

\*\*Source: From a 'Global Nameplate Retail Client' homepage

# Manufacturing process drill-down: cardboard box production requires three distinct manufacturing processes

## 1 Cardboard production

PACKAGING COST & CARBON REDUCTION

### 1 Cardboard production: Semi-automated setup with high share of process industry driven price indexing

Process steps in paper/cardboard machine (containerboard grades)

**A Pulp creation**

- Fibres (semi-chemical pulp, recycling paper)
- Stock suspension in pulp sumps with water
- Pulp suspension + stock
- Fiber content ~ 1%
- Cleaning
- Chaffing
- Sorting
- Grinding
- Beaching
- Addition of additives
- Mass aging, coloring

**B Wireform (wet) section**

- Feeding stock by means of headbox on wire
- Development (filtration)
- Formation of fiber fleece
- Dry content of the fiber approx. 20%

**C Press section**

- Fiber fibres are compressed (pressed) together
- Class 2-roll press or hydraulic compact press
- Dry content approx. 40-50%

**D Pre-dryer section**

- Cardboard web guided in steam fashion by means of dryer fabrics around a large number of steam-heated hollow cylinders (drying cylinders)
- Wearer evaporates
- Dry content approx. 80-90%

**E Size press/post-dryer section**

- If necessary, application of chem. Auxiliary dyes, according to coloring, according to strength, etc.
- Application of glue in micro-droplets at fiber and more resistant to moisture
- Application of synthetic resin, barcoat, wax
- full wet strength

**F Reel up**

- Cardboard web rolled up on winding rods to form reel spools
- Reel cut into smaller rolls according to customer order
- Strapping or spooling or
- Ready for shipment

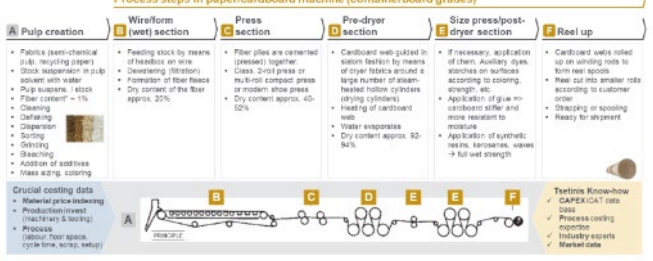
**Crucial costing data**

- Material price indexing
- Production/invest (machinery & tooling)
- Process (labour, floor space, cycle time, setup)

**Tactiris Know-how**

- CAPEX/CAT data
- Costs
- Process costing expertise
- Industry experts
- Market data

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### Cardboard (rolls)

Cost reference: €/ton or €/m  
Semi-automated process

### Market data

Typical costing input

## 2 Corrugated board production

PACKAGING COST & CARBON REDUCTION

### 2 Corrugated board production | wet section: Fully automated setup requiring crucial know-how on process KPIs, machinery and output

Process steps in the corrugator (corrugator board)

**A Unwinding stand**

- Overhead wireline
- Steel
- Variable speed drive
- Roll change or hot
- Overhaul of right and left side
- Oil level on each stand
- Regular the web breaks

**B Splicer**

- Automatic change of roll to mean of top ring
- Device for endless
- Splitting of hot water
- Heat

**C Preheater / Preparer**

- Heat water in heating
- heating cylinder approx. 20-30°C
- Heat of rolling track
- Heat water in heating
- heating cylinder approx. 130°C

**D Shaft unit**

- Cresting of corrugation
- approx. 2 raised corrugations
- Rolling with "roll" web
- Compacted paper held in
- corrugating rolls
- "air-air" / compression

**E Elevator / bridge**

- Bridge / roller stand
- corrugated board ends
- bridge
- Bridge / roller stand
- web to corrugating unit to unwinding unit

**F Gluing Machine (Laminator)**

- In order to produce
- single wall corrugated board
- Basic roll design: double wall corrugated board
- Rolling unit of the unit must be
- substantiated by another unit the gluing machine, after rolling giving surface or
- mechanical unit


**Crucial costing data**

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### Corrugated board (sheets)

Cost reference: €/area size  
Fully automated process

### Process parameters

## 3 Packaging box production

PACKAGING COST & CARBON REDUCTION

### 3 Packaging box production: To assure max. transparency and successful negotiations, we calculate all processes in full detail

**A Feeding / inline unit**

- Feeding of corrugated board
- blanks
- Printing
- Slitting
- Cresting

**B Die cut unit**

- Flatbed die cutting
- Rotary die cutting with / without pressure valve

**C Gluing / folding unit**

- Possibility of longitudinal, transverse, diagonal or reverse gluing/folding
- Set one or more glue dots or glue lines in different places
- The blanks for processing on the folding box glue are nearly identical and can be folded as required for a wide variety of folding and gluing variants

**D Counter / ejector unit**

- Stacking & counting of boxes acc. to defined customer codes

**E Other machines**

- Sheet printing press
- Separate sheet-fed printing press is generally more efficient than an integrated printing unit but requires additional space, personnel and investment
- These machines are largely identical to the final three options of an inline press: pre-feeder / in-feed - printing unit
- Other special operation machines

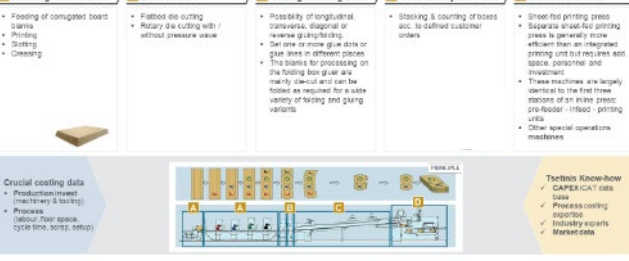
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### Packaging (boxes)

Cost reference: €/part  
Semi-/ fully automated process

### Process parameters



# Characteristics / cost drivers within the supply chain that need to be considered in a cost analysis and optimization of cardboard production and procurement

## 1 Cardboard production

- Volatile recycled paper supply markets, due to increased demand → volatile mixed paper prices
- Composition of mixed recycled paper can vary significantly
- Excess capacities of paper production lines being modified for container grade paper (key brands: Voith, Valmet, ...)
- High fixed-cost share, avg. material conversion per line ~ 50 tons/day
- Index-based cardboard pricing commonly utilized



### Cardboard (rolls)

Cost reference: €/ton or €/m  
Semi-automated process

**Medium**

(key input parameters known)

## 2 Corrugated board production

- Cost driver:
- # of liners and waves,
  - share of kraft liner,
  - grammage (g/m<sup>2</sup>),
  - process materials (energy, water, glue)
  - quality specifications



### Corrugated board (sheets)

Cost reference: €/area size  
Fully automated process

**High**

(validated bottom-up modeling)

## 3 Packaging box production

- Cost driver:
- card-/containerboard types (incl. wave types)
  - # of printing colors and printing type
  - box design complexity & quality specifications
  - Production volume and lot sizes

### Packaging (boxes)

Cost reference: €/part  
Semi/fully automated process

**High**

(validated bottom-up modeling)

Cost & carbon transparency

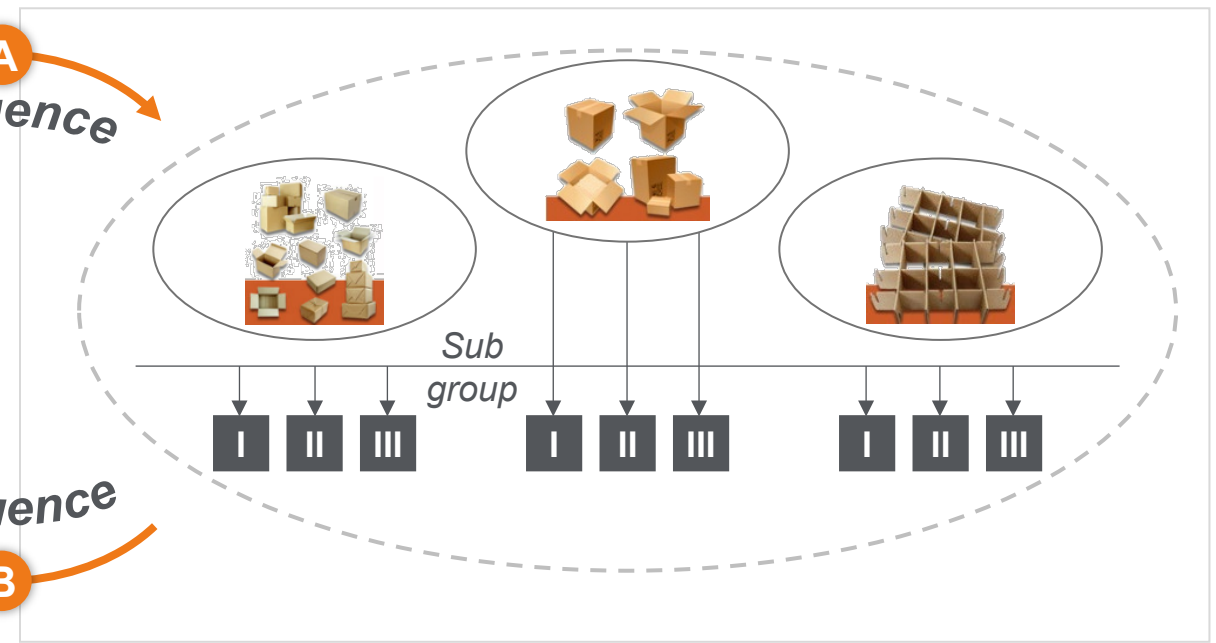


# Commercial options to optimize packaging cost, based on combination of rigorous 'should cost' modelling and the execution of two major supply 'bundling' concepts

## Country-based bundling



## Cluster-based bundling



### Approach

- Select countries / build-up cluster / subgroups per country
- Define representatives per country and cluster
- Cost structure analysis
- Supplier market research
- RFQ / benchmarking
- Negotiation / awarding

### Approach

- Build-up clusters / subgroups
- Suppliers market research per cluster / subgroup
- Define representative parts per cluster / subgroups
- Cost structure analysis
- RFQ / benchmarking
- Negotiation / awarding





Our four-step packaging operations excellence program starts with an initial assessment of packaging topics at our clients. Tangible results are always the goal...

### I. On-site appointment to assess the existing situation



- Quick assessment of existing packaging product, operations and procurement topics
- Interviews with staff in production engineering, controlling and procurement
- Identification of areas for improvement and possible pilot projects

1-2 day(s)

### II. Piloting of a 'specific packaging project' (bottom-up)



- Project selection based on greatest impact
- Set up of piloting team
- Execution of pilot, impact evaluation and estimate of overall benefit for client



4-6 weeks

### III. Project Holistic packaging optimization/reduction



- Blended 'top-down/bottom-up' approach
- Top-down: packaging & packing scoping, overall structuring of optimization levers and timing
- Bottom-up: detailed cost & carbon engineering approach including procurement / operations support

12+ weeks

### IV. Delivery & rollout of 'packaging reduction program' globally



- Set up of global rollout team (factories, countries, regions)
- Execution of global rollout
- Tracking and reporting of deliverables and generated impact
- 'Lessons learned' feedback loops to optimize the rollout of the program 'on the fly'

12+ months

# Key elements of EFESO packaging cost & carbon improvement, designed to generate tangible packaging cost reductions and strengthen supplier relationships

## Key Element



**Bottom-up** cost & carbon transparency



**360°** view of commercial supplier relationship



**Validated manufacturing process** understanding



Benchmarking insights on **competitive best-practice**



**Structured** preparation of **supplier** engagement and negotiation **toolset**



**Negotiation** support and boost of supplier relationship

## Details

Bottom-up, **manufacturing process-based cost modelling**, software backed & x-industry proven  
Utilization of **validated parameter set** on labour, energy, machinery & carbon emission factors  
Integration of **product carbon footprint** transparency based on same manufacturing process data

Review of **key supplier aspects** such as product, business, innovation, sustainability and performance  
Consolidated **360° picture** of supplier  
Derivation of recommended **strategic actions** for continued supplier relationship

**Validation** of bottom-up **cost model** at manufacturing site and backed by brownfield site (parameters)  
Identification of potential **loss-makers** in processes and technology applications  
**Gap analysis** and **opps generation** to drive manufacturing process optimization

Expansion of cost base with benchmarking insights from **best-practice production sources**  
Conduct **RfQ initiatives** to back-up market intelligence insights  
Integrate benchmarking insights to manufacturing insights

Preparation of fact-based supplier **storybook** and negotiation **playbook**  
Validate **potential alternatives** to incumbent supplier setup  
Conduct supplier engagement **dry-runs**

Safeguard commercial negotiation with clear **communication plan**  
Support **execution of negotiation** to reach tangible results  
Pursue supplier **relationship booster** elements

## EFESO USPs\*



\*EFESO unique excellence level based on client feedback

# We assisted a globally known toy manufacturer in implementing a cost-engineering exercise that resulted in up to 20% savings on packaging costs



## Initial situation

- Strategic decision to implement x-industry known cost-engineering capabilities incl. CaaS technologies, with objective to support purchasing during supplier negotiations using relevant factual data, particularly on limited competitive supply markets
- Client intends to review key procurement commodities such as packaging and outsourced product packing volumes

## Approach / method

- Product cost optimization for packaging boxes and product instructions (leaflets, perfect binds) consisting of
  - Cost structure analysis (CSA)
  - Supplier analysis and validation
- Product cost optimization of outsourced packing scope:
  - Cost structure analysis (CSA)
  - Supplier analysis and validation

## Customer value added



Empowerment of inhouse **cost engineering** team to support procurement



Process mapping of all packaging and packing scopes with **bottom-up 'should cost' modelling**

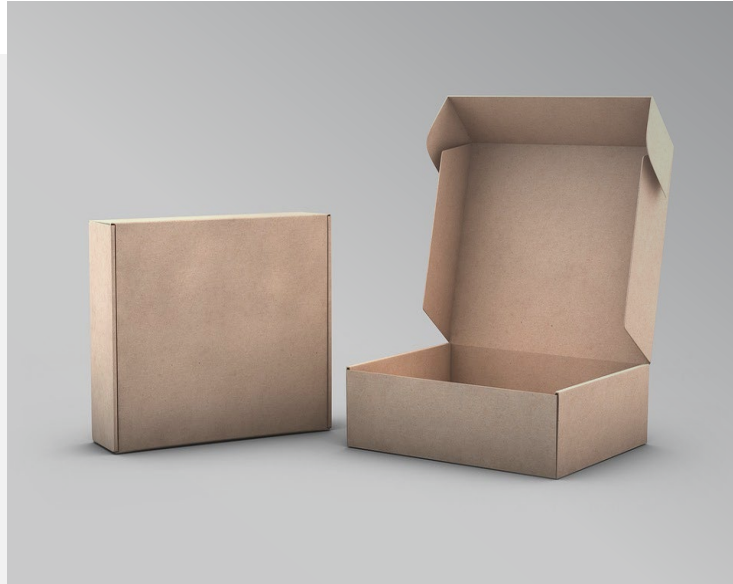


Validated **packaging cost reduction opps** of up to **20%** across multiple SKUs



Validated **packing cost reduction opps** of up to **30%** across multiple SKUs

# We helped an OEM to reduce its overall packaging costs by about 14%



## Initial situation

- Automotive OEM holding 15 suppliers for corrugated cardboard and outer packaging in Europe (scope > 20m€)
- Target: consolidate the corrugated cardboard suppliers in four locations

## Approach / method

- Clustering of cardboard packaging (e.g., folding boxes, blanks)
- Cost Structure Analysis (CSA) and bottom-up calculation of corrugated parts
- Market research and RfQ (definition of bidder list and benchmarking)
- Preparation and support of negotiation
- Nomination of strategic suppliers and implementation

## Customer value added



**Volume-based renegotiation** of packaging spend with **intelligent procurement split**



**Average savings** approx. **14%** - 28m€



**New contracts signed** with 9 suppliers



**Hand-shake of approach and data** results to client

# EFESO credentials in the packaging industry

Client Confidential



Worked with 6 of the top 10 global industry leaders

Active in the industry for more than 40 years

> 320 successful projects completed globally in the last 3 years

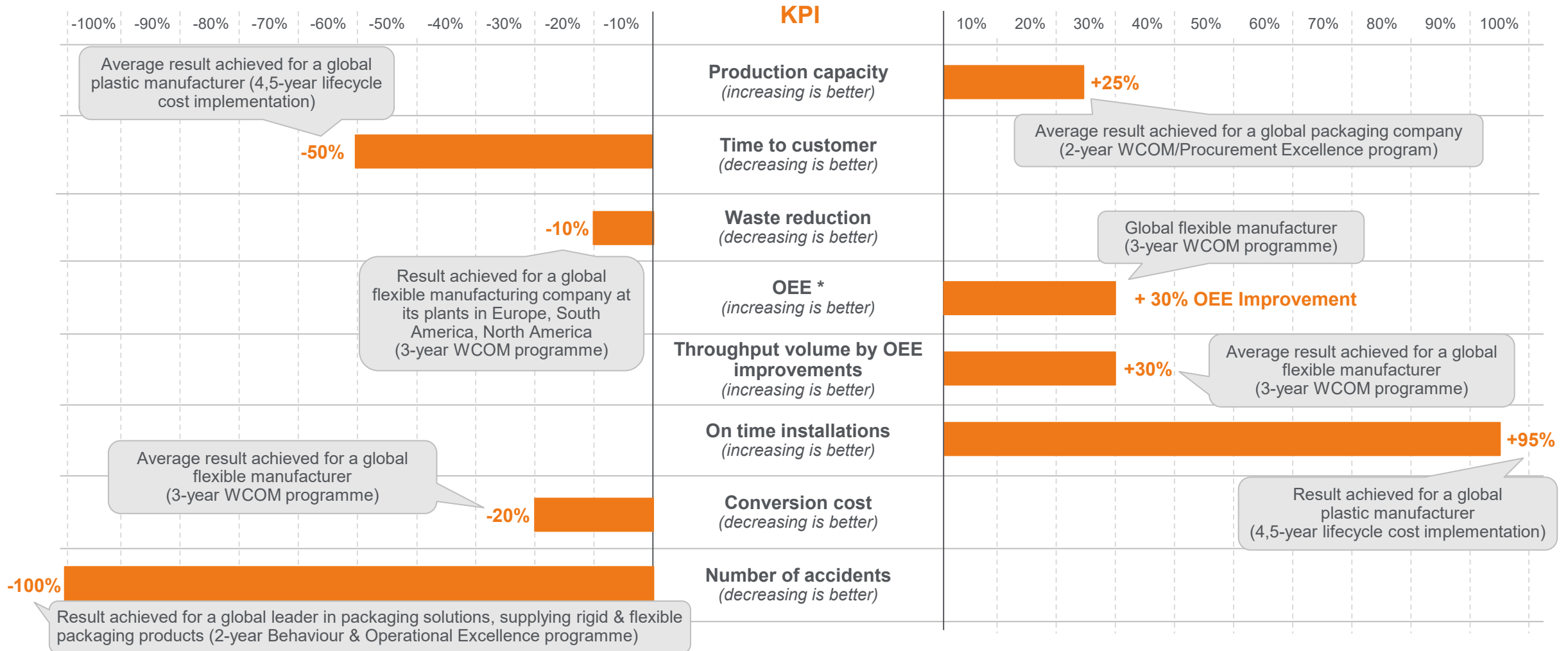


“ EFESO’s world-class operations management program improved production efficiencies and expanded our capacity for value-added products, while our facility consolidation program reduced capacity in other areas. Looking ahead, our positive momentum will allow us to invest in growth opportunities. ”

*President and CEO,  
Packaging company*



# EFESO packaging process optimization at factory site: excellent results in the flexible packaging industry



■ Achieved result

## YOUR CONTACT:



### **Alexander Klos**

EFESO Management Consultants  
*Senior Principal*

 +49 151 62862230

 [a.klos@tsetinis.com](mailto:a.klos@tsetinis.com)

