WHZ Westsächsische Hochschule Zwickau
Hochschule für Mobilität

Sustainability-oriented Management Control with a special focus on Resource Efficiency

Prof. Dr. rer. pol. habil. Dr. h. c. Bernd Zirkler

Chair of Business Administration, esp. Accounting and Management Control

Executive Director of the Institute of Business Administration

Structure

1. Development of Sustainability Reporting

2. Approaches to Sustainability Management

3. Measuring the qualitative Sustainability Performance: e. g. Resource Efficiency Sustainability

4. Integration of Social and Environmental aspects into Economic Value Driver Systems

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Development of Sustainability Reporting

Increased pressure on companies to report on their sustainability performance

2023 European Sustainability Reporting Standards (ESRS)
2023 Corporate Sustainability Reporting Directive (CSRD)

2022 EU Taxonomy
2022 International Sustainability Standards Board (ISSB)

2020 European Green Deal (Climate neutral until 2050)

2015 17 Sustainable Development Goals (SDGs)

2014 Non-Financial Reporting Directive (NFRD)

1997 Global Reporting Initiative (GRI) – Voluntary sustainability standards

1987 Brundtland Report – ***Our Common Future (World Commission on Environment and Development, WCED)***

1645 - 1714 Hans Carl von Carlowitz – Sylvicultura Oeconomica (1713)

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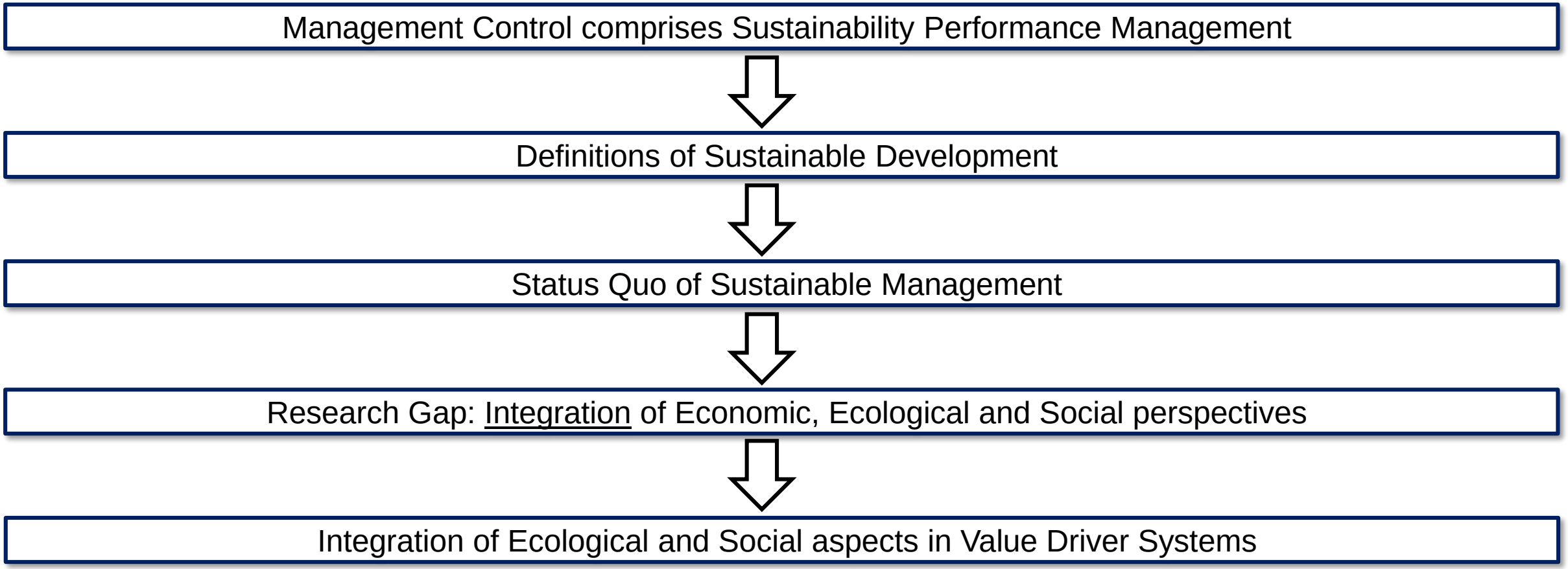
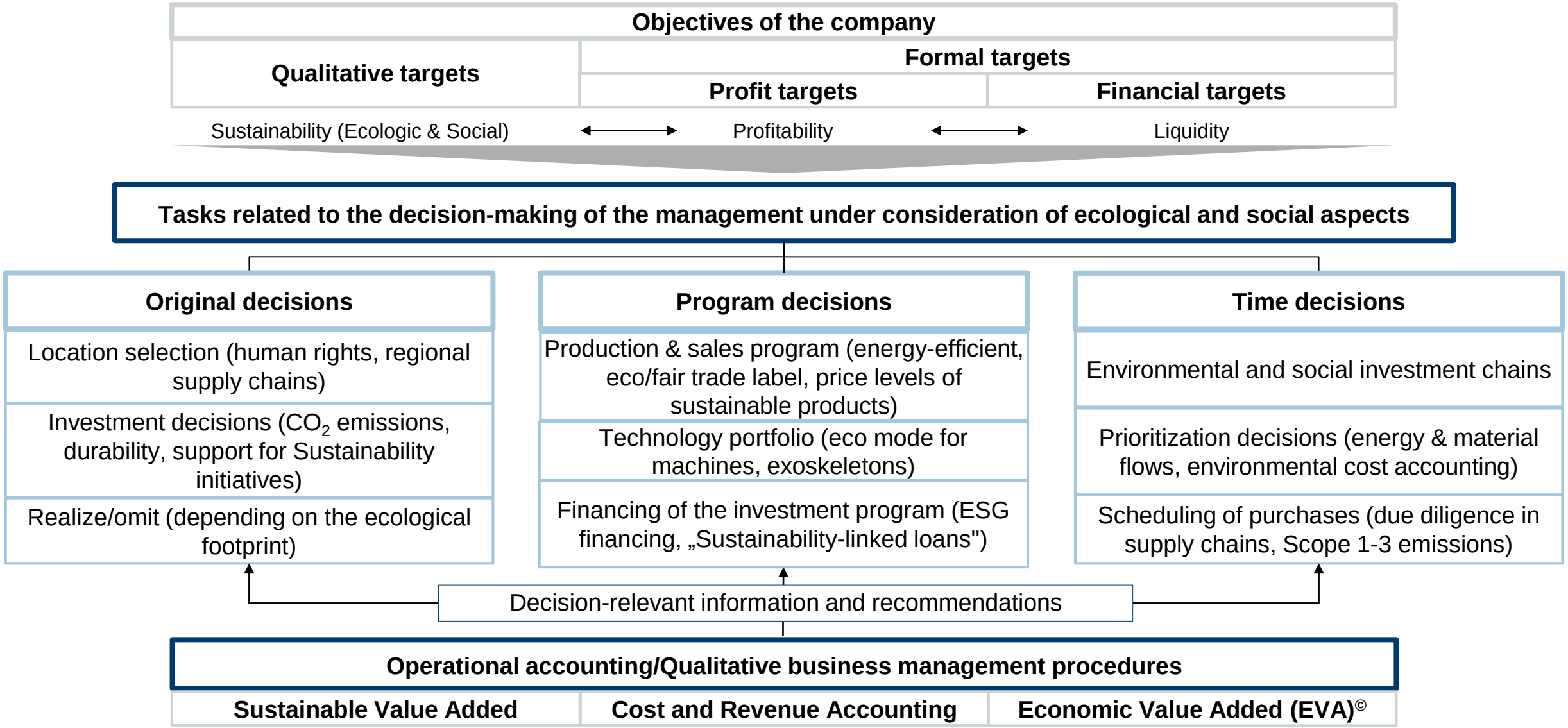
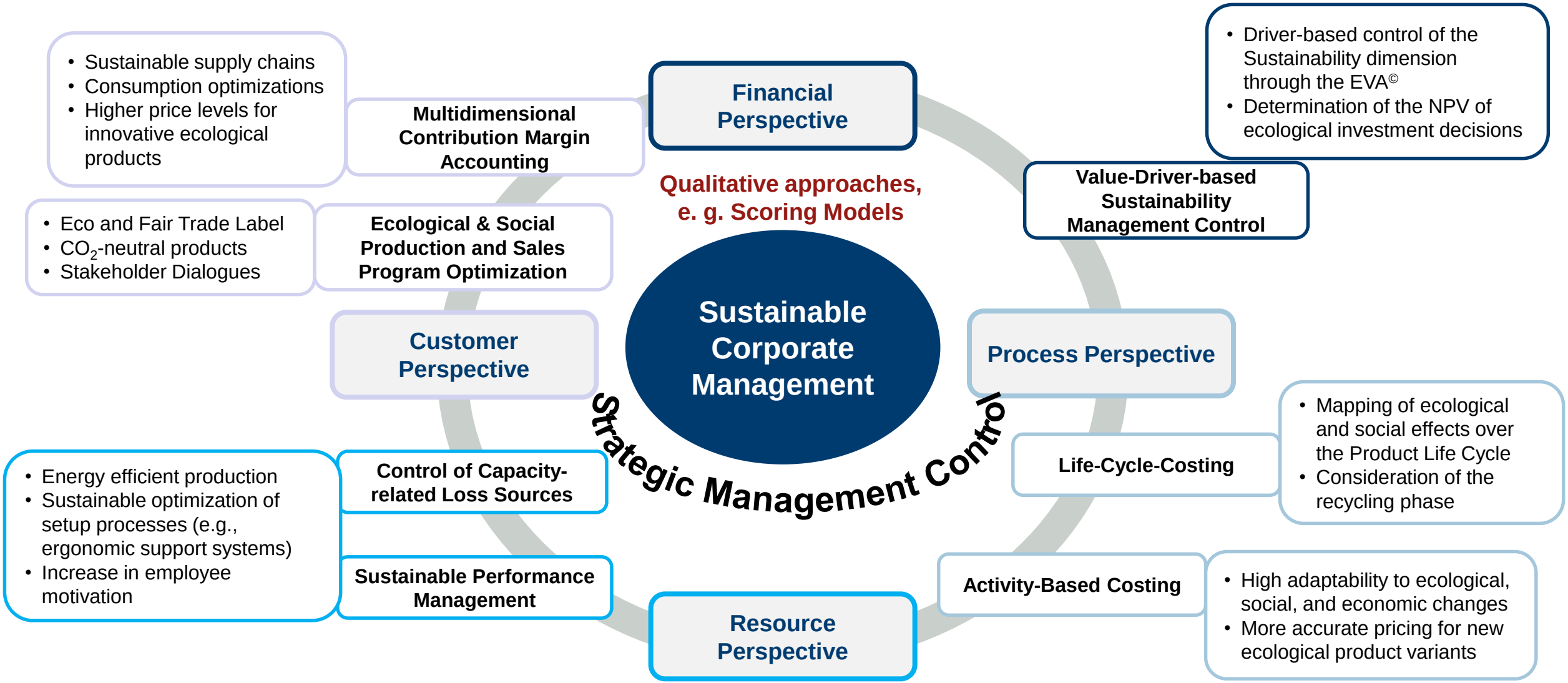
Cornerstones of Sustainability-oriented Management Control



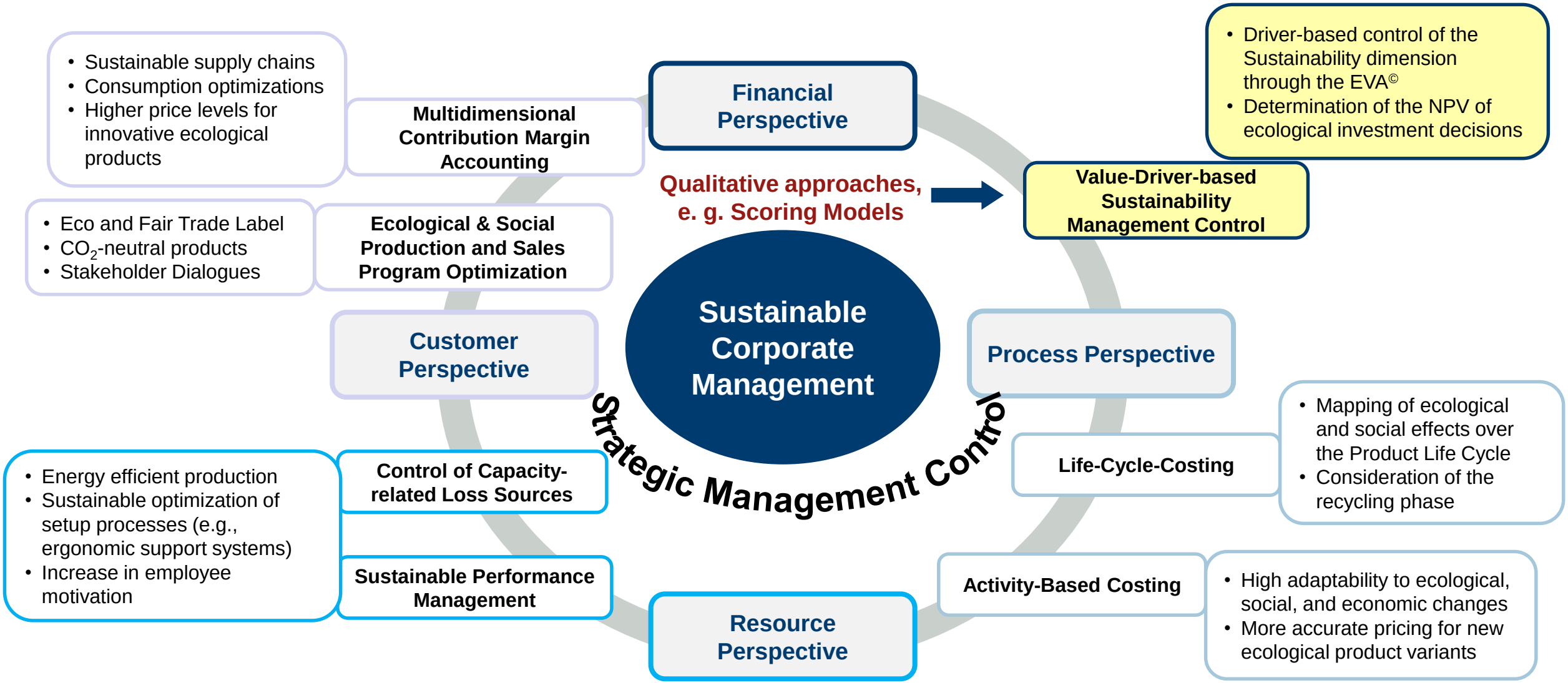
Objective and accounting-orientation of a multidimensional-based Sustainability Management Control System



Approaches to Sustainable Corporate Management



Approaches to Sustainable Corporate Management



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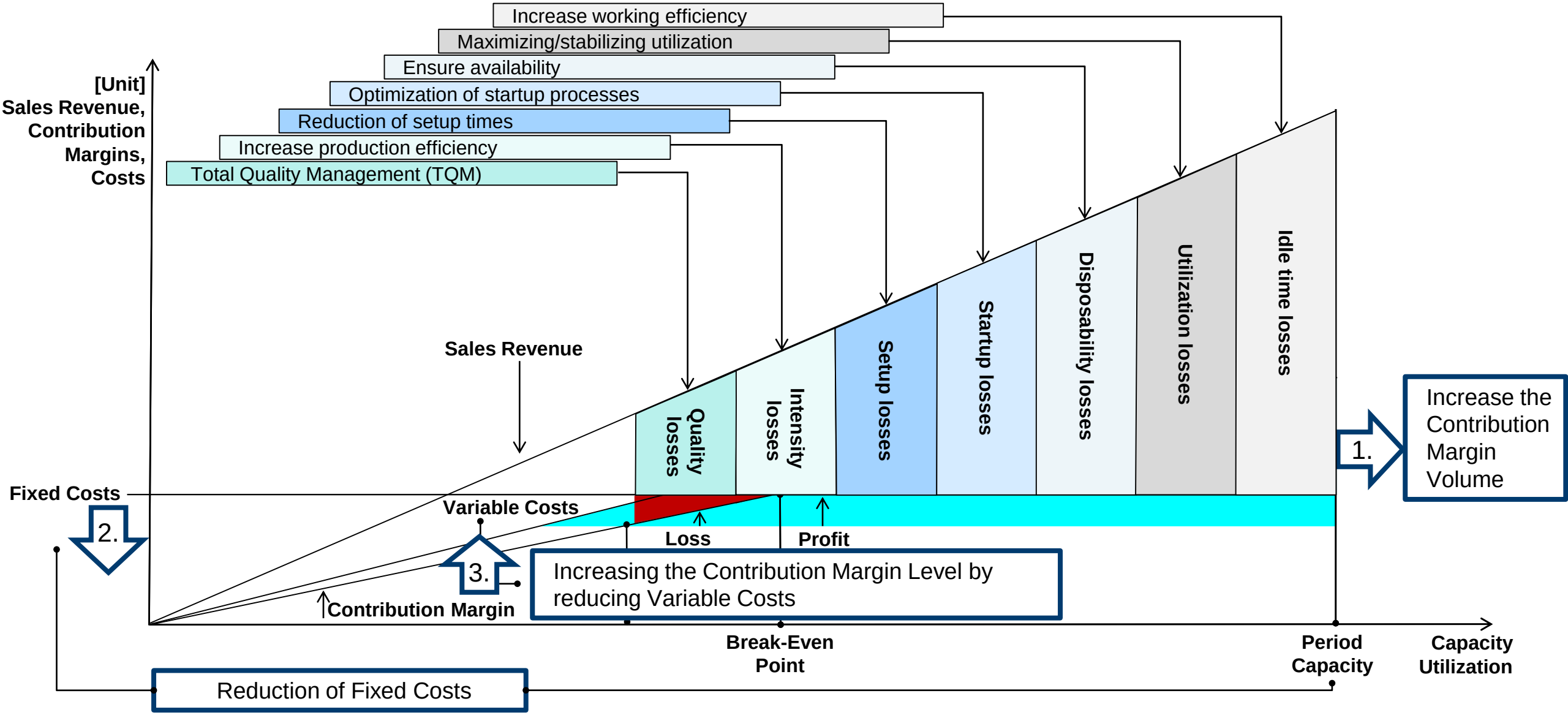
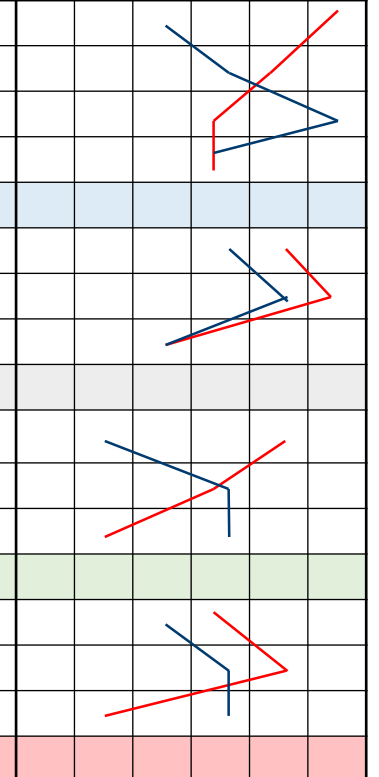
Economic Effects of combating Capacity-related Loss Sources

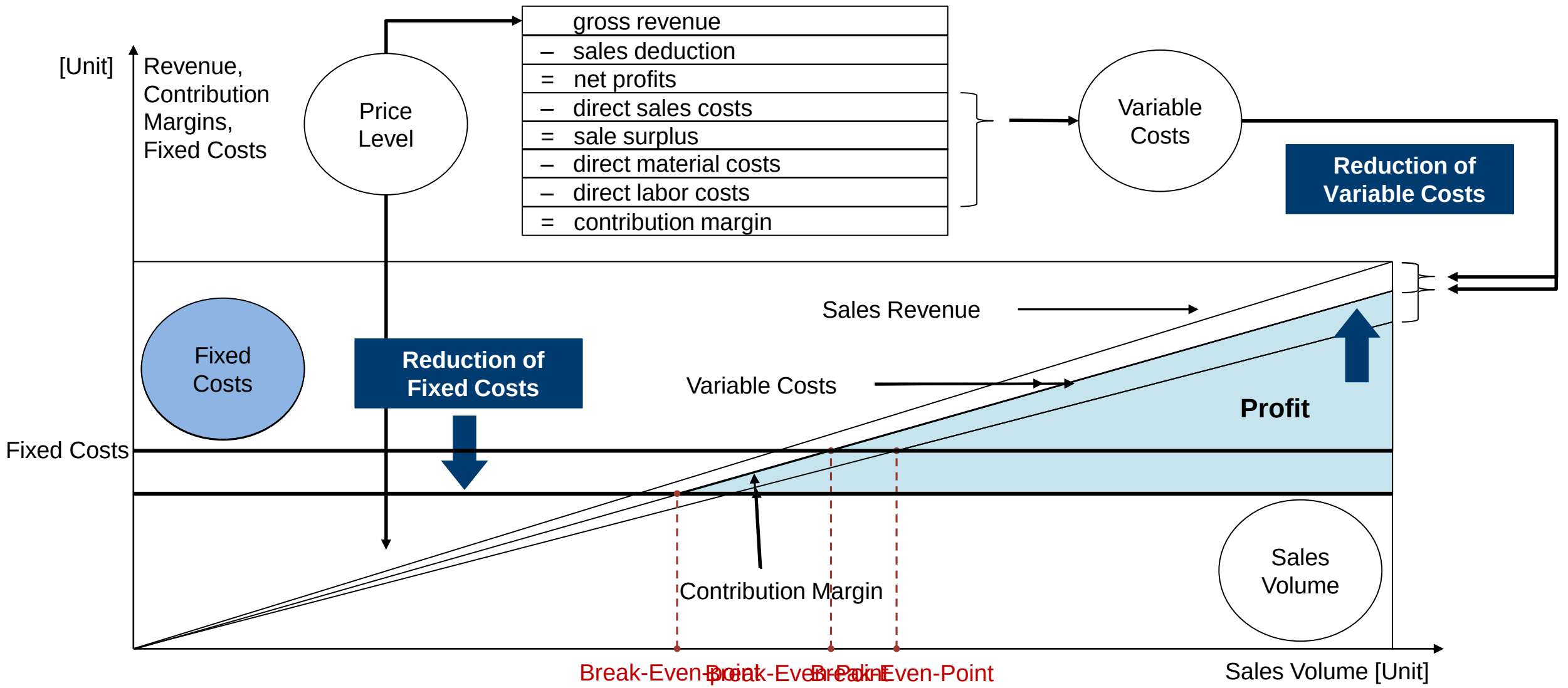


Scoring Model for measuring the qualitative Sustainability Performance: e.g. Resource Efficiency Sustainability

Line	01 Evaluation Criteria Subgoals	02 Evaluation	03 Minimum Points	04 Machine I Scoring Values	04 Machine I Weighted Scoring Values	05 Machine II Scoring Values	05 Machine II Weighted Scoring Values	06 Profile of the Scoring Values and Machines (1 2 3 4 5 6)
1	Quality standards	6%	2	6>2	0,36	3>2	0,18	
2	Quality assurance plan	11%	3	5>3	0,55	4>3	0,44	
3	Quality control	11%	4	4=4	0,44	6>4	0,66	
4	Quality improvement	7%	3	4>3	0,28	4>3	0,28	
5	Quality assurance strategies	35%			1,63		1,56	
6	Evaluate the production line	10%	3	5>3	0,50	4>3	0,40	
7	Update the technology	14%	5	6>5	0,84	5=5	0,70	
8	Improve employee training	6%	3	3=3	0,18	3=3	0,18	
9	Increase production efficiency	30%			1,52		1,28	
10	Identify challenges	6%	2	5>2	0,30	2=2	0,12	
11	Optimize workflow	6%	3	4>3	0,24	4>3	0,24	
12	Use automated solutions	3%	2	2=2	0,06	4>2	0,12	
13	Optimization of startup processes	15%			0,60		0,48	
14	Employee productivity	8%	3	4>3	0,32	3=3	0,24	
15	Employee qualification	8%	4	5>4	0,40	4=4	0,32	
16	Employee health	4%	1	2>1	0,08	4>1	0,16	
17	Increase working efficiency	20%			0,80		0,72	
18	Total Score	100%			4,55		4,04	



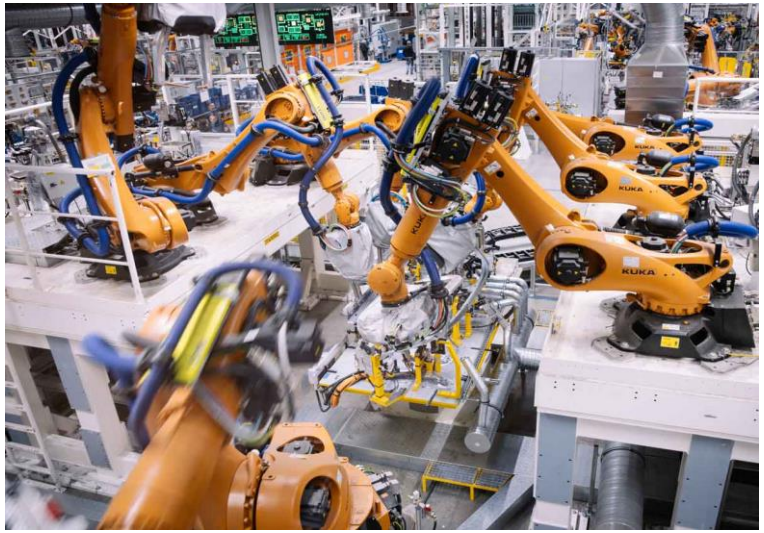
Result Simulations: Reduction of Fixed Costs



Maximal Capacity Consumption by Resource Coordination (Volume)

Before

- Susceptible to errors
- High rate of work accidents
- Unhealthy working conditions

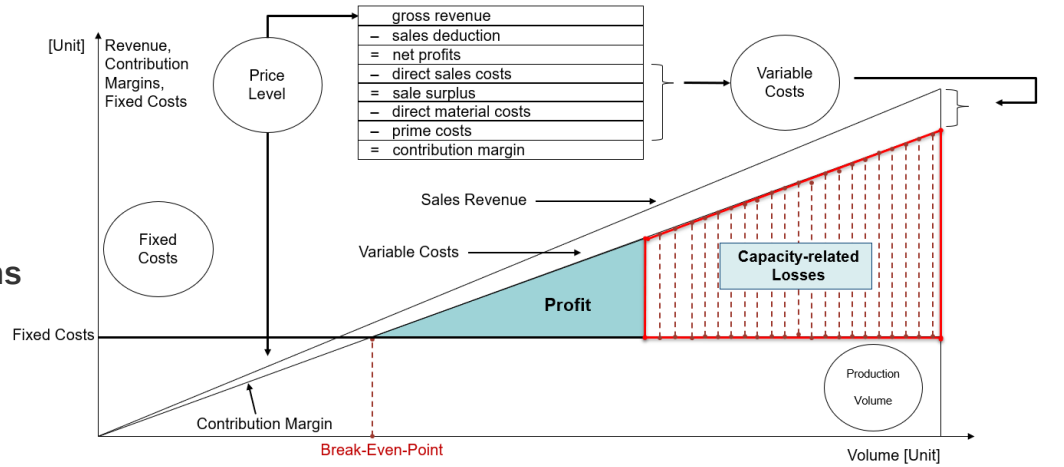


After

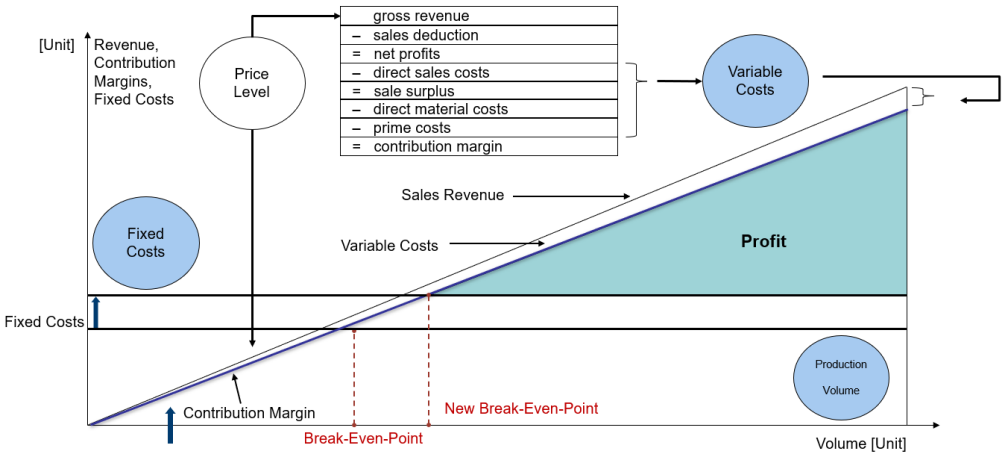
- More efficient
- Increased capacity consumption
- Changed cost structure

Reference: Schuster, S. (2020).

Profit Determinants for Companies



Maximal Capacity Consumption by Resource Coordination (Volume)



Raising the Price Level by using Sustainable Materials and focusing on a Sustainable Supply Chain (Price Level)

Reference: FAZ.net (2024).

Before

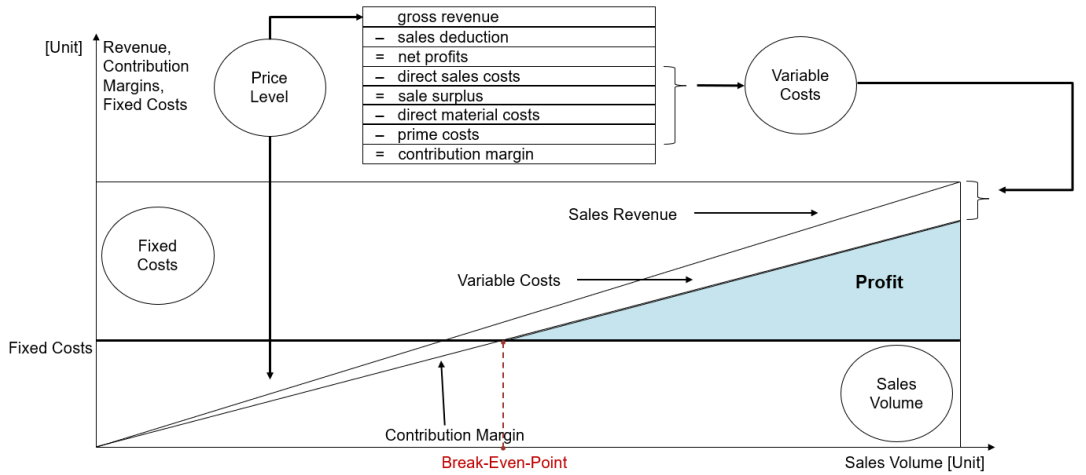
- Non-renewable resources
- Health risks of chemicals in consumer products
- Low quality materials

Reference: Giesswein (2023).

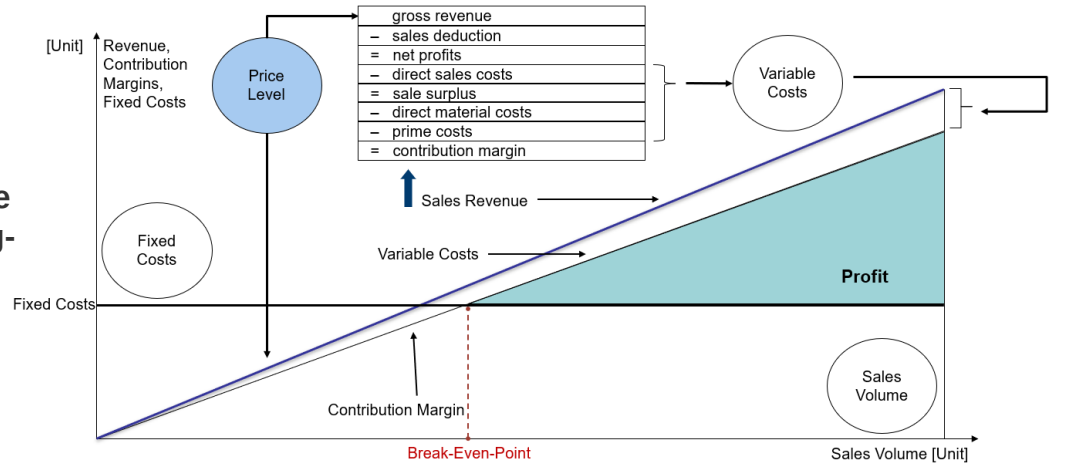
After

- Focusing on worker rights and responsible sourcing of raw materials
- Price increase of more sustainable products and are followed by long-term financial benefits
- Pressure for suppliers to improve their sustainability performance

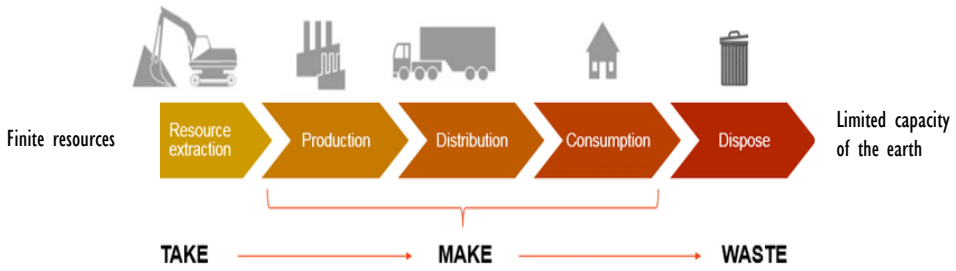
Profit Determinants for Companies



Raising the Price Level by using sustainable Materials (Price Level)



Cost Cutting through Material Savings with Recycling (Variable Costs)



With reference to: Wautelet, T. (2018).

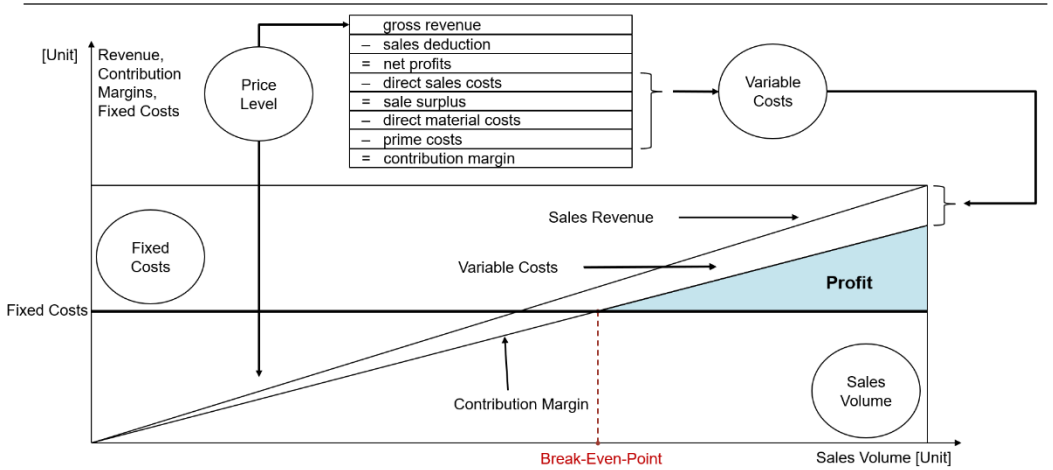
Before

- High raw material costs
- Profit margins decrease due to higher production costs
- High ecological burden

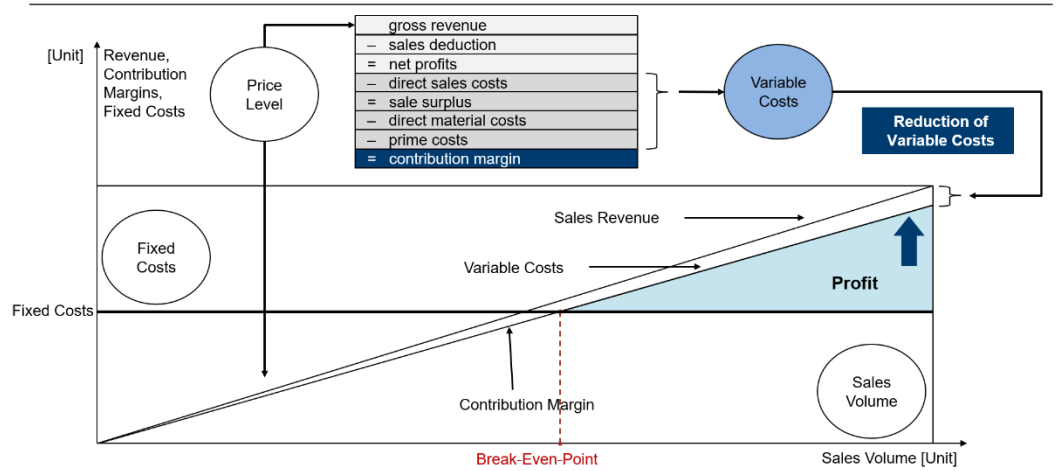
After

- Products made from recycled materials
- Efficient and ecologically and economically recycling with high-quality secondary materials
- Massive cost reduction in variable costs

Profit Determinants for Companies



Reduction of Variable Costs

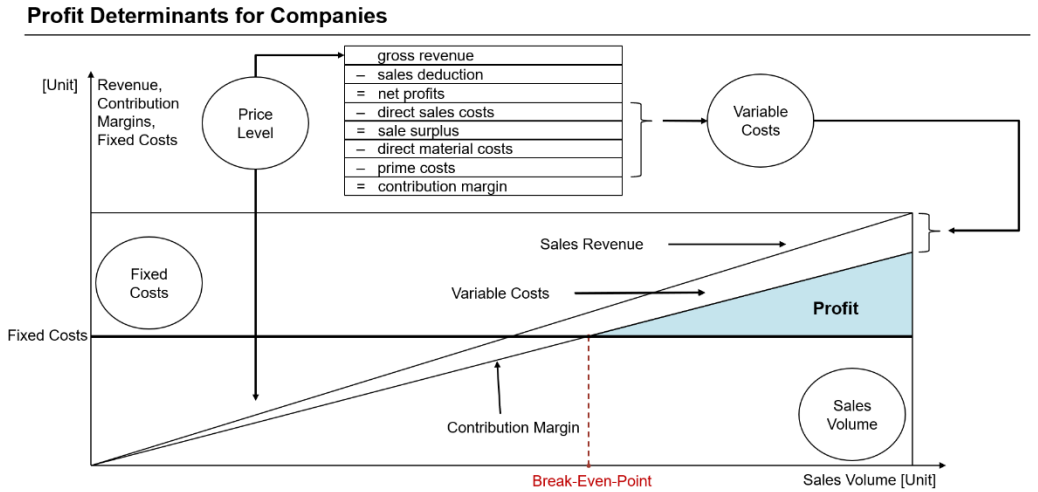


Reduction of Fixed and Variable Costs through Energy Savings (example by Audi)

Reference: Verpraet, I. (2020).

Before

- **Through megatrends fixed costs gets higher**
- **Massive energy losses through material preparation**



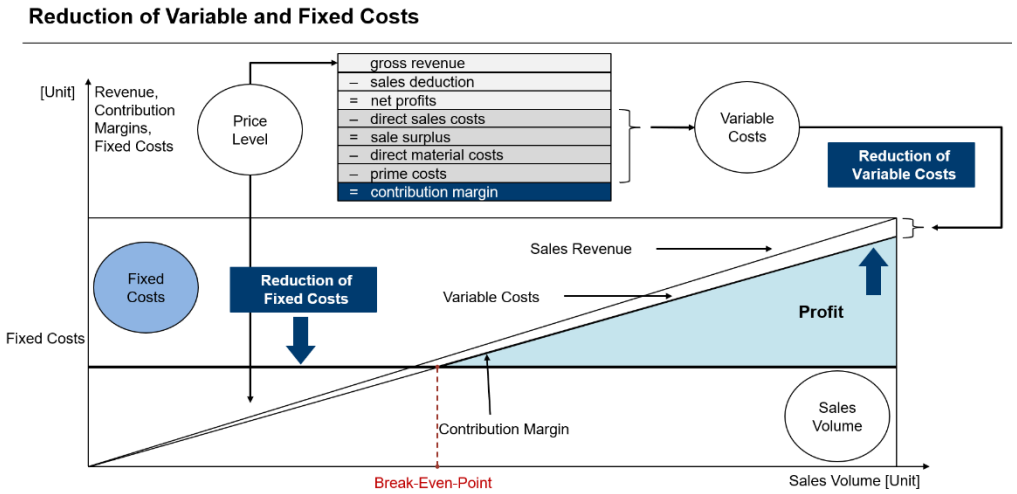
CIRCULAR ECONOMY KPIS

KPI	Unit	2022	2021	Notes and comments
CO_2 avoided since 2017 through the Aluminum Closed Loop Project	in metric tons of CO_2	633,881	467,671	The calculation of the CO_2 savings from the Aluminum Closed Loop was updated compared with the prior year because the press shop offcuts were reassessed.
Proportion of freshwater needed at sites in risk zones	in million m^3/year	15.9	15.8	Passenger cars and light commercial vehicles

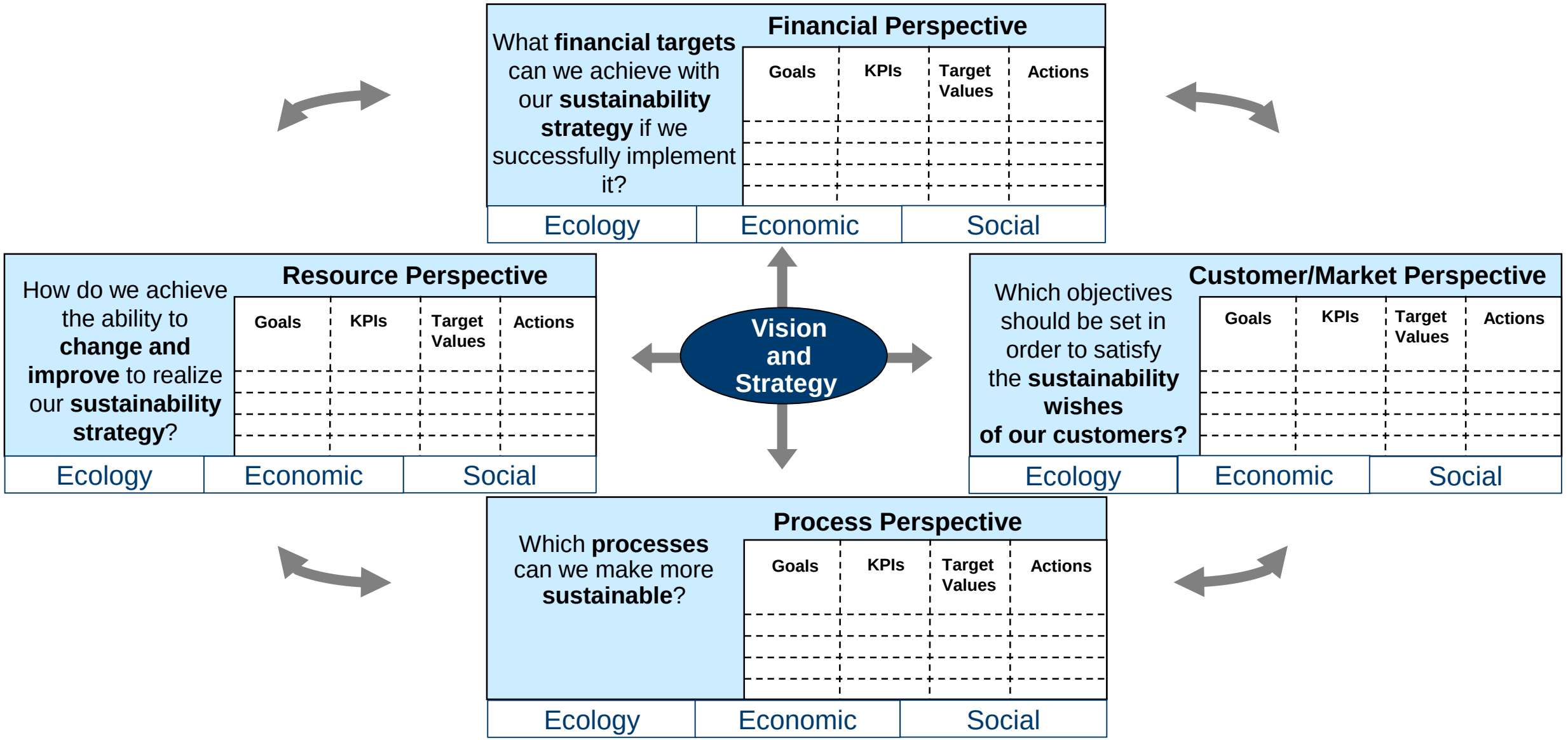
Reference: Audi AG (2024).

After

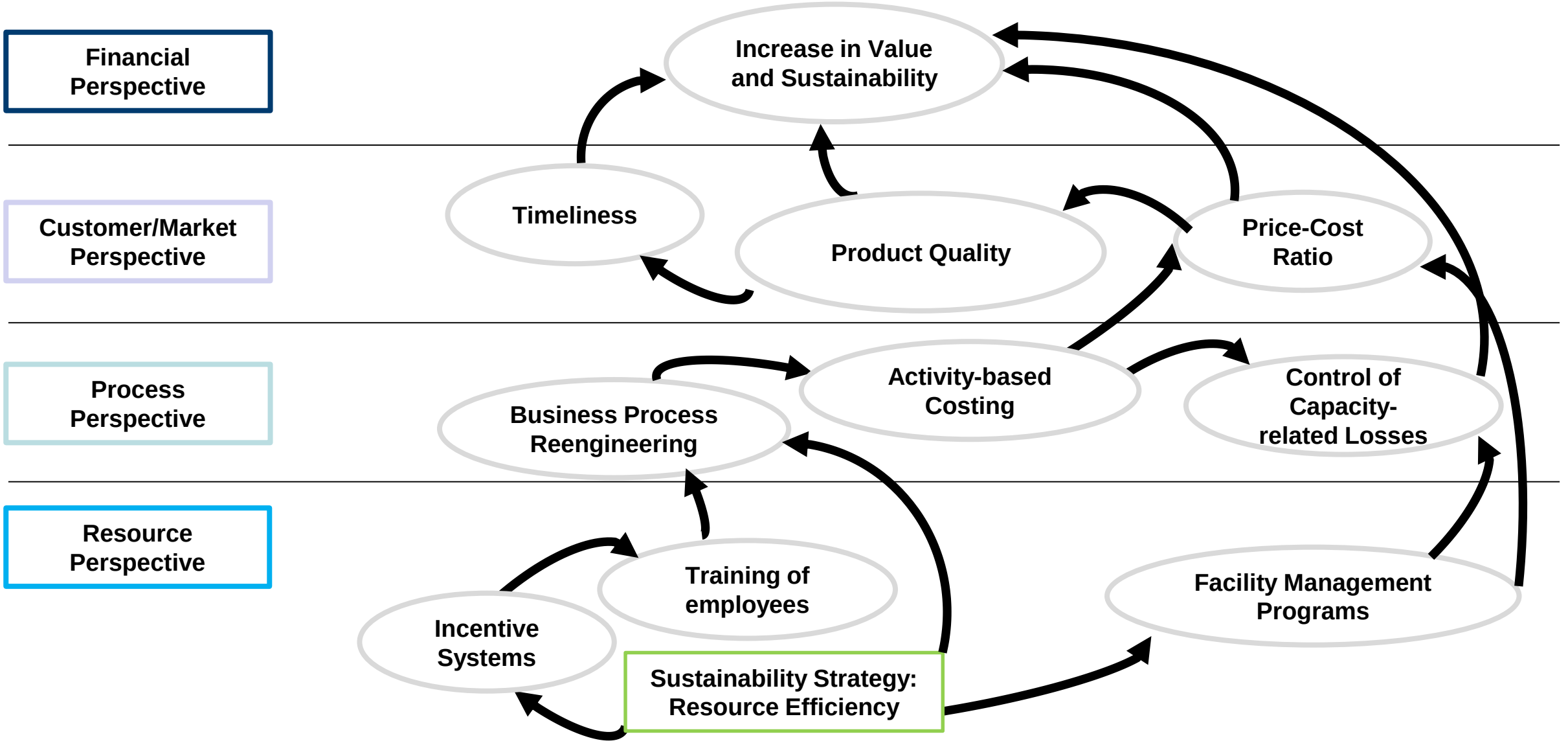
- **Up to 95% energy savings by using secondary aluminum**
- **Massive cost reduction in fixed costs**



Balanced Scorecard for connecting qualitative and quantitative performance of Sustainability Objectives



Cause-Effect Relations for Communicating and Implementing a Sustainability Strategy



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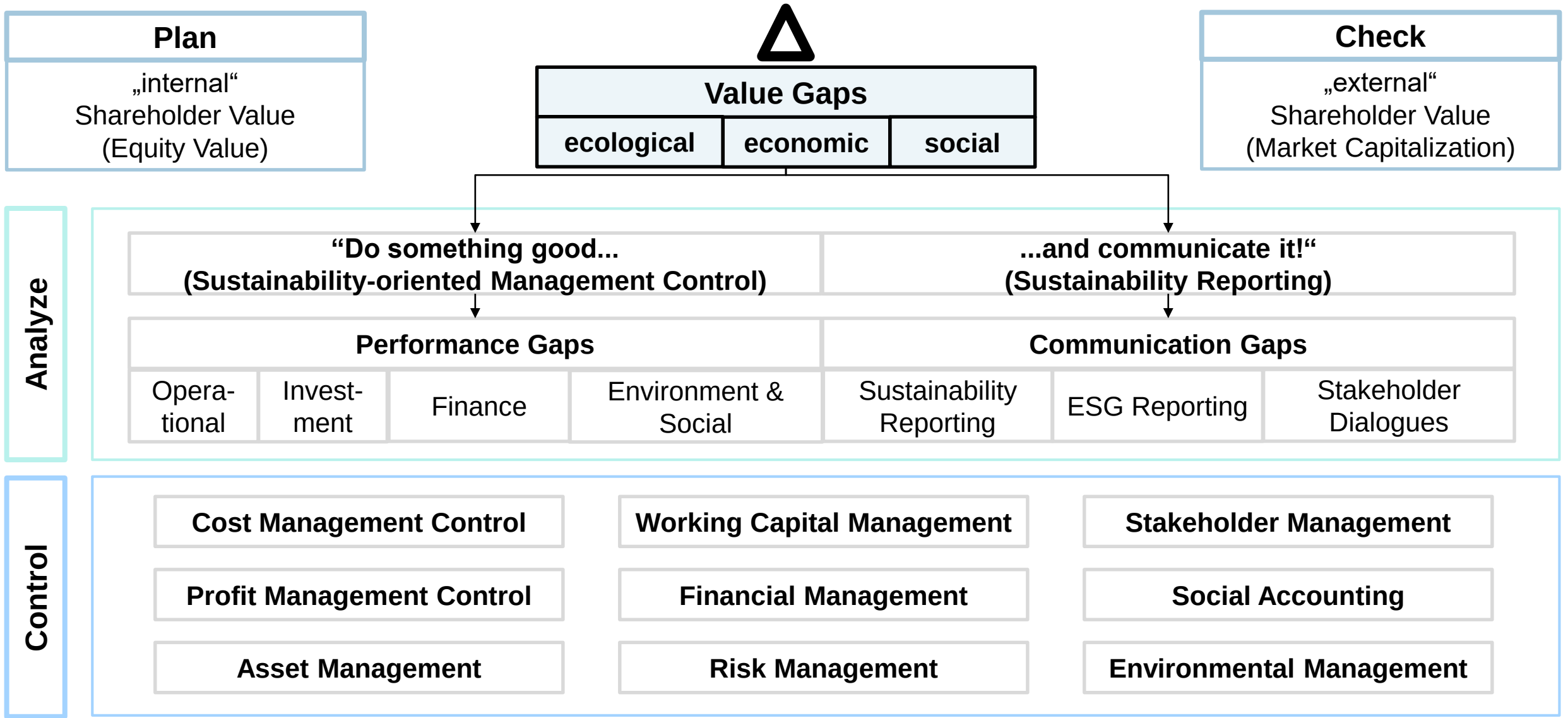
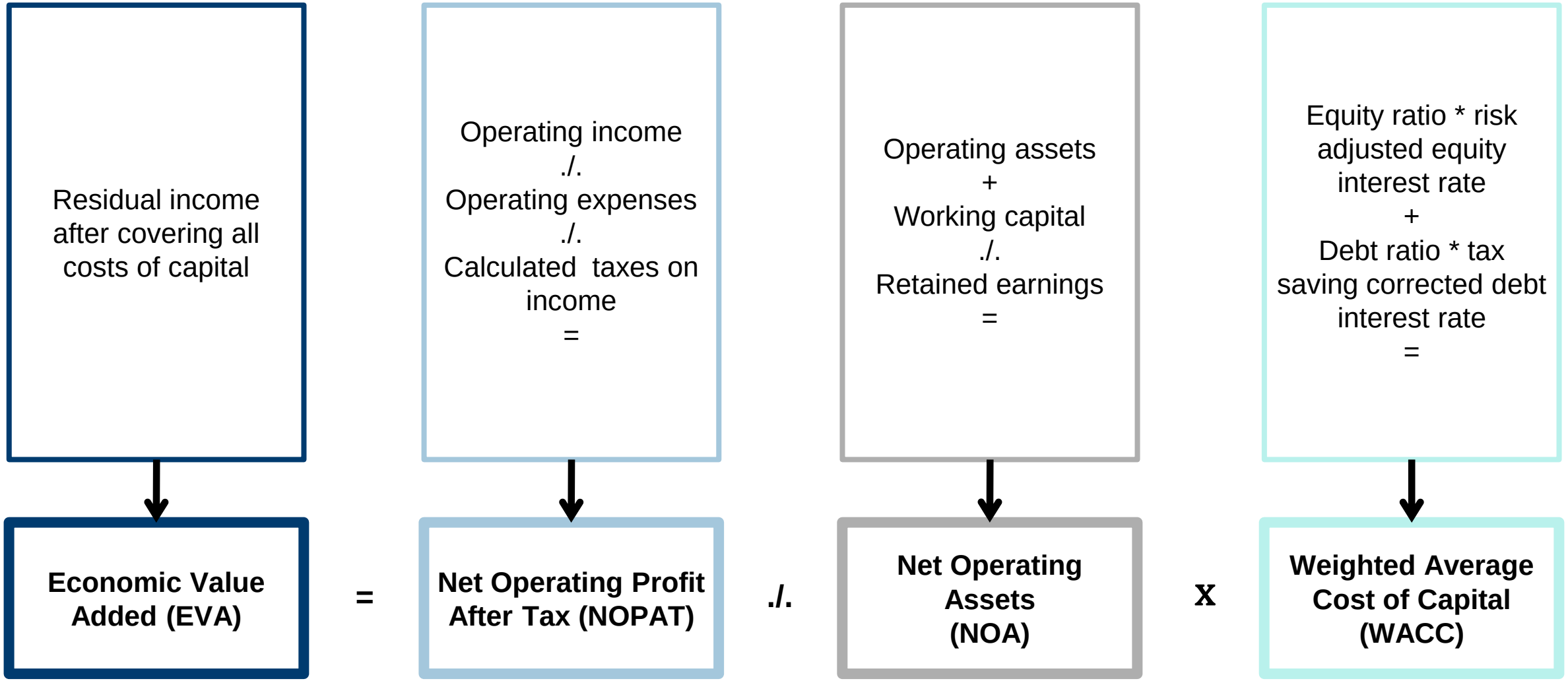
Management Control-based and value-oriented Sustainability Management



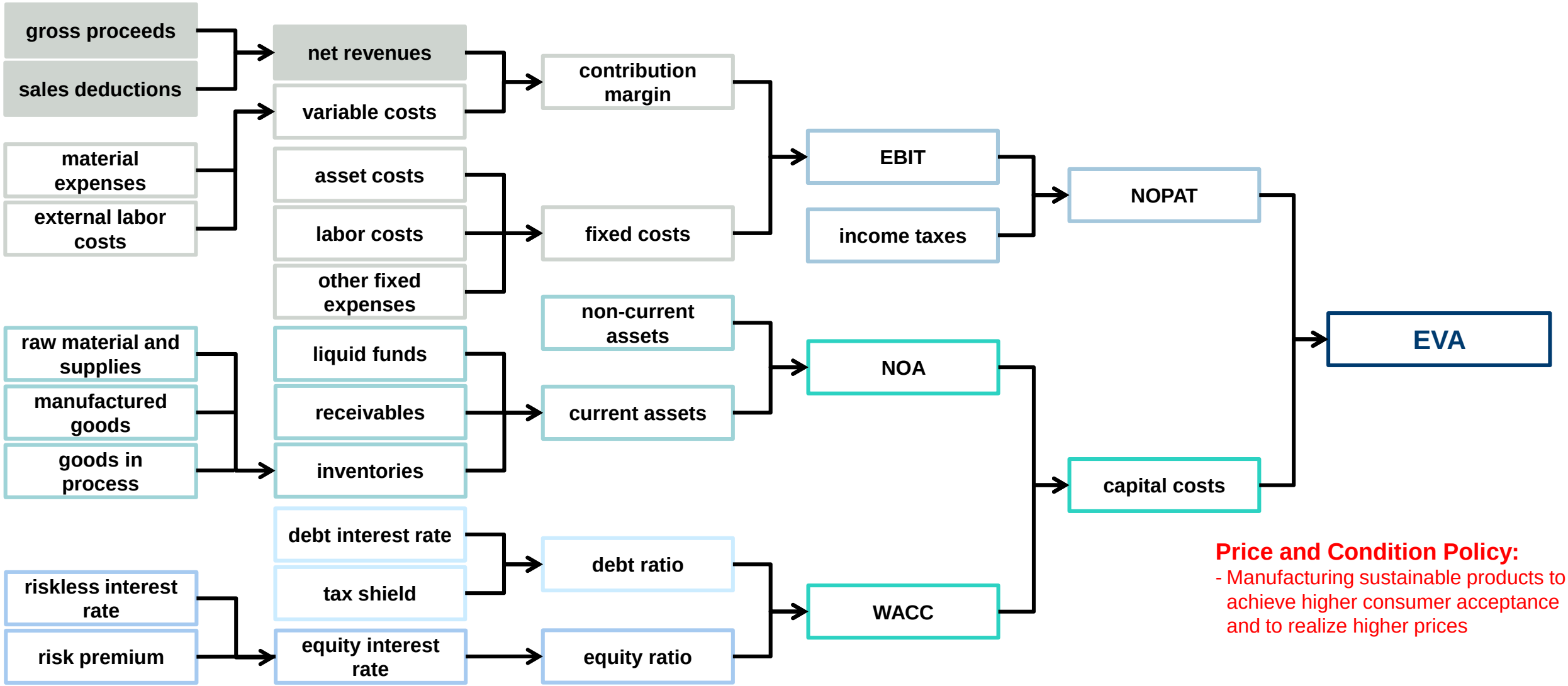
Economic Value Added (EVA)© Calculation



EVA©-based Value Driver System and calculation of the Shareholder Value

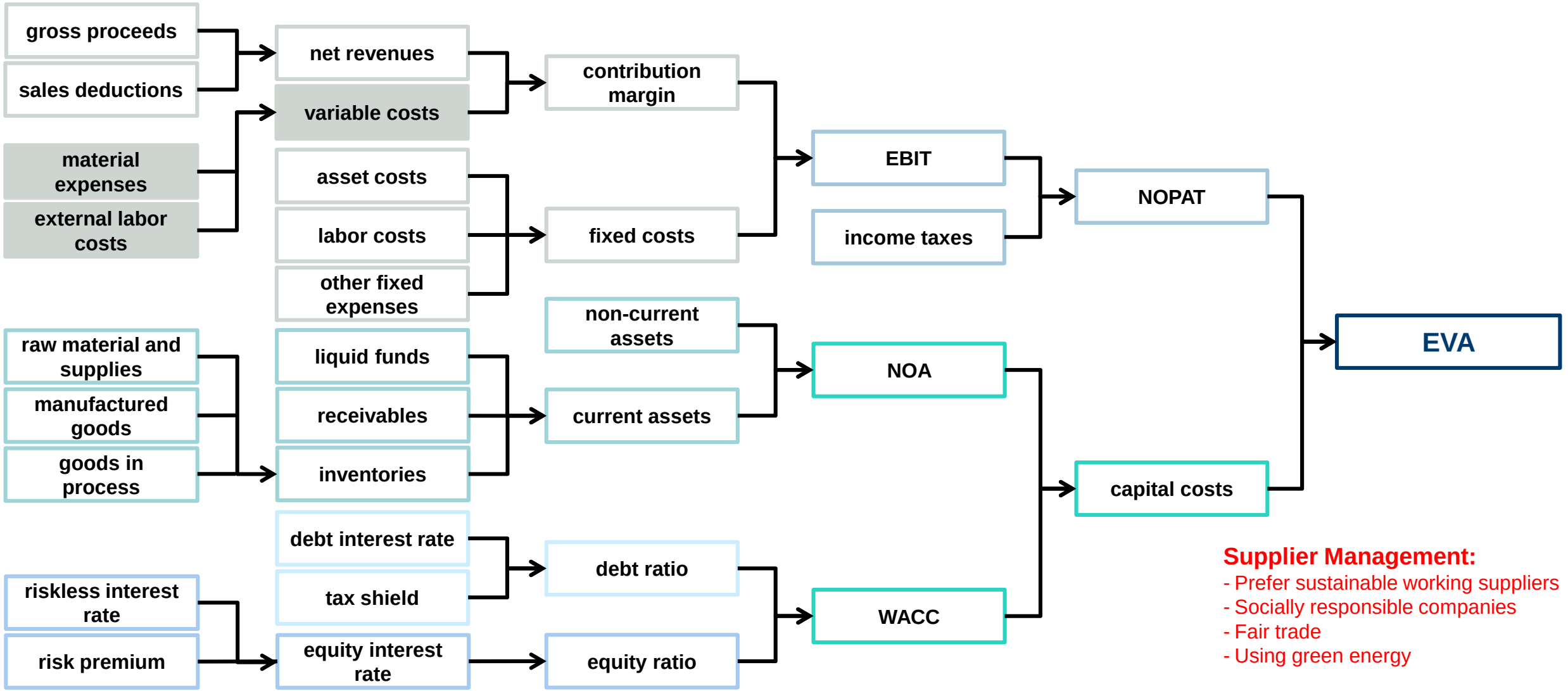
	Period of time (t)	Start (t_0)	t_1	t_2	t_3	t_4	t_5	t_6 $t_?$
01	Revenues		5.000,00	5.200,00	5.400,00	5.600,00	5.800,00	6.000,00
02	EBIT		460,00	480,00	500,00	520,00	540,00	580,00
03	Calculated taxes on income (40 %)		184,00	192,00	200,00	208,00	216,00	232,00
04	NOPAT		276,00	288,00	300,00	312,00	324,00	348,00
05	NOA	2.000,0	2.100,00	2.200,00	2.300,00	2.400,00	2.500,00	2.600,00
06	WACC (r_{WACC} = 10 %)		200,00	210,00	220,00	230,00	240,00	260,00
07	EVA		76,00	78,00	80,00	82,00	84,00	88,00
08	Discounting ratio (10,0 %)		1/1,1	$1/1,1^2$	$1/1,1^3$	$1/1,1^4$	$1/1,1^5$	1/0,1
09	EVA present value of final phase t_5						880,0	
10	EVA present value of final phase t_0	546,4						
11	EVA present value of t_5	52,2						
12	EVA present value of t_4	56,0						
13	EVA present value of t_3	60,1						
14	EVA present value of t_2	64,5						
15	EVA present value of t_1	69,1						
16	Planning phase present value t0	301,8						
17	MVA	848,2						
18	NOA	2.000,0						
19	Company value	2.848,2						
20	./. Market value of debts (q_F = 50%)	-1.000,0						
21	SHV	1.848,2						

Sustainable Revenue Management focuses on the realization of higher prices/volume through better sustainable-oriented consumer acceptance

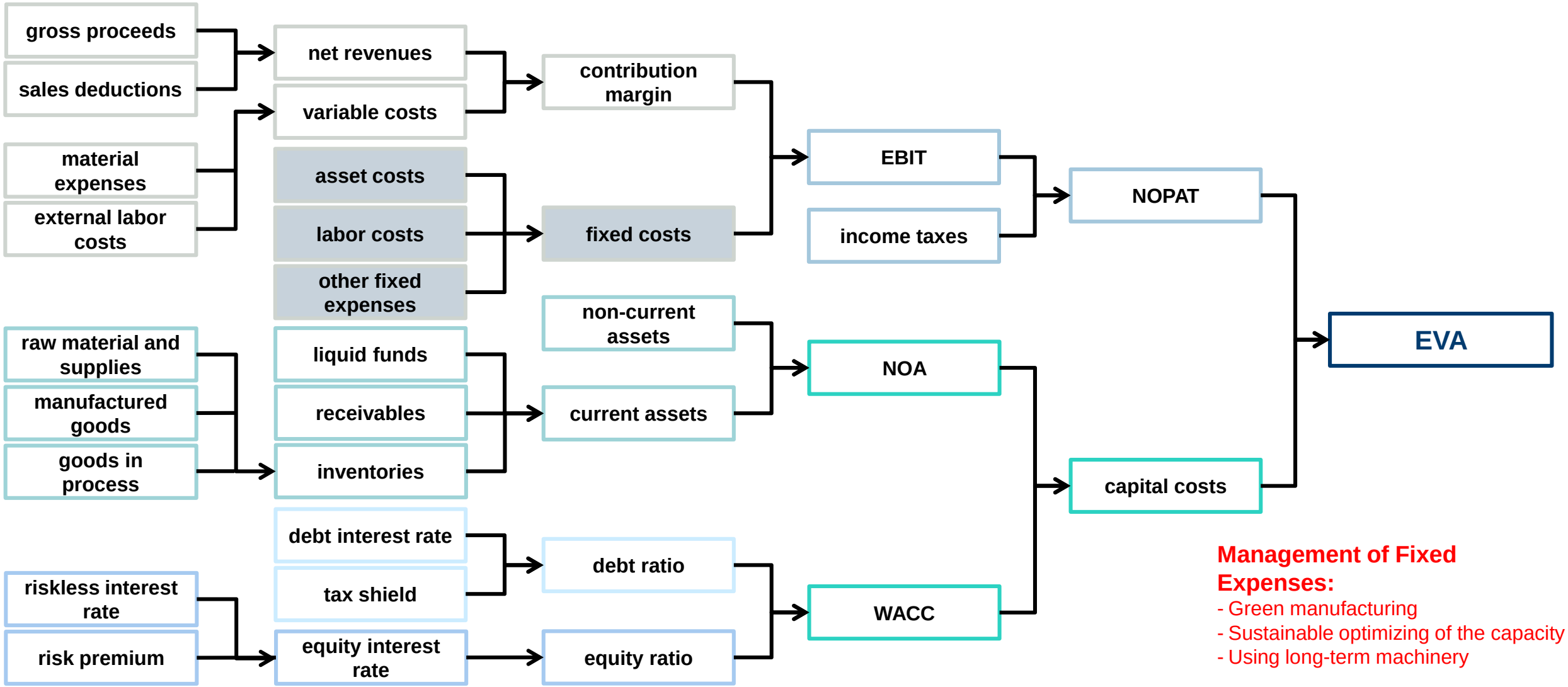


Price and Condition Policy:
- Manufacturing sustainable products to achieve higher consumer acceptance and to realize higher prices

Sustainable Management of Variable Costs can be reduced by a sustainable resource consumption approach



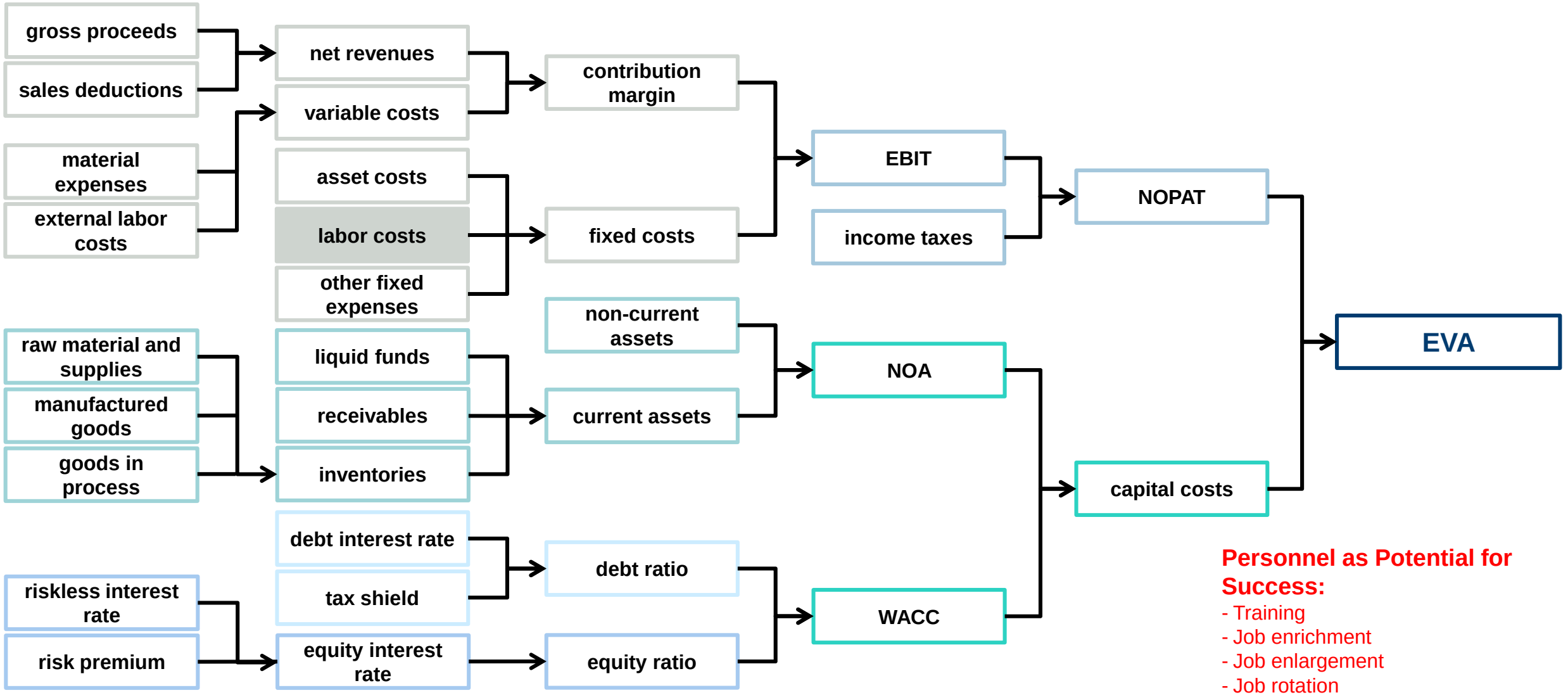
Sustainable Management of Fixed Costs by combating Capacity-related Loss Sources



Management of Fixed Expenses:

- Green manufacturing
- Sustainable optimizing of the capacity
- Using long-term machinery

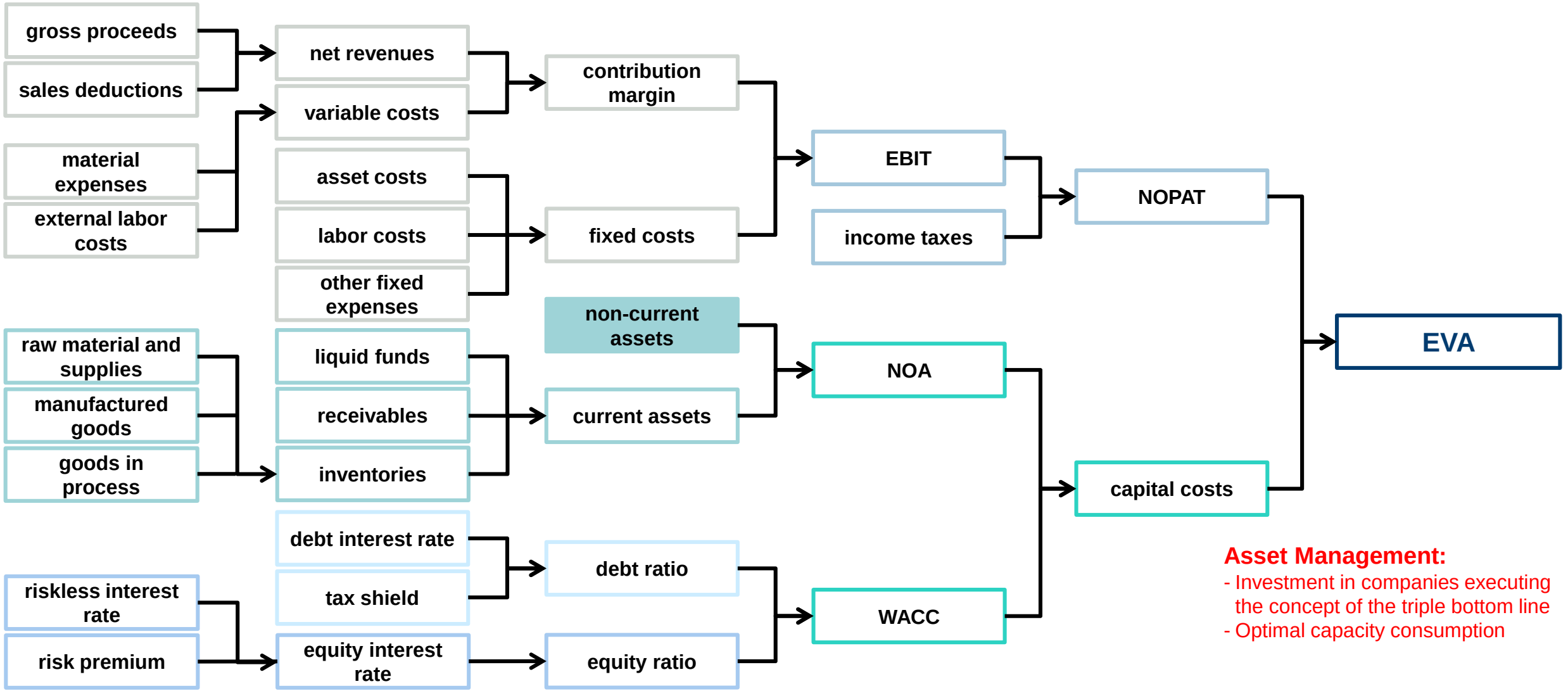
Sustainable Management of Fixed Costs focuses on supporting employees to succeed and reach their full potential



Personnel as Potential for Success:

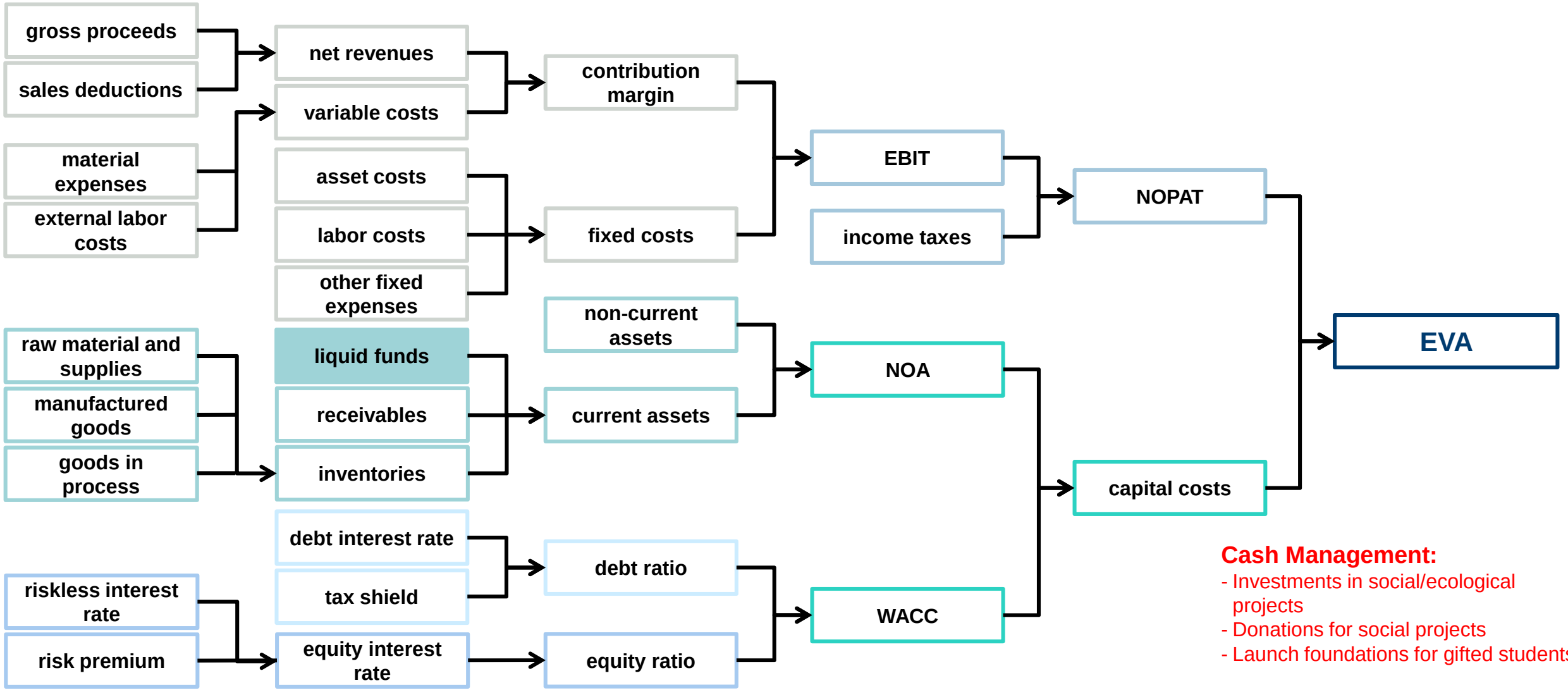
- Training
- Job enrichment
- Job enlargement
- Job rotation

Sustainable Asset Management focuses on maximal consumption of non-current assets



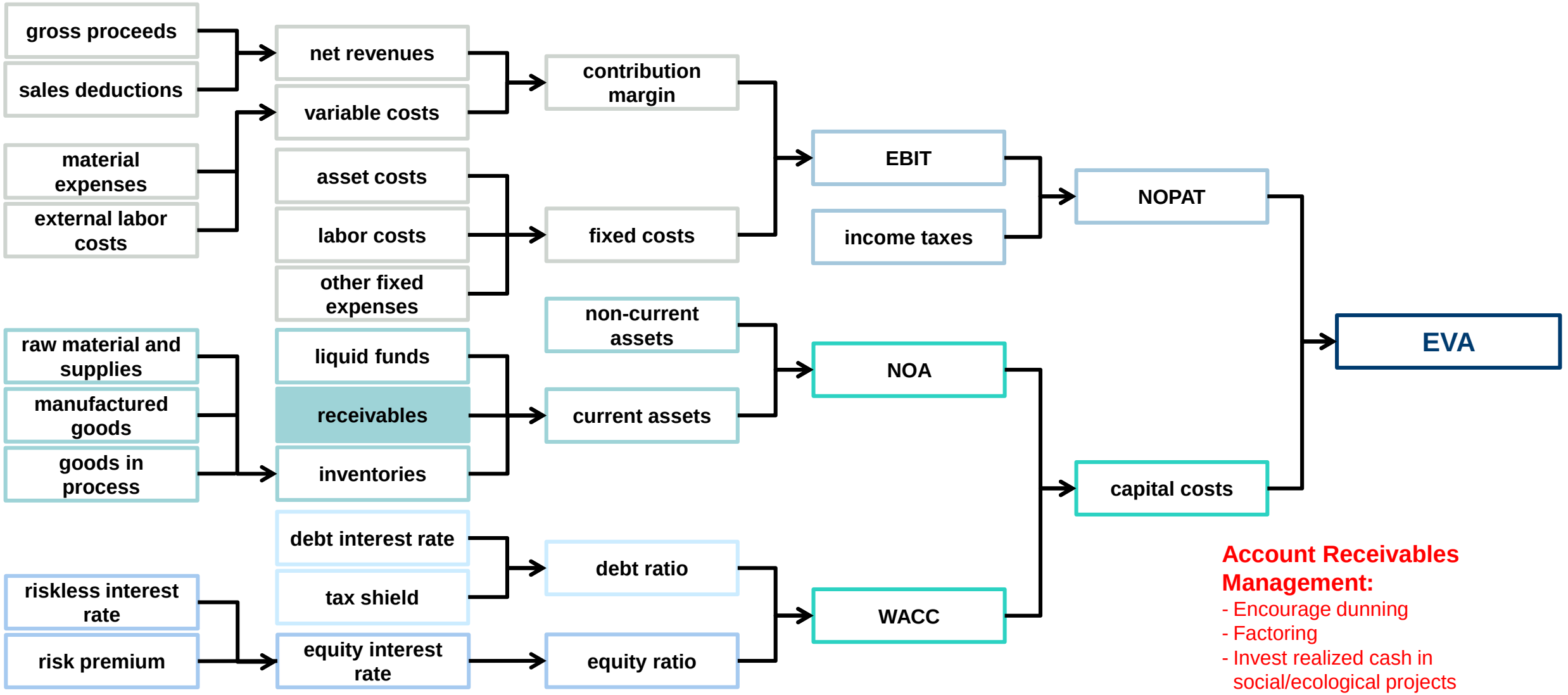
Asset Management:
- Investment in companies executing the concept of the triple bottom line
- Optimal capacity consumption

Sustainable Asset Management encourages to invest in socially and ecologically sustainable projects



Cash Management:
- Investments in social/ecological projects
- Donations for social projects
- Launch foundations for gifted students

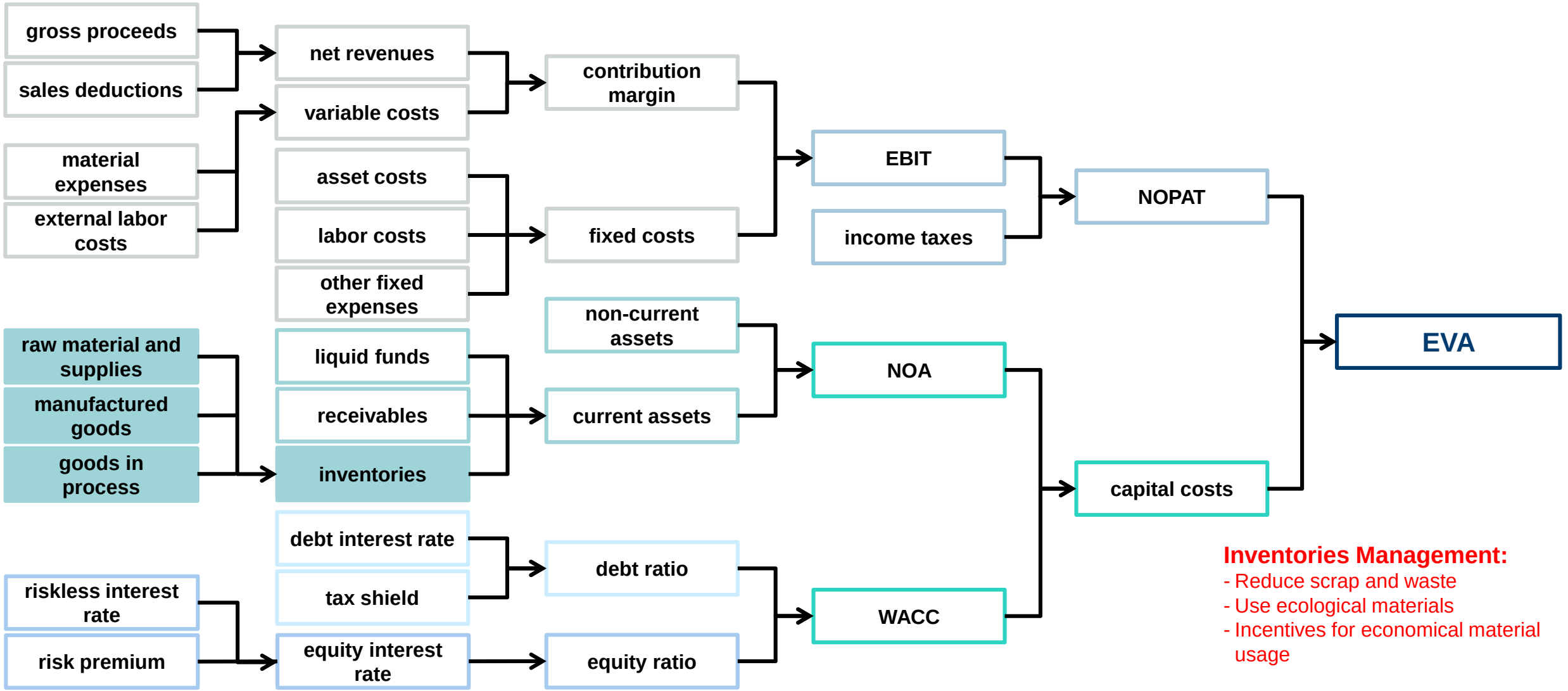
Sustainable Asset Management encourages to invest realized cash in socially and ecologically sustainable projects



Account Receivables Management:

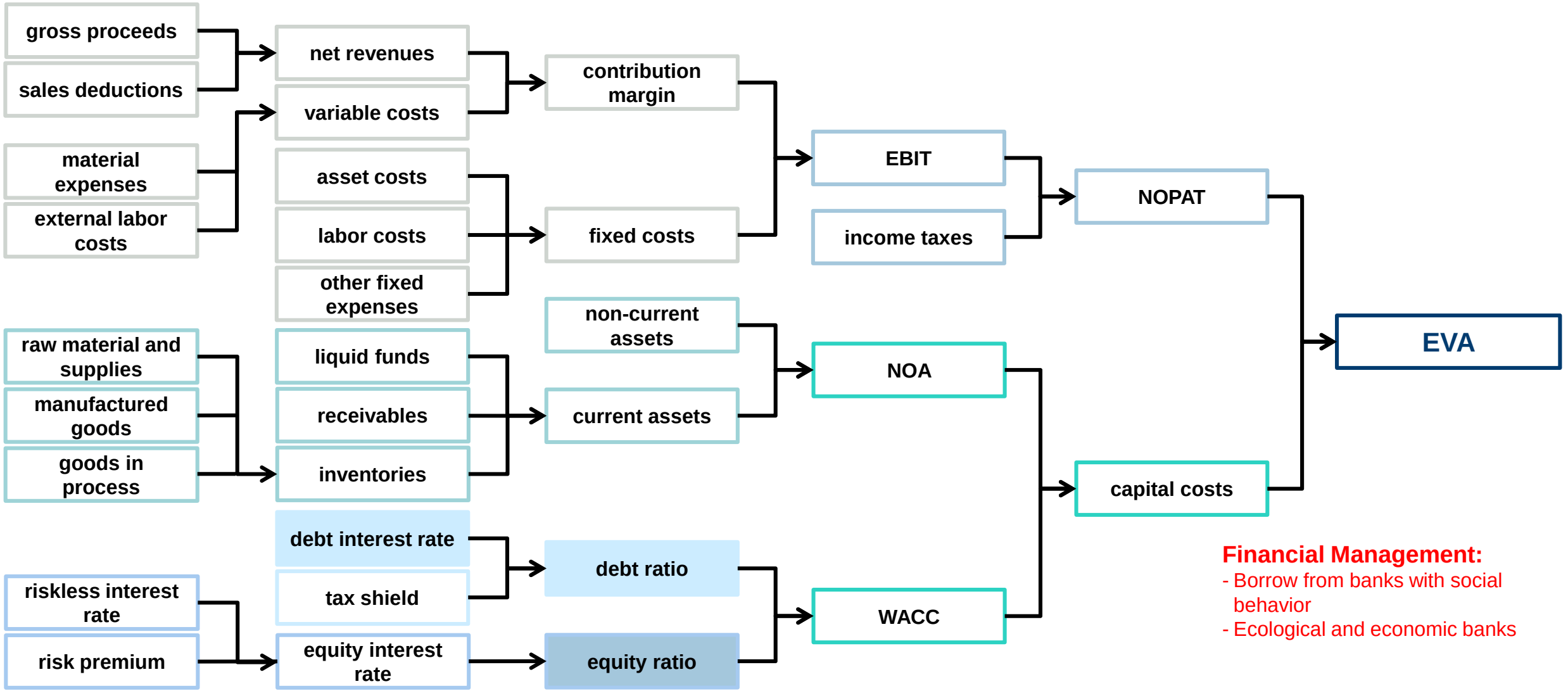
- Encourage dunning
- Factoring
- Invest realized cash in social/ecological projects

Sustainable Asset Management focuses on reducing scrap and waste which in turn leads to ecological benefits

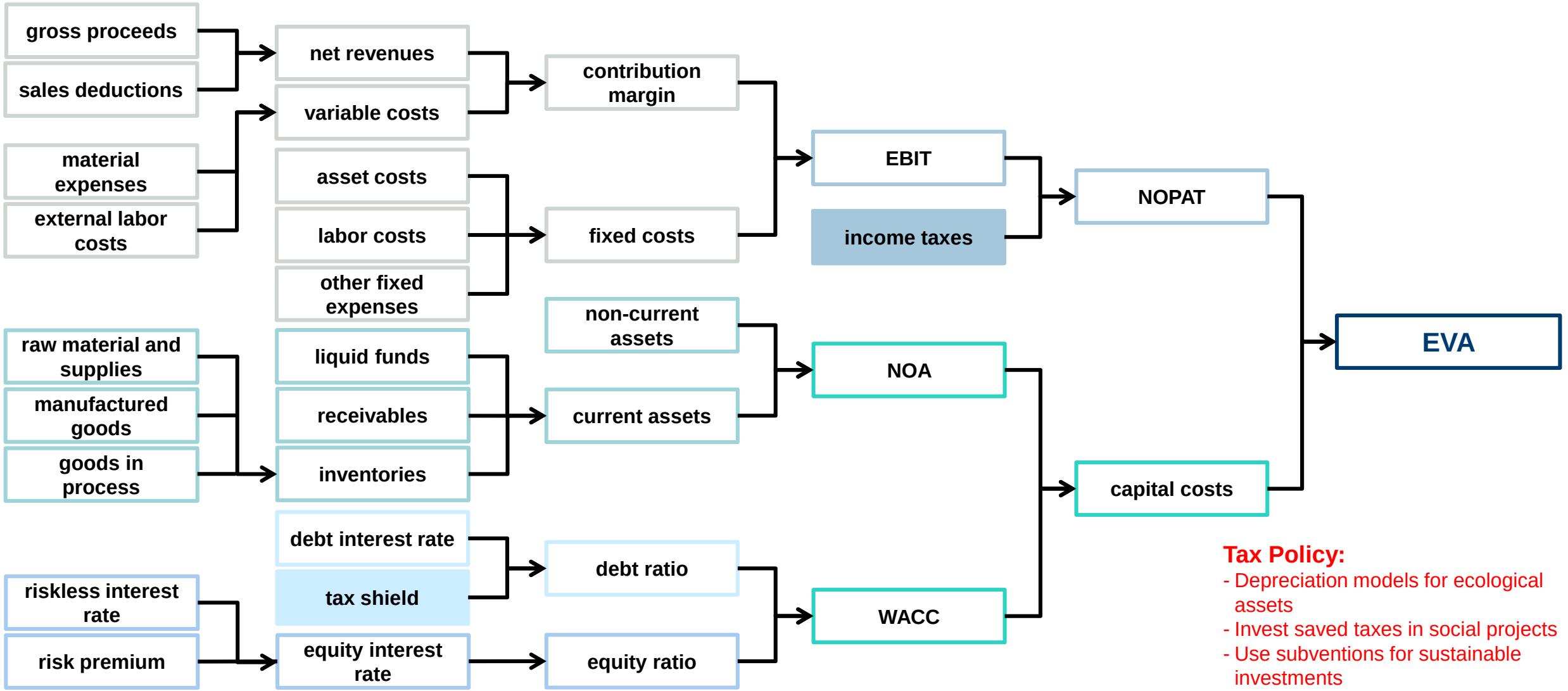


Inventories Management:
- Reduce scrap and waste
- Use ecological materials
- Incentives for economical material usage

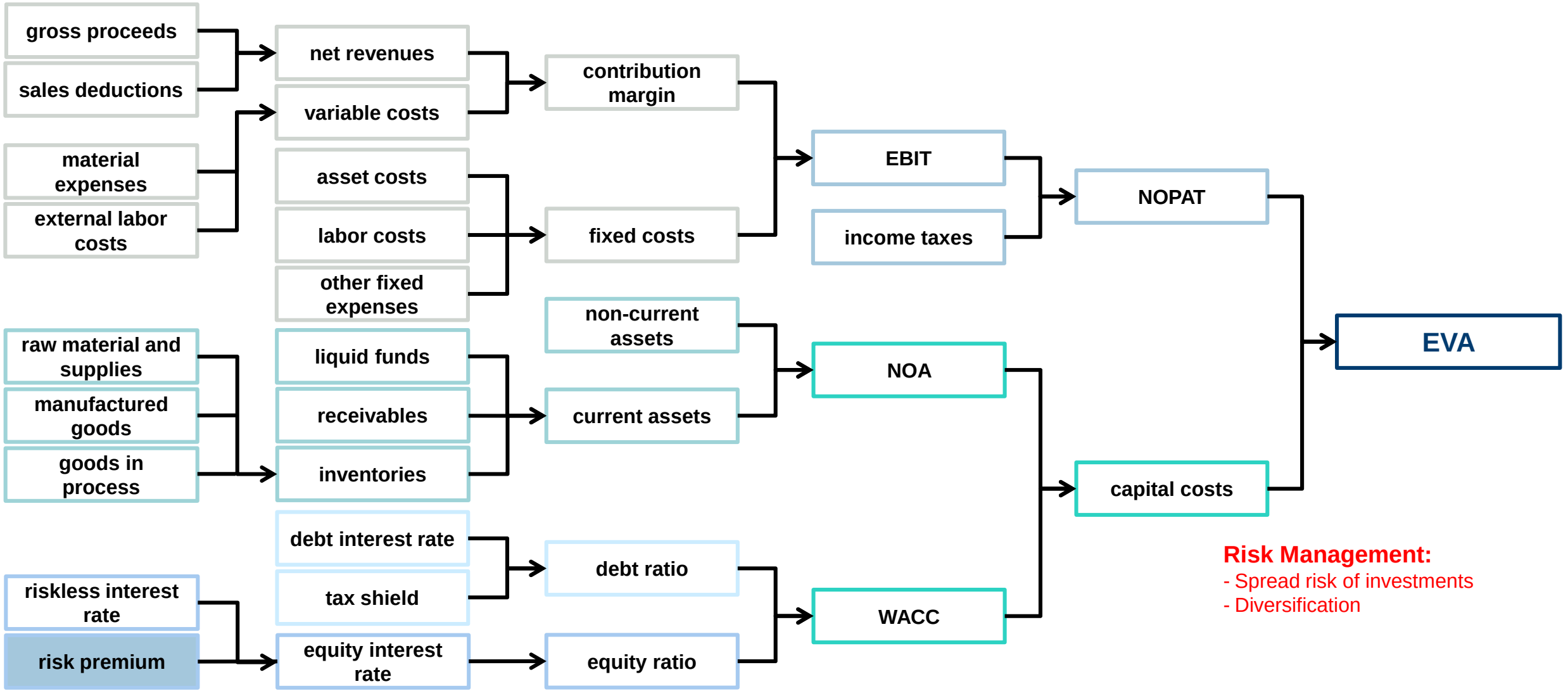
Sustainable Financial Management can be implemented by borrowing from banks with ecological/social initiatives (e. g. „banking on green“)



Sustainable Financial Management: Income taxes may be minimized by using social and ecological tax saving programs



Sustainable Financial Management: Risk Management may serve Financial Management by a diversification of ecological products



Advantages and Disadvantages of Monetization

Advantages of monetization	Disadvantages of monetization
Consistent questioning of impacts, accurate and accountable data is demanded	Partly this is methodically not possible and only pretends a false accuracy
Consequences of different measures are better comparable with each other	Credibility suffers when values appear arbitrary or even are manipulated
Linking with operational accounting, thus using existing tools, methods and IT tools	Contradicts „Strong Sustainability" if damages cannot be offset against each other
Easier integration into the existing Management Control and Management System	
Stronger perception by the management	

Junior Research Groups FÖCO and FungiMat

FÖCO – Integrative and interdisciplinary junior research group in the fields of Green Finance, Life Cycle Assessment and Sustainability Management Control

Duration: 01/2022 – 12/2022

Funding Amount: 400,000 EUR

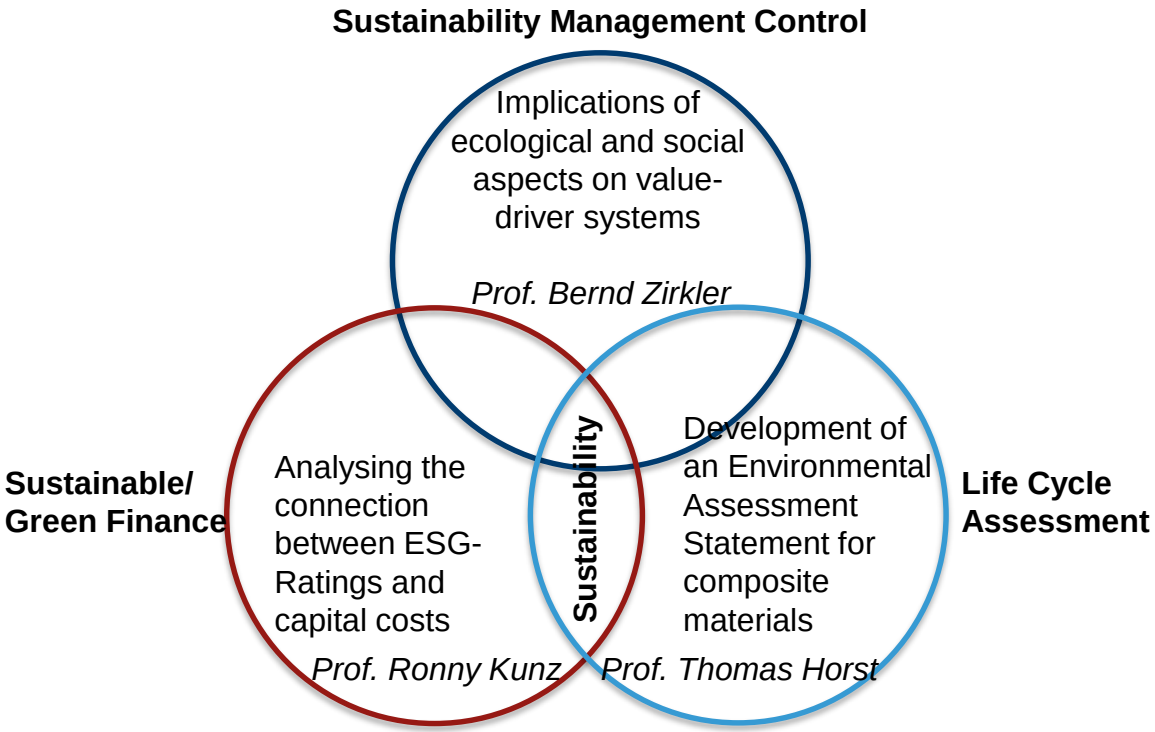
Funded by the European Social Fund (ESF) and administered by the Development Bank of Saxony (SAB)

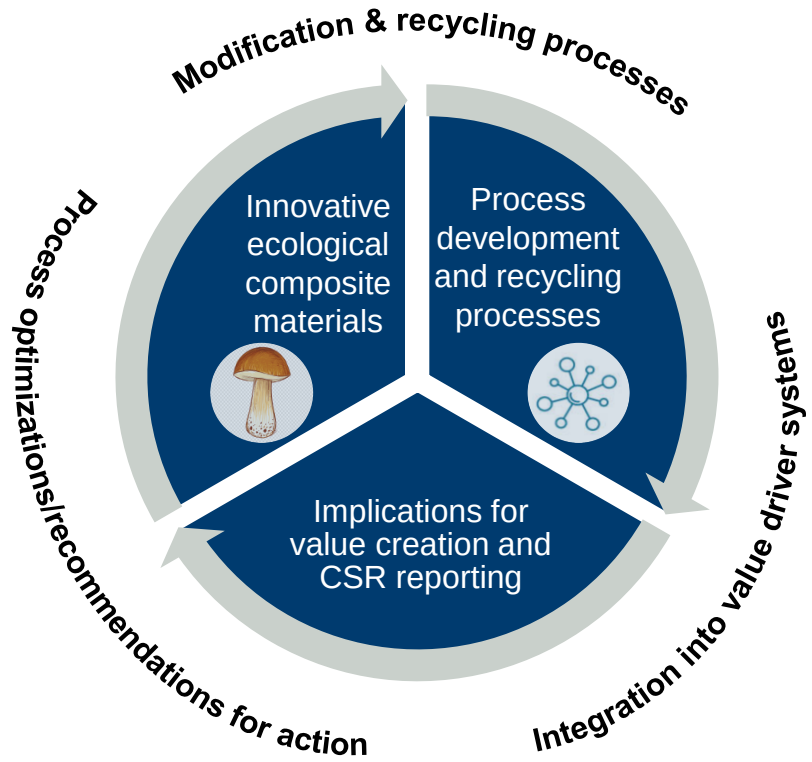
FungiMat – Junior research group towards ecologic composite materials made out of mushroom-mycelia and biopolymers and their implications on economic value driver systems and the CSR-Reporting

Duration: 01/2024 – 12/2026

Funding Amount: 1,400,000 EUR

Funded by the European Social Fund (ESF) and administered by the Development Bank of Saxony (SAB)





Thank you for your attention!

Any questions?

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Back-up

Sustainability Indicators disclosed in 10 or more Reports

Table 1*

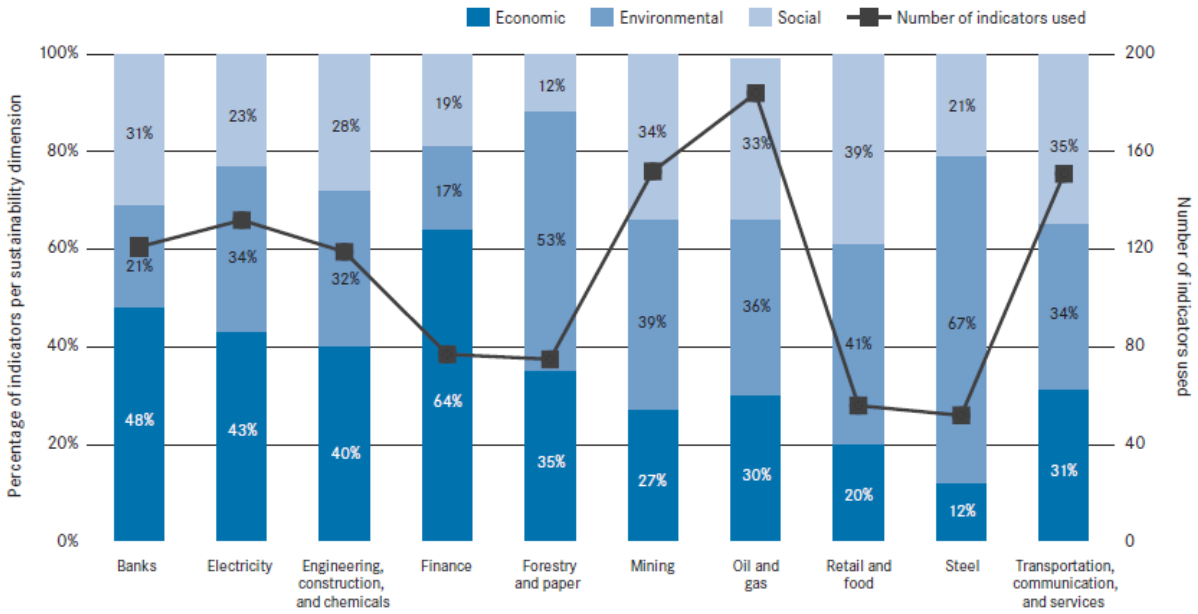
Indicators disclosed in 10 or more reports

Indicator	Total	Indicator Location in Report				
		Introduction	Scorecard	Chart	Table	Box
Funding, donations, sponsorship	42	13	8	10	10	1
Greenhouse gas emissions / CO_2 equivalent emissions	42	3	11	17	10	1
Total employees	41	19	12	2	7	1
Taxes and royalties	30	3	3	2	20	2
Lost time injury frequency	29	5	7	9	6	2
Total production	24	7	7	4	4	2
Breakdown of donations	24		1	19	3	1
Employees by region	23			6	17	
Environmental spills and releases	22		7	9	5	1
Total revenues	20	1	7	2	9	1
Wages and benefits	19	1	2	3	12	1
Number of women	19			7	11	1
All injury frequency	18	7	6	3	2	
Energy use intensity	16		3	7	6	
Greenhouse gas emissions intensity	15	1	2	9	3	
Number of aboriginal descent employees	15	1	2	4	8	
Number of employees with disabilities	15		1	4	10	
Number of employees from visible minorities	15		1	4	10	
Regulatory notifications and fines	14	3	2		8	1
Total assets	14	3	2	2	5	2
Water consumption	14	1		8	5	
Net income	13	3	4		4	2
Water consumption intensity	13	3	1	6	3	
Energy consumption	13			7	5	1
Fatalities	12	4	6	1	1	
All injury frequency rate	12	1	1	7	3	
Employee turnover rate	12	1	2	4	4	1
Electricity use	12		5	3	3	1
Emissions of sulphur dioxide	12		2	9	1	
Sales	11	5	1		4	1
Investment in learning / training	11	3	2		4	2
Solid waste material recycled	11	2	3	1	3	2
Women executives	11		2		9	
Reportable environmental incidents	10	2	2	5	1	
Value added and community benefits	10	1		3	5	1
CO_2 emissions	10		1	4	4	1

*This table contains data from Laurence Clement Roca and Cory Searcy, "An Analysis of Indicators Disclosed in Corporate Sustainability Reports," *Journal of Cleaner Production*, Vol. 20, 2012.

Exhibit 1*

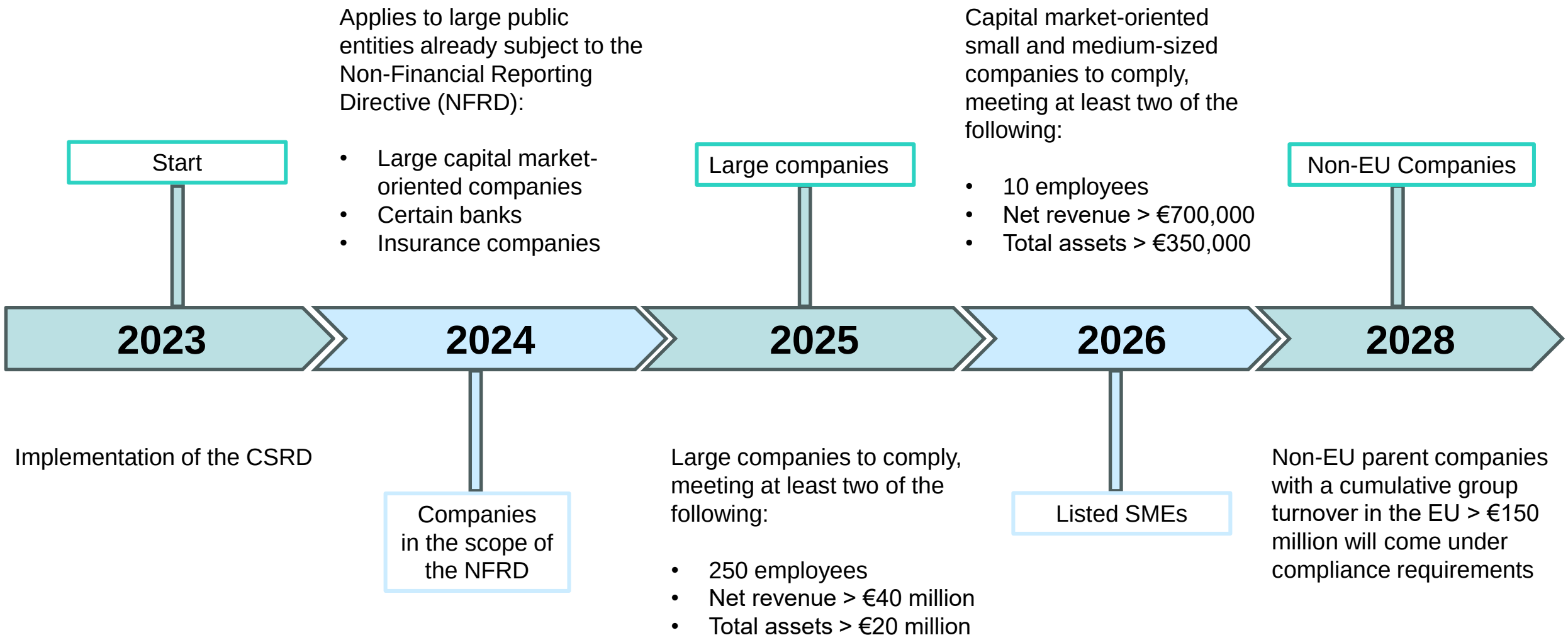
Total number of indicators used per industry sector and percentage per sustainability dimension



*This exhibit contains data reported in Laurence Clement Roca and Cory Searcy, "An Analysis of Indicators Disclosed in Corporate Sustainability Reports," *Journal of Cleaner Production*, Vol. 20, 2012.

Reference: Tonello, M. (2012)

Timeline of the CSRD Implementation



European Sustainability Reporting Standards (ESRS)

European Sustainability Reporting Standards (ESRS)		
Environment	**Social**	**Governance/Corporate Management**
ESRS E1 Climate change	**ESRS S1 Own workforce**	**ESRS G1 Risk management and control**
Alignment of greenhouse gases (GHG) emission reduction targets with limiting global warming to 1.5°C	Working conditions; equal treatment and opportunities for all; work-life balance	The principle and understanding of the structure and composition of the governance
ESRS E2 Pollution	**ESRS S2 Workers in the value chain**	**ESRS G2 Business conduct**
Understand material impacts/risks and opportunities related to pollution	The reduction of negative impacts, advancement of positive outcomes, and the management of risks and opportunities for workers	Policies and targets on business conduct, prevention and detection of corruption and bribery
ESRS E3 Water and marine sources	**ESRS S3 Affected communities**	
The impacts of water and how it effectively addresses these issues	Their chapters on human rights and employment and industrial relations	
ESRS E4 Biodiversity and ecosystems	**ESRS S4 Consumers and end users**	
The relationship to freshwater and marine habitats, ecosystems and populations of related fauna and flora species	The undertaking's business model and strategy take account of the interests of stakeholders	
ESRS E5 Resource and circular economy		
The goal is to retain the value of the resources and achieve a long-life optimal use or reuse		

Consideration of the Environment as another Stakeholder Group

Perspective		Position	Stakeholders
Calculation according to Output Compilation	+	**Gross Value Added (Total Performance)**	
		Revenues	Customers
		Increase in Inventory (Unfinished Goods / Finished Goods)	
		Financial Income and Other Operating Income	
	-	**Advance Performance**	
		Cost of Materials (Consumer Goods and Services)	Suppliers
		Operational Environmental Protection Measures	
		Depreciation (Tangible and Intangible Consumer Goods)	
		Operational Environmental Protection Measures	
		Other Operating Expenses	
	=	**Net Value Added**	
Calculation according to the Distribution Approach	-	Personnel Costs (Wages, Salaries, Pension Provisions, Social Security Contributions)	Employees
	-	Interest	Outside Creditors
	-	Income Taxes and Other Charges	Government
	-	Donations	Society
	=	**Profit**	Owners
		Distribution or Reinvestment	

Companies are incorporating more environmentally friendly practices into their strategy

Value Added Statement

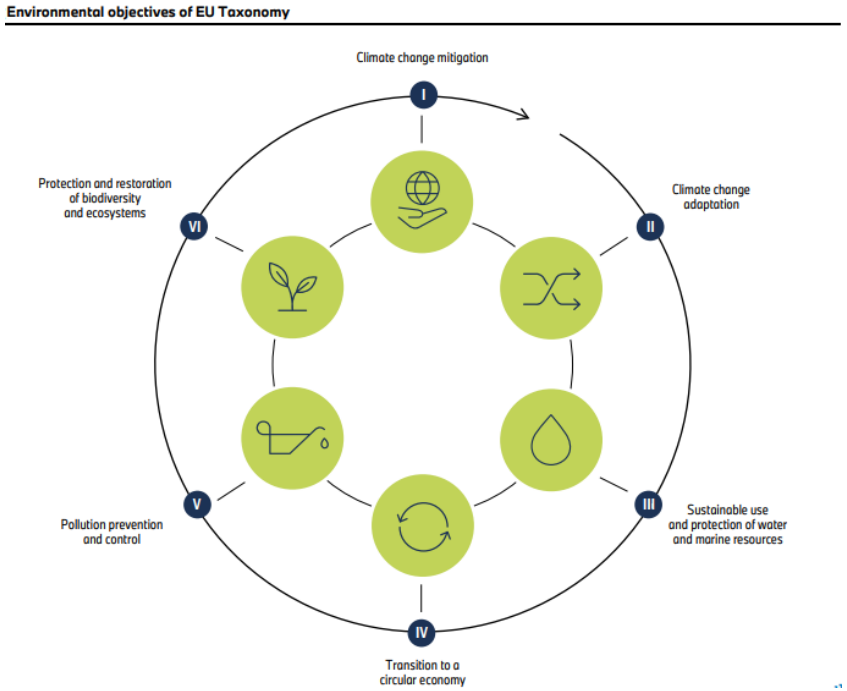
BMW Group value added statement

	2023 in € million	2023 in %	2022 in € million	2022 in %	Change in %
WORK PERFORMED					
Revenues	155,498	100.1	142,610	92.7	9.0
Financial income	– 1,227	– 0.8	9,783	6.4	-
Other income	1,045	0.7	1,377	0.9	– 24.1
Total output	**155,316**	**100.0**	**153,770**	**100.0**	**1.0**
Cost of materials*	82,527	53.1	80,181	52.1	2.9
Other expenses	22,609	14.6	19,479	12.7	16.1
Bought-in costs	**105,136**	**67.7**	**99,660**	**64.9**	**5.5**
Gross value added	**50,180**	**32.3**	**54,110**	**35.2**	**– 7.3**
Depreciation and amortisation of total tangible, intangible and investment assets	14,565	9.4	14,456	9.4	0.8
Net value added	**35,615**	**22.9**	**39,654**	**25.8**	**– 10.2**
ALLOCATION					
Employees	14,721	41.3	13,932	35.1	5.7
Providers of finance	3,665	10.3	2,274	5.7	61.2
Government/public sector	5,064	14.2	4,866	12.3	4.1
Shareholders	3,802	10.7	5,480	13.8	– 30.6
Group	7,488	21.0	12,461	31.4	– 39.9
Non-controlling interests	875	2.5	641	1.6	-
Net value added	**35,615**	**100.0**	**39,654**	**100.0**	**– 10.2**

* Cost of materials comprises all primary material costs incurred for vehicle production plus ancillary material costs (such as customs duties, insurance premiums and freight).

Referece: BMW Group Report (2023): Combined Management Report, p. 65. [Slide 22], in: https://www.bmwgroup.com/en/report/2023/downloads/BMW-Group-Report-2023-en.pdf [12.09.2024].

Value Added Statement



Reducing carbon emissions within the supply chain management

- The use of green electricity
- The use of secondary raw materials
- New manufacturing processes for raw materials
- Product and material innovations such as biomaterials

Businesses integrating sustainable practices experience long-term financial benefits

Reference: BMW Group Sustainability & Responsibility (2024): More stringent CO2 targets [Slide 23], in: https://www.bmwgroup.com/en/sustainability.html#carousel-f9cdf9ea9e-item-9e54d5aadd-tabpanel [19.09.2024]