Value Chain Analysis in the Transformation Model

DRWO4.0 Webinar on Transformation Model
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Interreg Danube Region
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Presenter

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Output O3.1

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PART 1

VCA Explained

Theory, Framework & Findings

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What is Value Chain Analysis?

VCA is the analytical foundation of the DRWO4.0 Transformation Model — a systematic approach to understanding how value is created, where inefficiencies occur and which transformation opportunities exist.

Map the System

Visualise how materials, information and value flow from raw material sourcing to end-of-life management

Identify Gaps

Systematically distinguish value-adding activities from non-value-adding ones that consume resources without contributing to customer value

Define Priorities

Rank transformation opportunities by impact on throughput, quality, cost and sustainability — feeding directly into CULIS implementation

Key Characteristics

Sector-neutral

Applicable to any wood-based subsector: sawmilling, panels, joinery, packaging, furniture

Reference sector

NACE C31 Furniture Manufacturing used as the DRWO4.0 demonstration and reference case

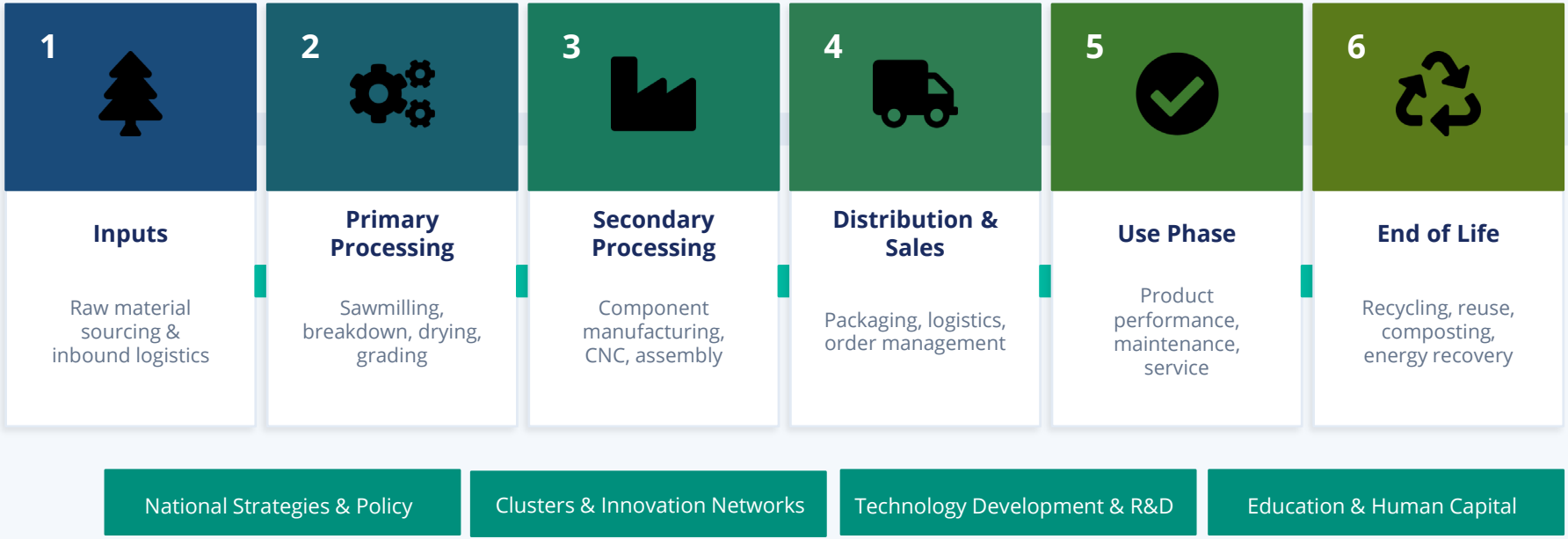
Transnational

Common 6-stage structure ensures comparability of results across all Danube Region partner countries

Diagnostic tool

VCA answers 'What should we improve?' — CULIS then answers 'How should we improve it?'

The 6-Stage Value Chain Structure



All sector-specific VCA analyses must be nested under these 6 common stages to ensure cross-country comparability within DRWO4.0.

What VCA Delivers — Three Critical Outputs

Output 01

Value Chain Maps

Visual documentation of material flows, information flows and decision points across the complete production system.

- Current state map of all processes from inputs to end-of-life
- Material flow showing quantities, losses and by-product streams
- Information flow identifying where data is generated and used
- Decision points — who decides what, with what information

Output 02

Flow Analysis Sheet

Quantified documentation of process performance including cycle times, waiting times and coordination gaps.

- Process cycle times and changeover times
- Bottlenecks and capacity constraints
- Waiting times and coordination delays between stages
- Quality generation vs. detection points

Output 03

Prioritised Improvement Areas

Ranked list of transformation opportunities by impact on throughput, quality, cost and sustainability.

- Quick wins: immediate improvements, limited investment
- Strategic improvements: longer-term, significant change
- Lean, Digital and Green opportunities identified separately
- Direct input for CULIS pillar selection and implementation

The 5 Value Drivers — Assessment Dimensions

Each value chain stage is evaluated across five standardised drivers. This ensures comparability across companies, sectors and countries.

D1	**Digital Automation** Integration of digital systems across the value chain. Includes ERP, CNC, CAD/CAM and MES systems. Measures how well production, planning and quality systems are digitally connected.	*Example: ERP connected to CNC production line*
D2	**Quality Control & Traceability** Digital monitoring, tracking and quality management systems. Covers product traceability, chain-of-custody documentation and automated quality inspection.	*Example: RFID / QR code tracking of timber batches*
D3	**Logistics & Distribution Digitalisation** Digital planning, tracking and coordination of material flows. Includes transport management, fleet telematics, warehouse management and customer order systems.	*Example: Telematics on harvesting/transport fleet*
D4	**Sustainability & Circularity** Systems for material efficiency, waste reduction and circular economy practices. Covers energy monitoring, by-product utilisation, renewable energy adoption and end-of-life management.	*Example: Sawdust / offcut stream managed as bioenergy*
D5	**Data Analytics & Decision Support** Use of data for process optimisation and decision-making. Covers business intelligence, predictive maintenance, AI-supported analytics and real-time dashboards.	*Example: Predictive maintenance on kiln or CNC*

Maturity Model — The 0 to 3 Scoring Scale

0 — None

Manual processes only. No digital tools or automated systems.

1 — Basic

Individual digital tools used (e.g. standalone CNC, basic digital files) but not integrated.

2 — Developing

At least 50% of processes digitally connected to ERP/MES. Selected automation, inconsistent application.

3 — Advanced

Smart manufacturing, digital twins, full traceability, systematic circular economy practices.

Current & Potential Scores

For each driver at each stage, assign TWO scores:

Current Score
Where you are today

Potential Score
Realistic position within 3–5 years

Gap Size → Priority Level

1.5 – 3.0	**LARGE GAP** — HIGH — Priority transformation area
0.5 – 1.4	**MEDIUM GAP** — MEDIUM — Incremental improvement
0 – 0.4	**SMALL GAP** — LOW — Maintain current level

VCA Findings across the Danube Region

Semi-structured interviews with 3–5 furniture manufacturing SMEs per country. Maturity scoring across all five drivers.

Digital Automation

1.0 → 2.8

CNC widespread but ERP/CNC integration very limited. System integration is the top priority across all countries.

Quality & Traceability

1.4 → 2.6

Quality control largely manual or partially digital. High awareness of strategic importance. Investment capacity is the main barrier.

Logistics Digitalisation

0.9 → 2.7

Strong variation: export-oriented countries more advanced.
Manual coordination still dominant in domestic markets.

Sustainability

0.7 → 2.3

Lowest and most heterogeneous scores. Limited to basic waste/energy measures. Not yet embedded in routine operations.

Data Analytics

0.8 → 2.5

Very limited use of analytics beyond basic reporting. Large realistic potential once basic digital infrastructure is in place.

Current avg. 5-yr potential

Key regional consensus: substantial development potential exists across all drivers. The main barrier is not technology availability — it is funding accessibility, administrative complexity and skills shortages.

PART 2

Practical Implementation Guide

How to Apply VCA — Phase by Phase

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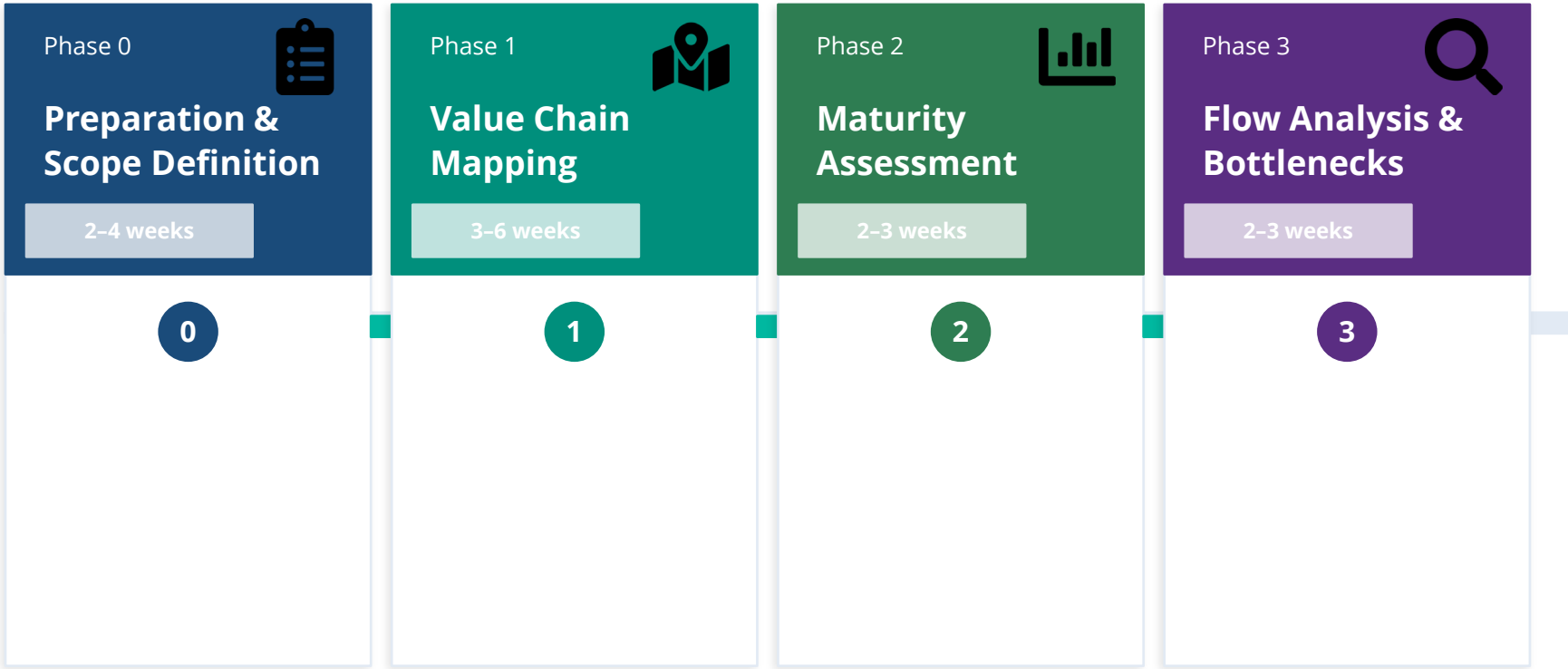
VCA Implementation — Four-Phase Approach



Total typical duration: 9–16 weeks | Can be conducted collaboratively with DRWO4.0 partner facilitation

Phase 0 — Preparation & Phase 1 — Value Chain Mapping

Phase 0 · Preparation & Scope Definition · 2–4 weeks

Define scope

Which subsector, product lines, processes and geographies will be analysed

Secure commitment

Management support and clear communication of VCA objectives to all stakeholders

Build the team

Cross-functional: operations, quality, logistics, IT, finance — minimum 4 functions

Prepare tools

Process documentation forms, interview guides, measurement protocols and templates

Deliverables: Scope document · VCA project charter · Data collection plan

Phase 1 · Value Chain Mapping · 3–6 weeks

Document each stage

Inputs, outputs, cycle times, quality control points per stage

Map material flows

From raw material through all stages to finished product and by-product streams

Trace information flows

Where data is generated, transferred and used for decisions

Record performance data

Process times, changeover times, capacity utilisation, batch sizes

Deliverables: VCA map · Flow analysis sheet · Priority improvement areas

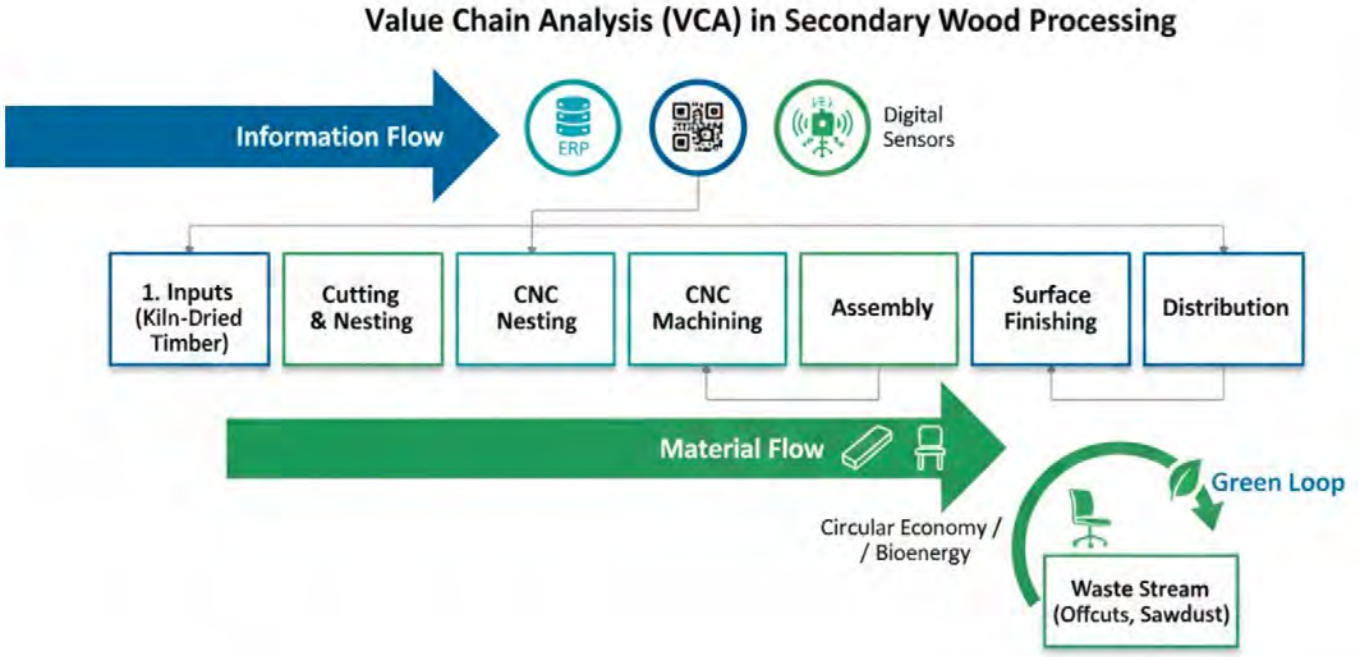
VCA in Practice — Secondary Wood Processing Example

The diagram below illustrates a completed Phase 1 output for a secondary wood processing enterprise. Note the separation of information flow (top), material flow (middle) and the circular Green Loop for waste streams.

INFO FLOW

MAT. FLOW

GREEN LOOP



Phase 2 — Maturity Self-Assessment: Step by Step

Step 1

Assemble the Assessment Team

Production/operations · Quality management · Logistics/supply chain · IT/digital systems · Management. Minimum 4 functions represented.

Step 2

Review Your Value Chain Map

Use the Phase 1 map to identify the relevant stages for your organisation. Confirm which of the 6 standard stages apply and how your sector-specific processes nest within them.

Step 3

Score Each Driver at Each Stage

For each of the 5 value drivers (D1–D5), assign a score from 0 to 3 for each value chain stage. Use the standardised scoring criteria. Be conservative — score what is systematically in place, not what is occasionally used.

Step 4

Assign Current AND Potential Scores

For each driver/stage combination: (1) Current score — where you are today. (2) Potential score — where you could realistically be in 3–5 years with focused investment. Be realistic, not optimistic.

Step 5

Calculate Gap & Prioritise

Gap = Potential minus Current. Large gap (≥1.5) = high priority. Use the gap matrix to identify your top 3–5 transformation areas. These feed directly into CULIS pillar selection.

A detailed self-assessment guide with scoring worksheets is available in Annex 1 of the VCA methodology document on the DRWO4.0 project website.

Phase 3 — Flow Analysis & Bottleneck Identification

What to Identify

Physical bottlenecks
Constraints that limit overall throughput — e.g. drying kiln capacity, CNC machine speed

Information delays
Lack of data availability or delayed transfer that impacts decision quality

Quality generation points
Where defects originate vs. where they are discovered (detection lag)

Waste sources
Material waste (offcuts, rejects), time waste (waiting, motion), energy waste

Coordination failures
Ineffective handoffs between departments, shifts or external partners

Deliverables & Prioritisation

Bottleneck Analysis Report
Primary system constraints ranked by impact on throughput

Waste Quantification Summary
Estimates of material, time and energy losses with financial impact

Prioritised Flow Analysis Sheet
Improvement areas ranked by impact AND implementation feasibility

Prioritisation Matrix

Quick Wins	High impact · Low effort · Act immediately
Strategic Improvements	High impact · High effort · Plan carefully
Low Priority	Low impact · Any effort · Monitor only

Gap Analysis — Reading and Using Your Results

The gap between current and potential maturity scores is your transformation roadmap. Here is how to read it.

Value Chain Stage	D1 Digital Auto.	D2 Quality	D3 Logistics	D4 Sustainability	D5 Analytics
Inputs	1→2 (+1)	1→2 (+1)	**0→2 (+2★)**	**0→2 (+2★)**	0→1 (+1)
Primary Processing	**1→3 (+2★)**	1→2 (+1)	1→2 (+1)	**0→2 (+2★)**	**0→2 (+2★)**
Secondary Processing	2→3 (+1)	2→3 (+1)	**1→3 (+2★)**	1→2 (+1)	1→2 (+1)
Distribution & Sales	1→2 (+1)	1→2 (+1)	**0→3 (+3★)**	**0→2 (+2★)**	**0→2 (+2★)**

★ = Gap ≥2.0 — High Priority

How to Use These Results

Identify Top 3–5 Priority Areas

Focus on stages+drivers with largest gaps. These define your transformation roadmap.

Benchmark Across Partners

Compare your maturity profile with sector averages across DRWO4.0 countries.

Track Progress Over Time

Re-run assessment annually. Gap reduction = evidence of transformation progress.

Feed into CULIS Pillar Selection

Large gaps in D1–D2 → Digital pillar. D4 → Green pillar. Flow inefficiencies → Lean pillar.

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From Diagnosis to Action

VCA → CULIS

VCA answers:

"What should we improve?"

Value chain maps · Flow analysis · Prioritised improvement areas · Maturity gap scores

CULIS answers:

"How should we improve it?"

Lean pillar · Digital pillar · Green pillar · Phased implementation · KPI tracking

Prof. Nedeljko Štefanić will now present the CULIS methodology and the integrated VCA–CULIS workflow in practice.

Thank you | Questions welcome in the open discussion at 14:15