



WHZ Westsächsische
Hochschule Zwickau
Hochschule für Mobilität

Sustainability-oriented Management Control

Masterclass in the framework of the ROLA-Seminar
(Research-oriented Learning and Analysis) at
University of Applied Sciences Zwickau

*Prof. Dr. rer. pol. habil. Dr. h. c. Bernd Zirkler (WHZ)
Zwickau, Germany, November 29, 2023*

Structure

1. Approaches to Sustainability Management

2. Integration of social and environmental aspects into economic value driver systems

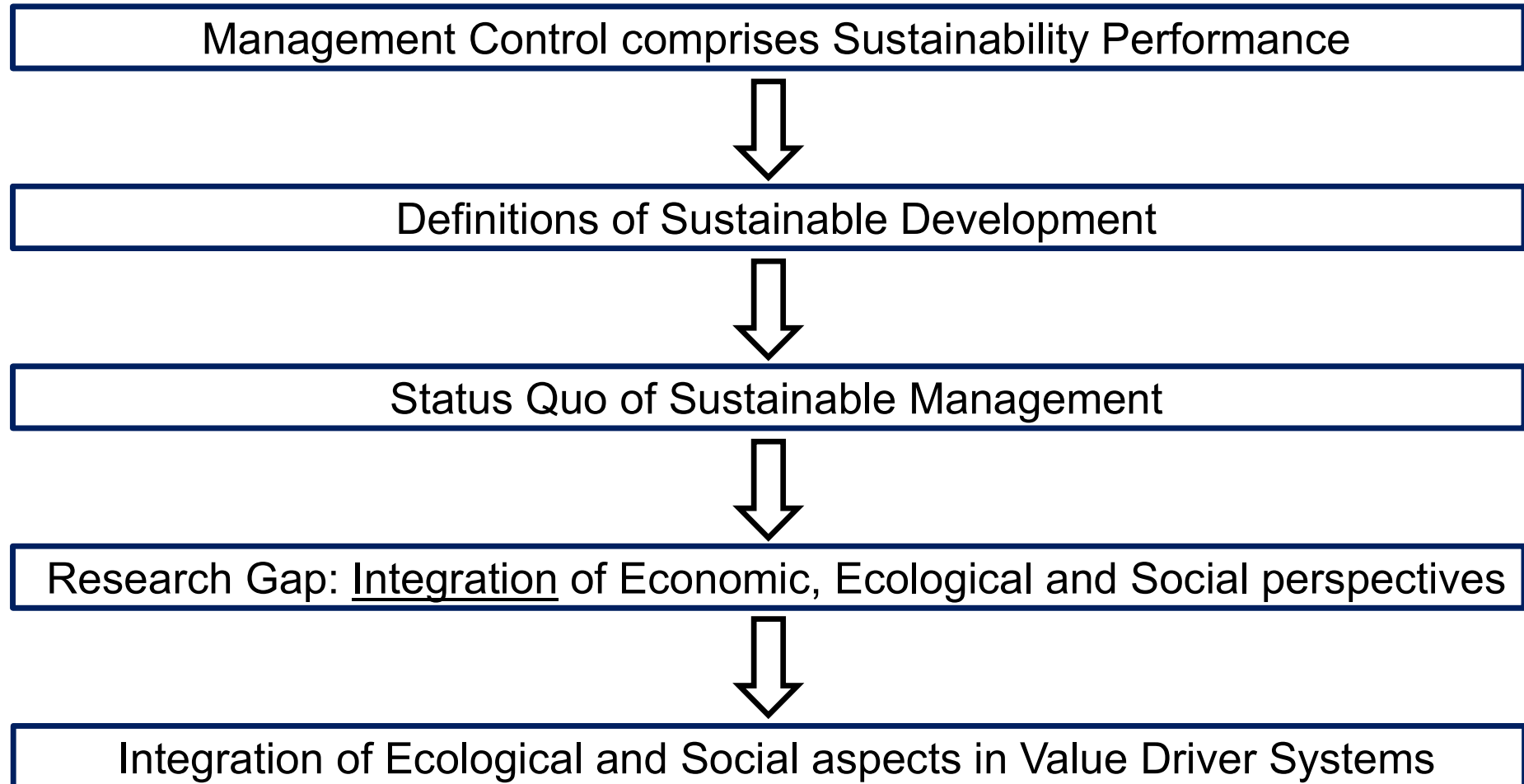
3. Insight into applied research projects

1. Approaches to Sustainability Management

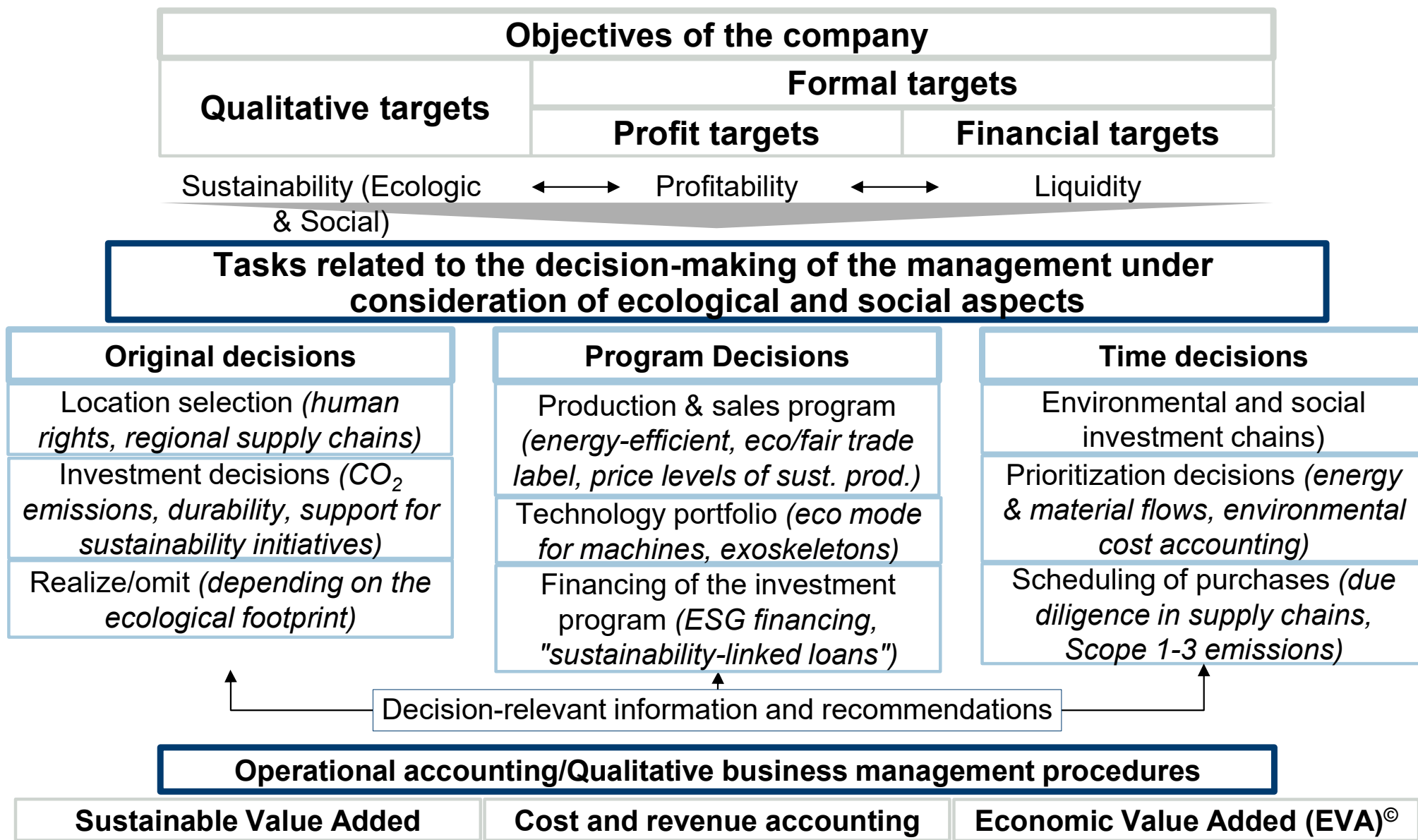
2. Integration of social and environmental aspects into economic value driver systems

3. Insight into applied research projects

Cornerstones of Sustainability-oriented Management Control



Objective and accounting orientation of a multidimensional Sustainability Controlling



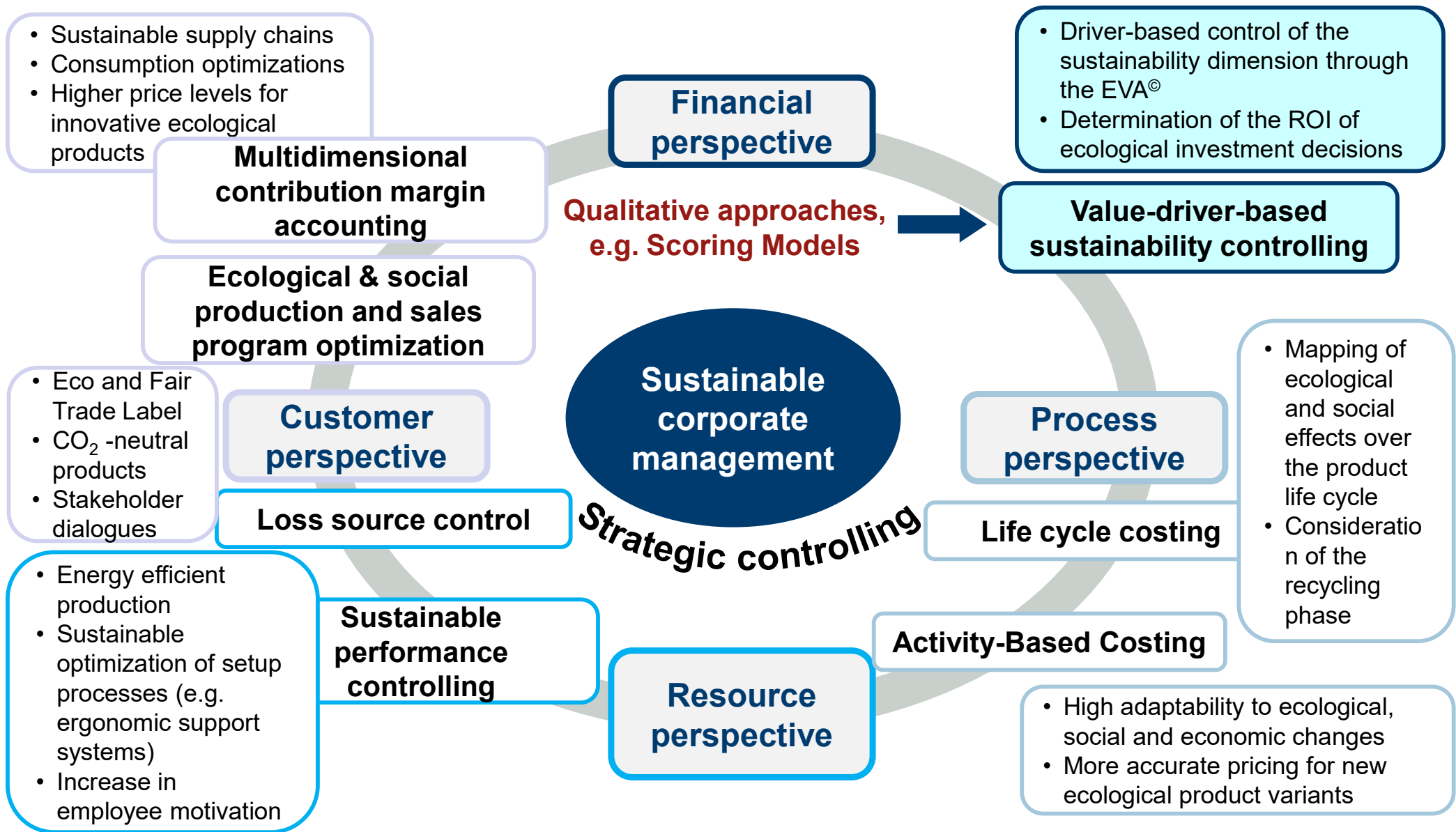
Sustainability indicators disclosed in 10 or more reports

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.

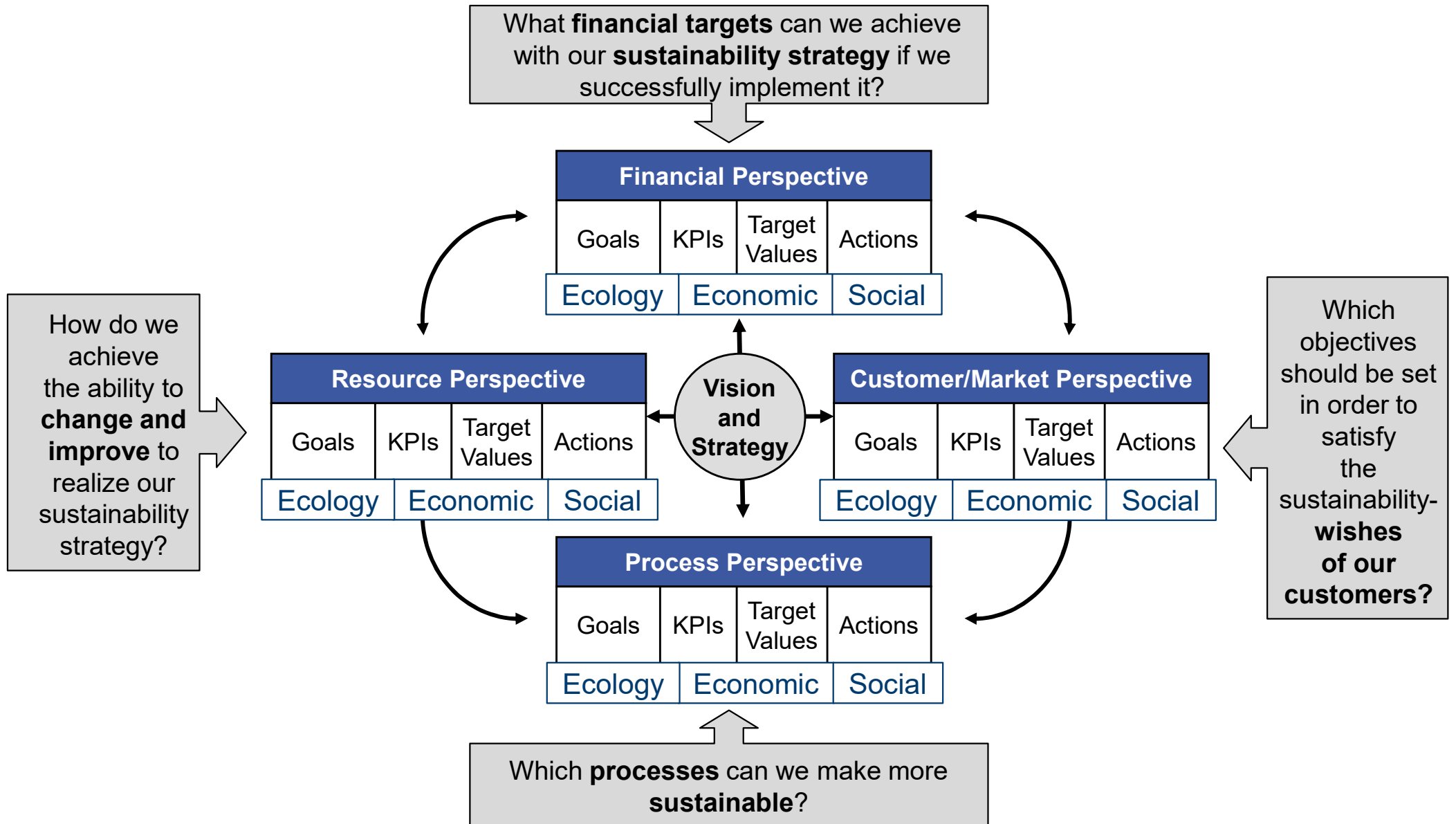
Approaches to Sustainability Management



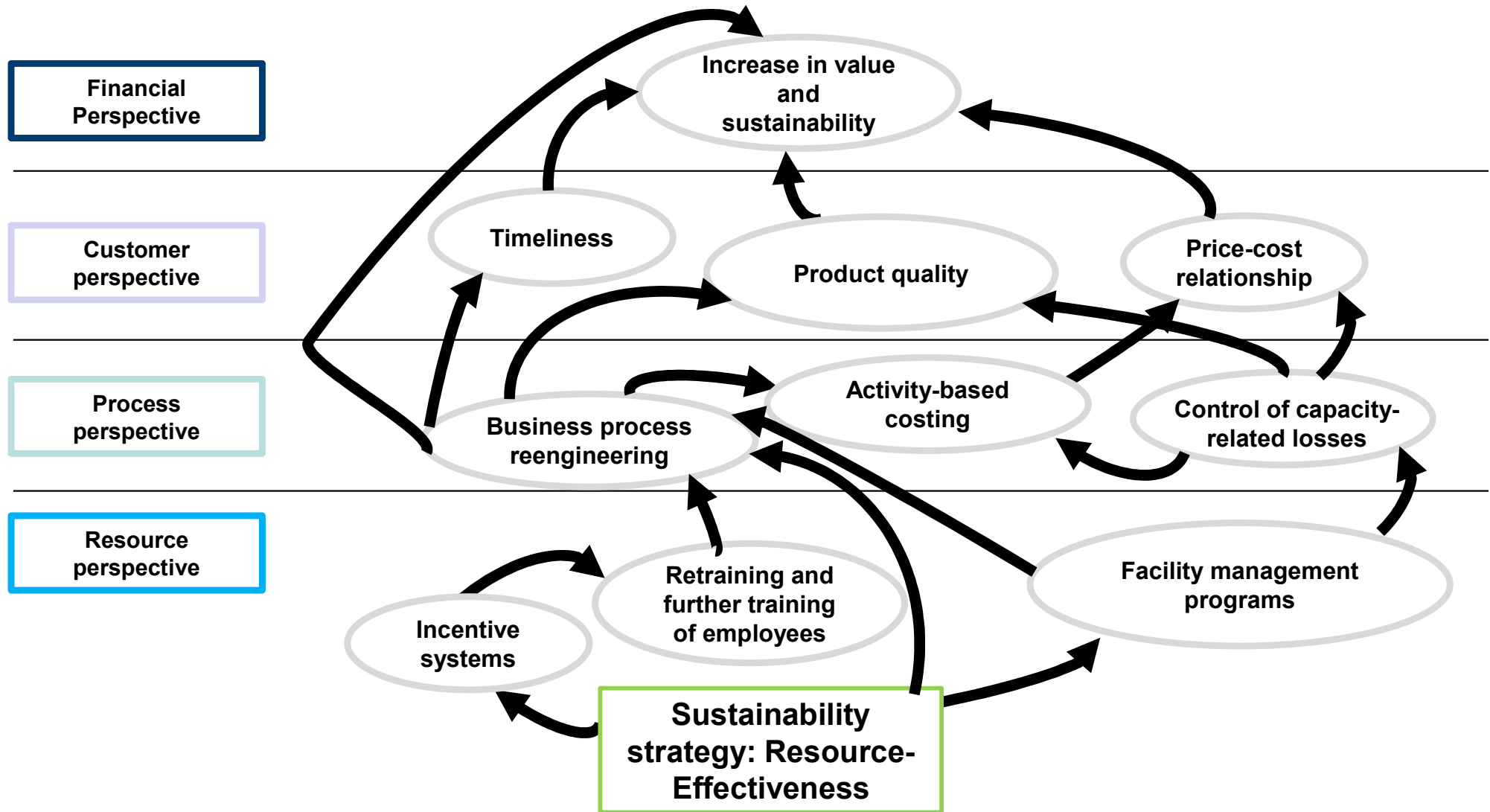
Scoring Model for measuring the qualitative Sustainability Performance

| Line | 01 | | 02 | 03 | 04 | | 05 | | 06 | | | | | | |
|------|----------------------------------|--|------------|----------------|----------------|-------------------------|----------------|-------------------------|--|---|---|---|---|---|--|
| | Evaluation criteria Sub-goals | | Evaluation | Minimum points | Machine I | | Machine II | | Profile of the Scoring-values and Appendix | | | | | | |
| | | | | | Scoring-values | weighted Scoring-values | Scoring-values | weighted Scoring-values | 1 | 2 | 3 | 4 | 5 | 6 | |
| 1 | Degree of automation | | 6% | 2 | 6>2 | 0,36 | 3>2 | 0,18 | | | | | | | |
| 2 | Ergonomics | | 11% | 3 | 5>3 | 0,55 | 4>3 | 0,44 | | | | | | | |
| 3 | Plant availability | | 11% | 4 | 4=4 | 0,44 | 6>4 | 0,66 | | | | | | | |
| 4 | Environmental friendliness | | 7% | 3 | 4>3 | 0,28 | 4>3 | 0,28 | | | | | | | |
| 5 | Resource efficiency | | 35% | | | 1,63 | | 1,56 | | | | | | | |
| 6 | Production reliability | | 10% | 3 | 5>3 | 0,50 | 4>3 | 0,40 | | | | | | | |
| 7 | Pollution | | 14% | 5 | 6>5 | 0,84 | 5=5 | 0,70 | | | | | | | |
| 8 | Quality audit | | 6% | 3 | 3=3 | 0,18 | 3=3 | 0,18 | | | | | | | |
| 9 | Sustainable production | | 30% | | | 1,52 | | 1,28 | | | | | | | |
| 10 | CO ₂ -Emissions | | 6% | 2 | 5>2 | 0,30 | 2=2 | 0,12 | | | | | | | |
| 11 | Share of electric engines | | 6% | 3 | 4>3 | 0,24 | 4>3 | 0,24 | | | | | | | |
| 12 | Throughput time | | 3% | 2 | 2=2 | 0,06 | 4>2 | 0,12 | | | | | | | |
| 13 | Sustainable Logistic Concept | | 15% | | | 0,60 | | 0,48 | | | | | | | |
| 14 | Employee satisfaction | | 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 | HR-Management | | 20% | | | 0,80 | | 0,72 | | | | | | | |
| 18 | Total Score | | 100% | | | 4,55 | | 4,04 | | | | | | | |

Sustainability-Balanced Scorecard for connecting qualitative and quantitative performance



Cause-effect relationships for communicating and implementing a sustainability strategy



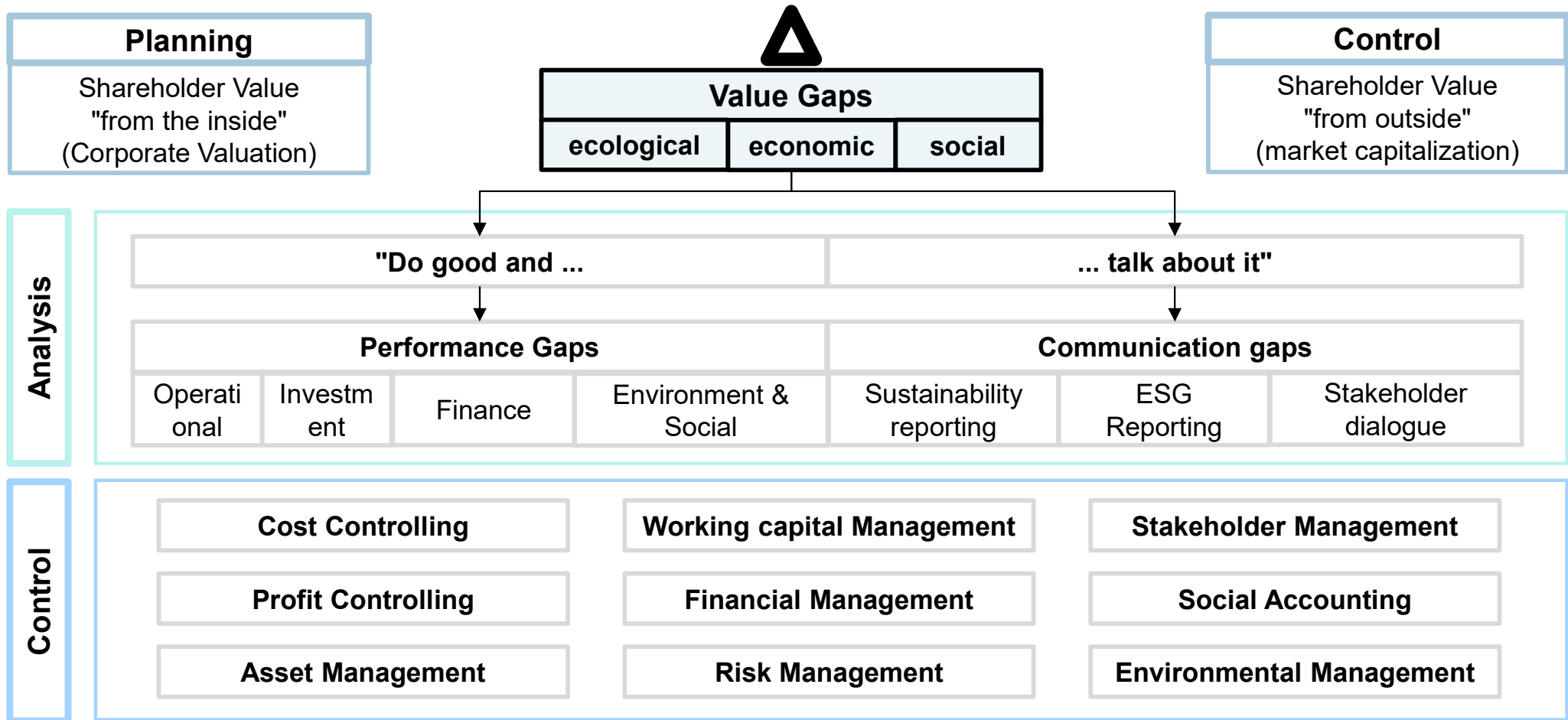
Structure

1. Approaches to Sustainability Management

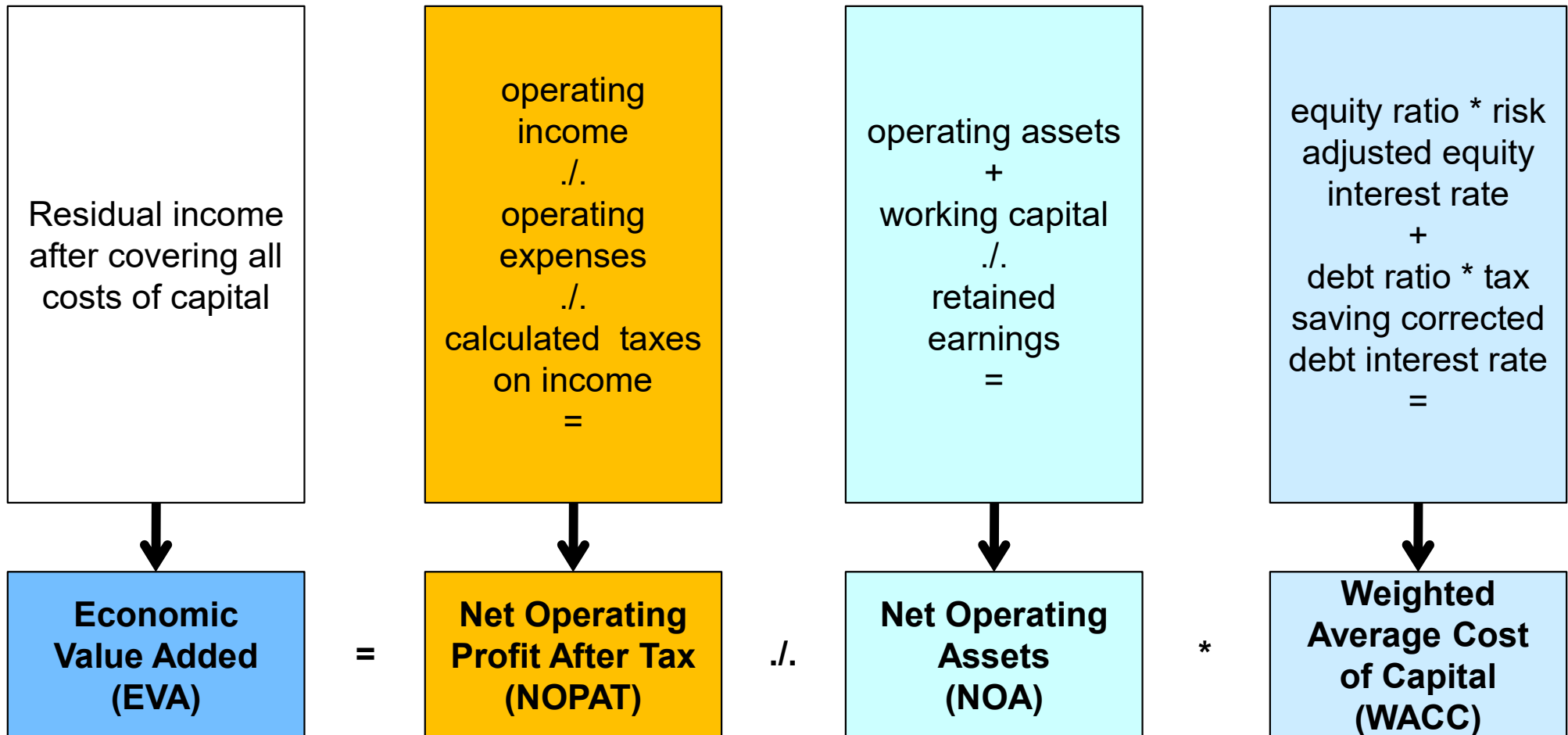
2. Integration of social and environmental aspects into economic value driver systems

3. Insight into applied research projects

Control-Cycle-based and value-oriented Sustainability Management

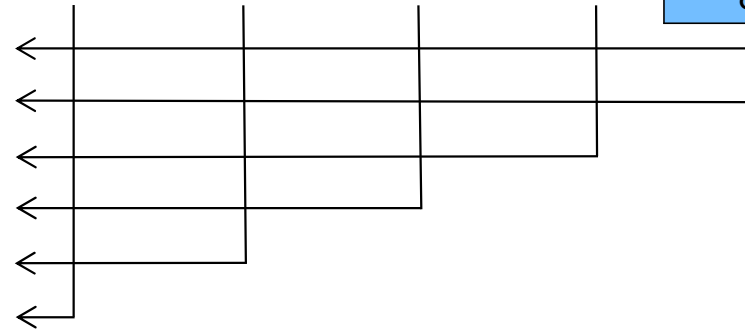


Economic Value Added (EVA)[©] Calculation

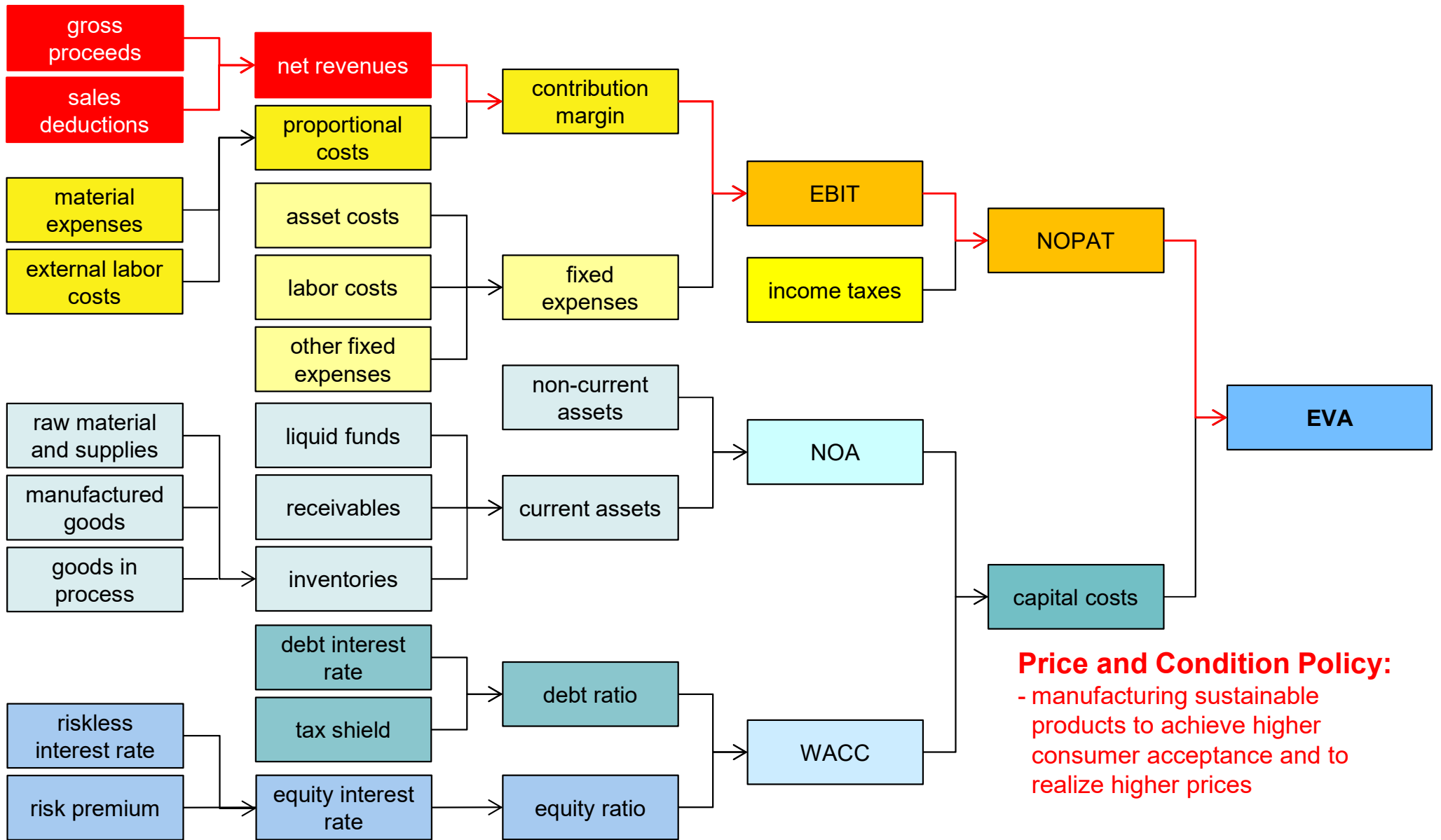


EVA[®]-based Value Driver System and Calculation of Shareholder Value

| | period of time (t) | start (t ₀) | t ₁ | t ₂ | t ₃ | t ₄ | t ₅ | t ₆ | t ₇ |
|----|--|-------------------------|----------------|--------------------|--------------------|--------------------|--------------------|----------------|----------------|
| 01 | revenues | | 5.000,0 | 5.200,0 | 5.400,0 | 5.600,0 | 5.800,0 | 6.000,0 | |
| 02 | EBIT | | 460,0 | 480,0 | 500,0 | 520,0 | 540,0 | 580,0 | |
| 03 | calculated taxes on income (40 %) | | 184,0 | 192,0 | 200,0 | 208,0 | 216,0 | 232,0 | |
| 04 | NOPAT | | 276,0 | 288,0 | 300,0 | 312,0 | 324,0 | 348,0 | |
| 05 | NOA | 2.000,0 | 2.100,0 | 2.200,0 | 2.300,0 | 2.400,0 | 2.500,0 | 2.600,0 | |
| 06 | WACC (r _{WACC} = 10 %) | | 200,0 | 210,0 | 220,0 | 230,0 | 240,0 | 260,0 | |
| 07 | Economic Value Added | | 76,0 | 78,0 | 80,0 | 82,0 | 84,0 | 88,0 | |
| 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 t ₀ | 301,8 | | | | | | | |
| 17 | Market Value Added (MVA) | 848,2 | | | | | | | |
| 18 | Net Operating Assets (NOA) | 2.000,0 | | | | | | | |
| 19 | company value | 2.848,2 | | | | | | | |
| 20 | ./. market value of debts (q _F = 50%) | -1.000,0 | | | | | | | |
| 21 | Shareholder Value (SHV) | 1.848,2 | | | | | | | |



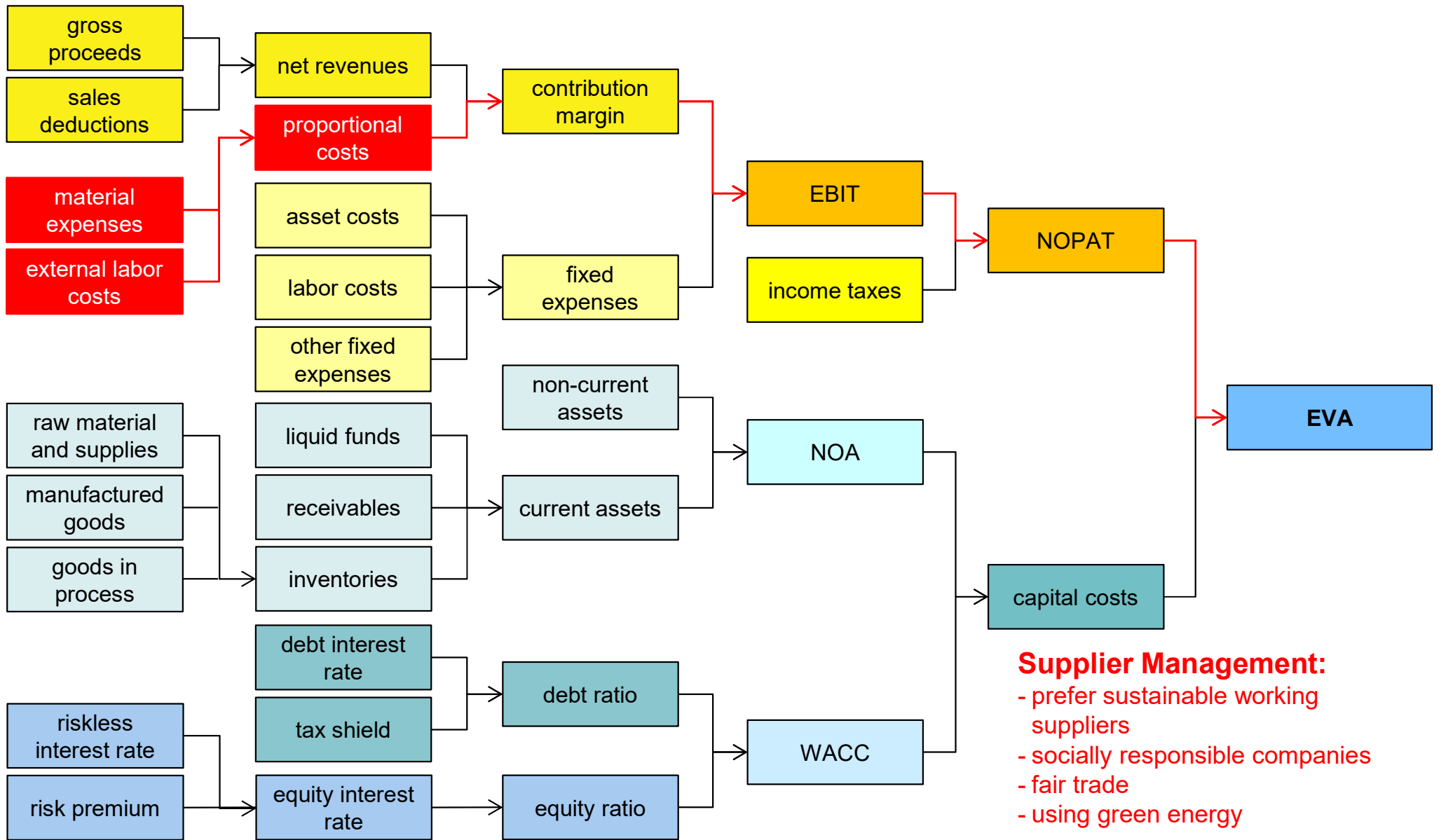
Sustainable Revenue Management: Cause and Effect-Relationships



Sustainable Revenue Management: Theses

- Sustainable revenue controlling focuses on the realization of higher prices through better consumer acceptance
- Better consumer acceptance can be achieved by producing sustainable products
- Due to social and ecological awareness those products have to meet social and ecological needs
- Therefore an increased consumer acceptance leads to higher consumer benefits and hence a higher price level
- The social and ecological benefits of the products have to be communicated to the markets

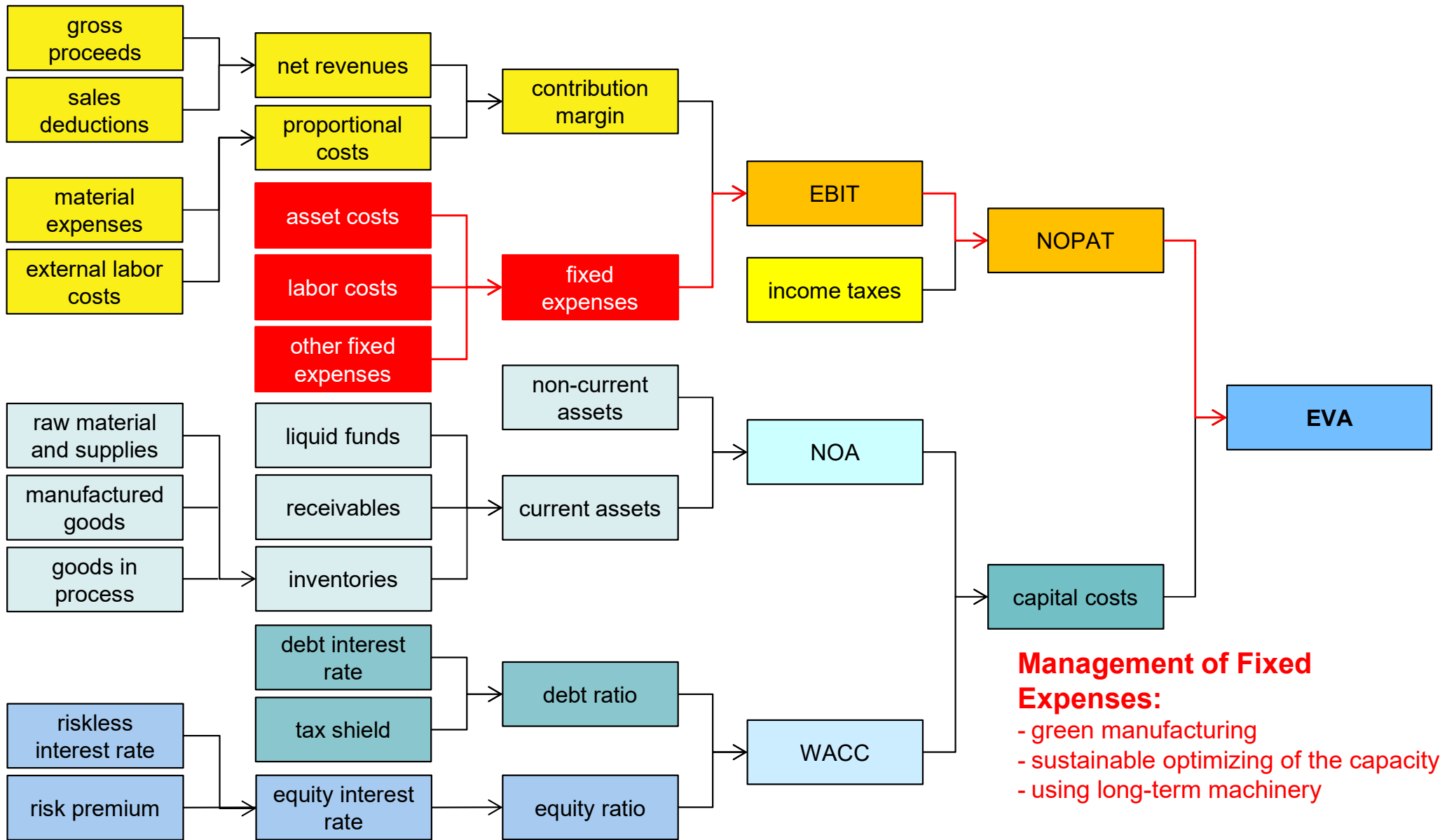
Sustainable Management of Variable Costs: Cause and Effect-Relationships



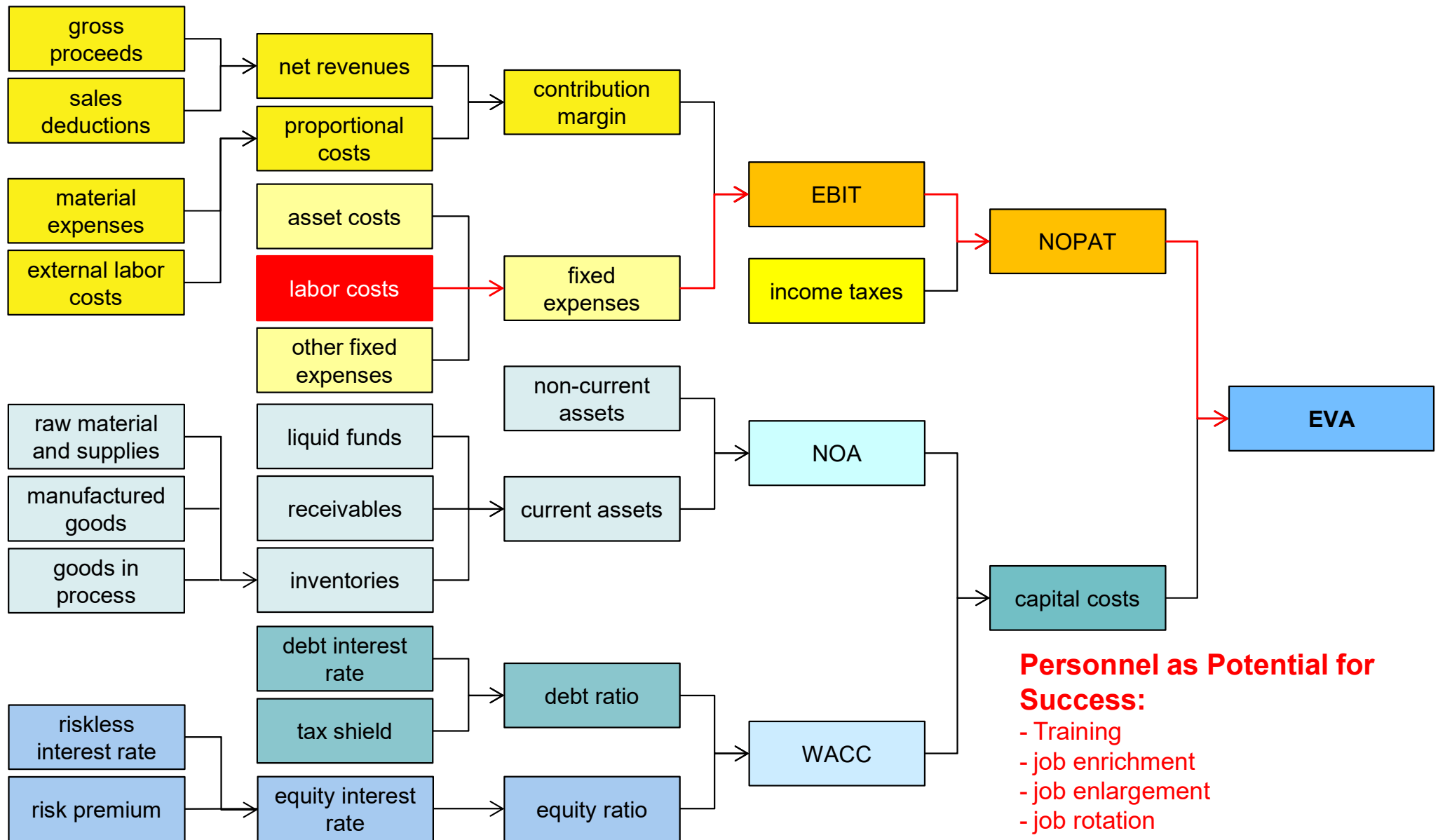
Sustainable Management of Variable Costs: Theses

- In a socially and ecologically oriented society proportional costs can be reduced by a sustainable resource consumption approach
- This means to apply for subsidies which are granted for using ecological materials
- It can be further implemented by avoiding anti-social and unecological materials as those are often penalized by social and ecological fines

Sustainable Management of Fixed Costs: Cause and Effect-Relationships



Sustainable Management of Fixed Costs: Cause and Effect-Relationships



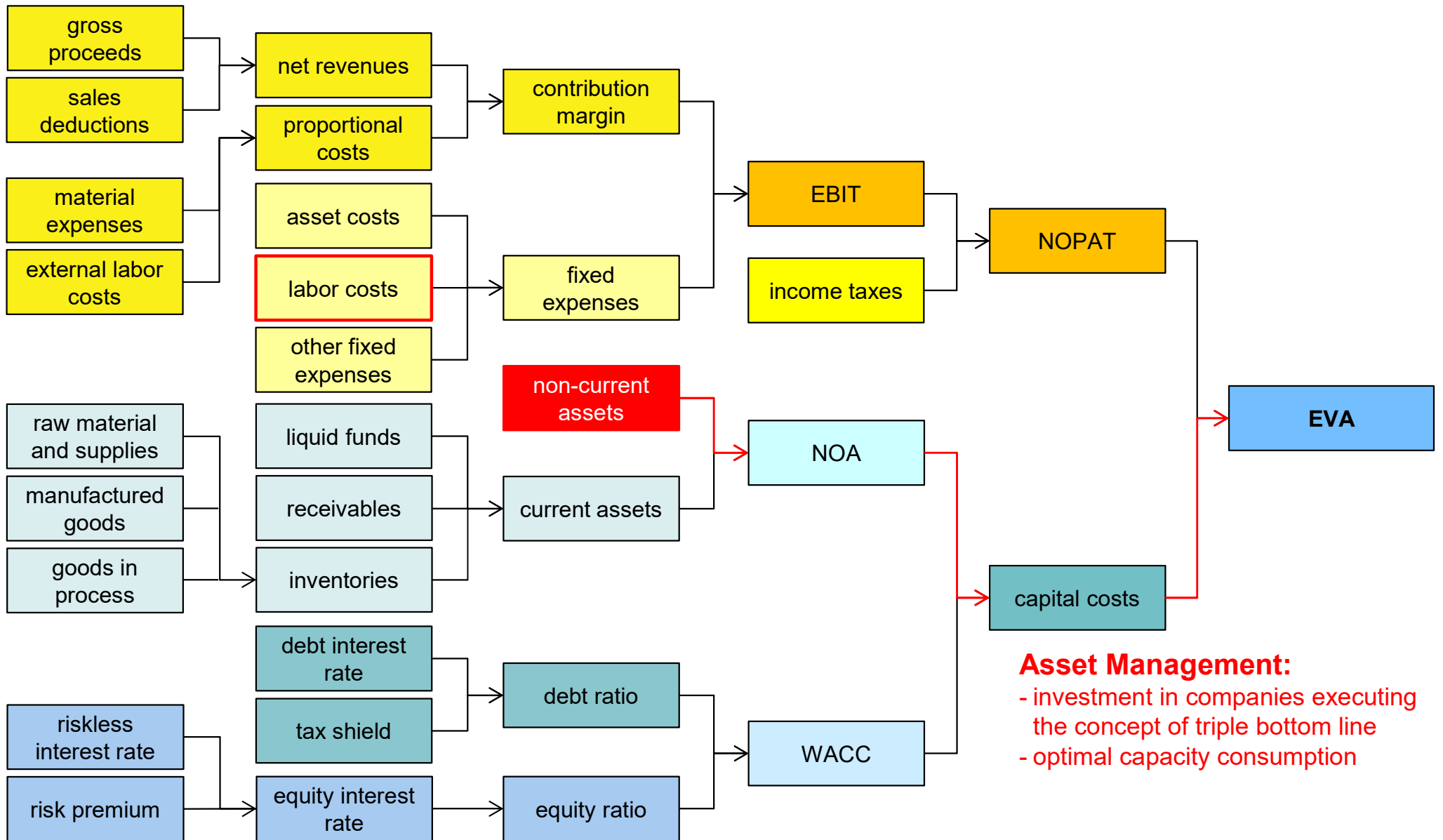
Personnel as Potential for Success:

- Training
- job enrichment
- job enlargement
- job rotation

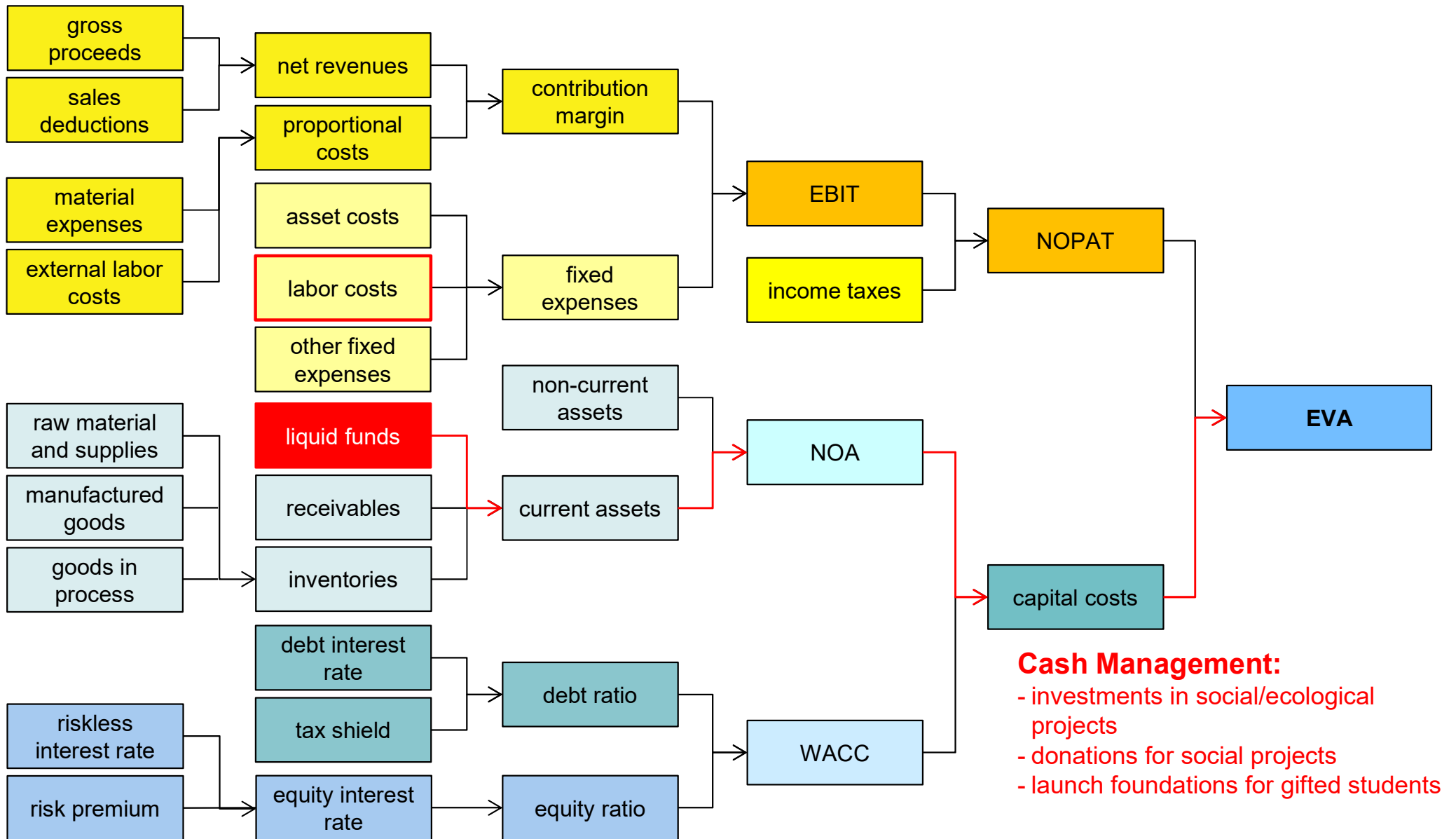
Sustainable Management of Fixed Costs: Theses

- A sustainable controlling of fixed expenses can be achieved by using social and ecological fixed resources
- Those resources are often encouraged by the state authorities (subsidies)
- Especially ecological resources usually have a longer life cycle and therefore lower periodical costs

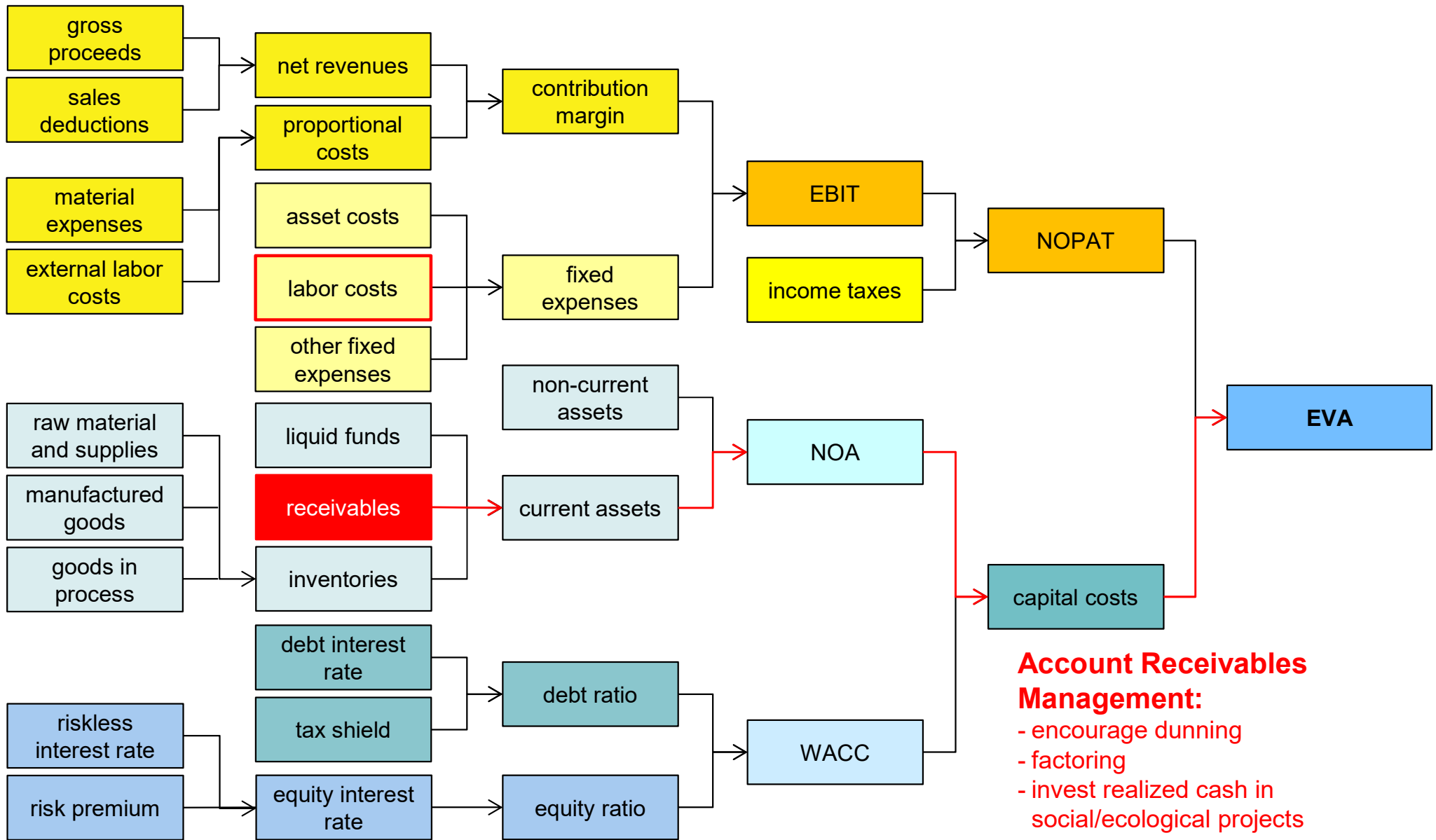
Sustainable Asset Management: Cause and Effect-Relationships



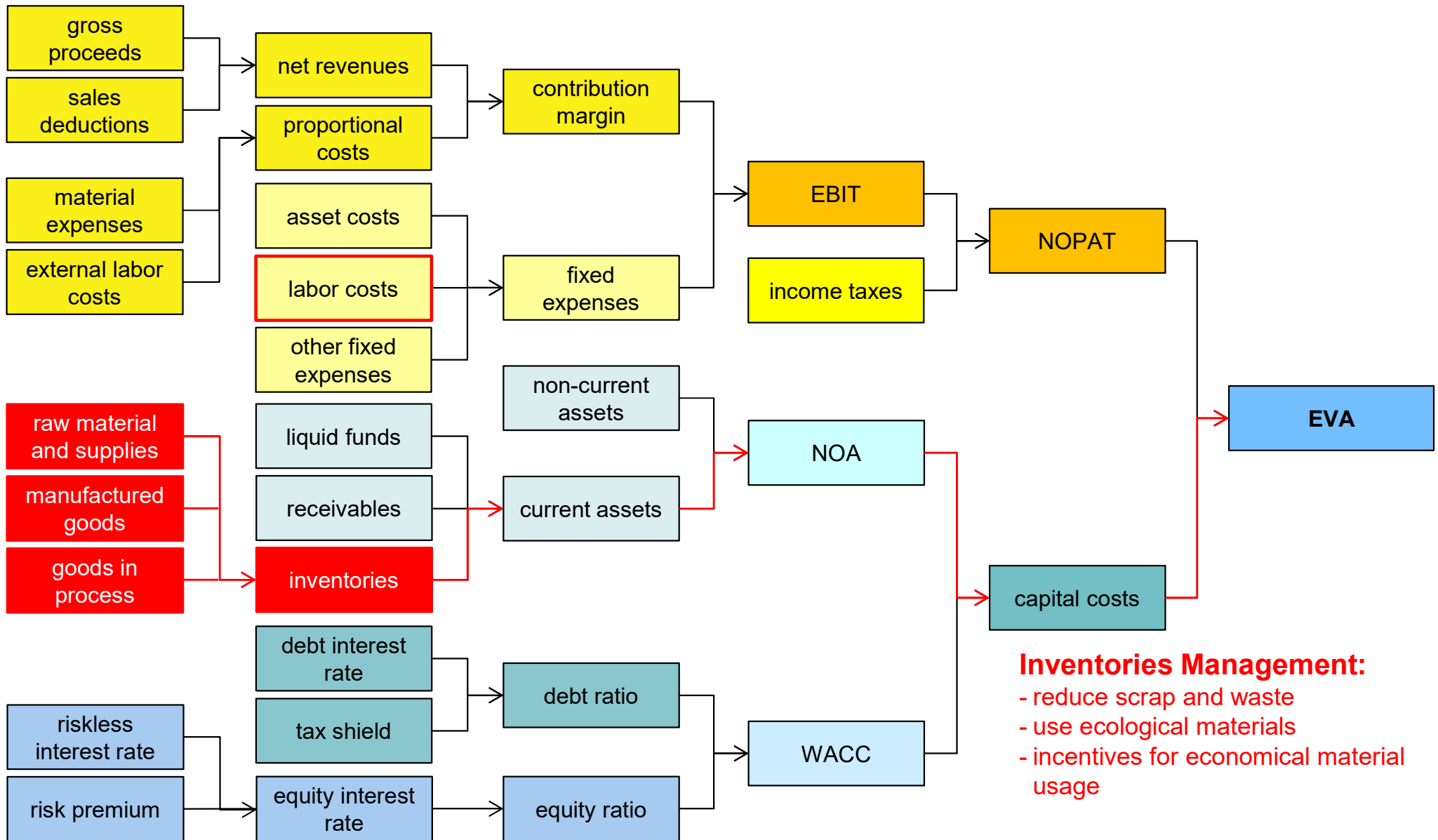
Sustainable Asset Management: Cause and Effect-Relationships



Sustainable Asset Management: Cause and Effect-Relationships



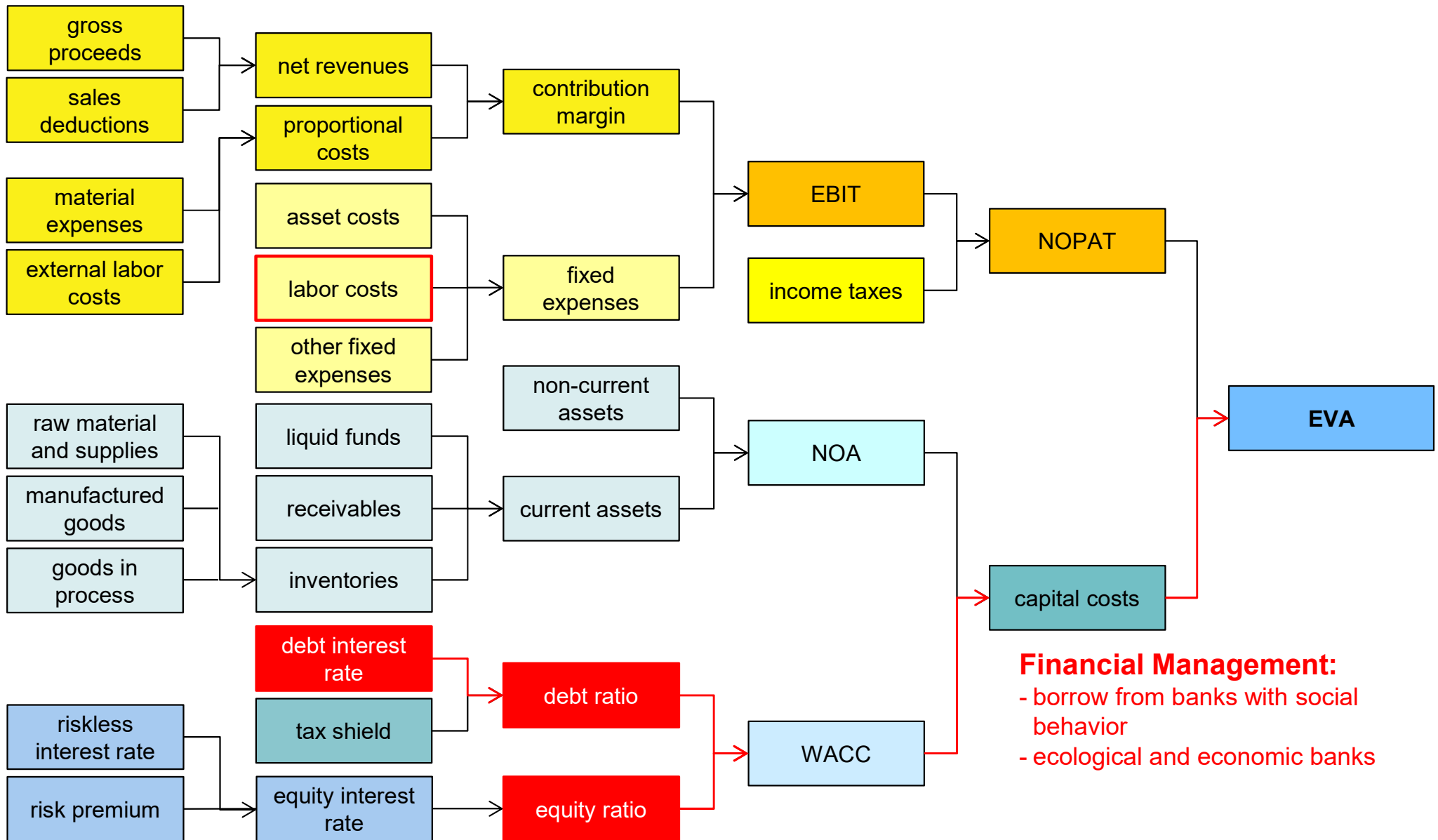
Sustainable Asset Management: Cause and Effect-Relationships



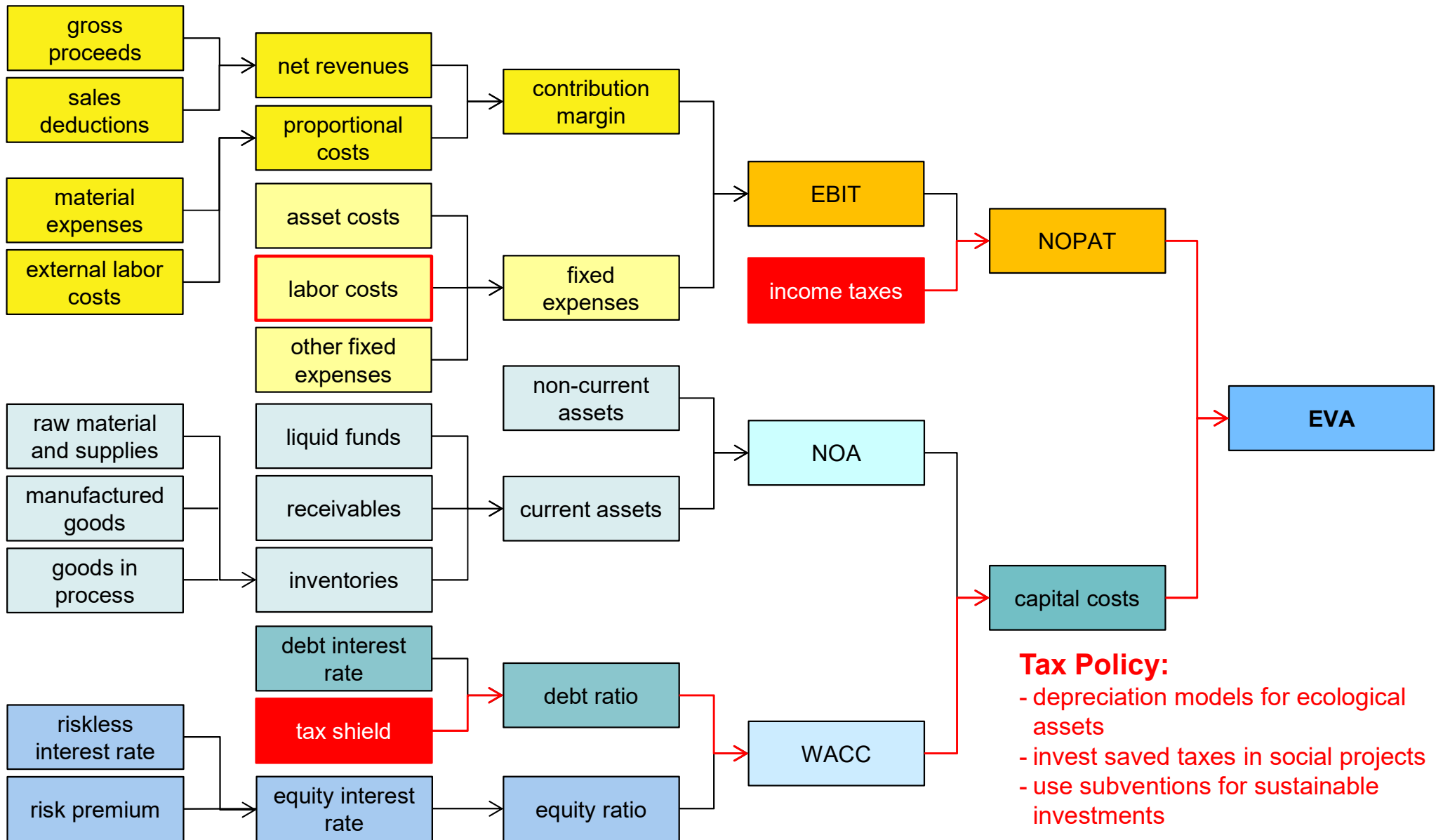
Sustainable Asset Management: Theses

- The sustainable controlling of asset management can be divided into the controlling of non-current assets and current assets
- Maximal consumption of non-current assets is crucial
- Current assets can be decreased by reducing scrap and waste which in turn leads to ecological benefits

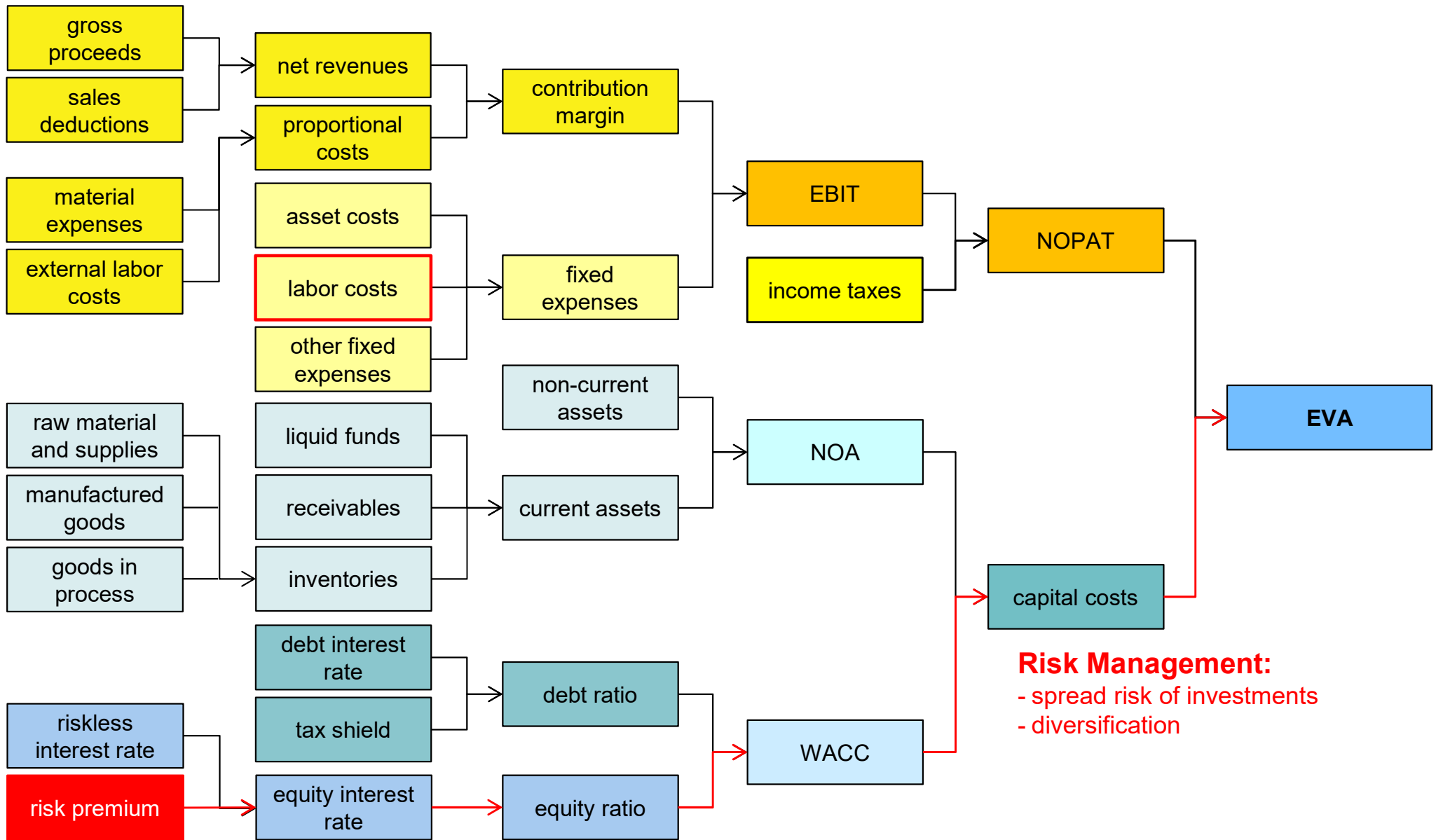
Sustainable Financial Management: Cause and Effect-Relationships



Sustainable Financial Management: Cause and Effect-Relationships



Sustainable Financial Management: Cause and Effect-Relationships



Sustainable Financial Management: Theses

- A sustainable financial management can be implemented by borrowing from banks with ecological/social initiatives (e.g. „banking on green“)
- Income taxes may be minimized by using social and ecological tax saving programs
- Risk management may serve financial management by a diversification of ecological products

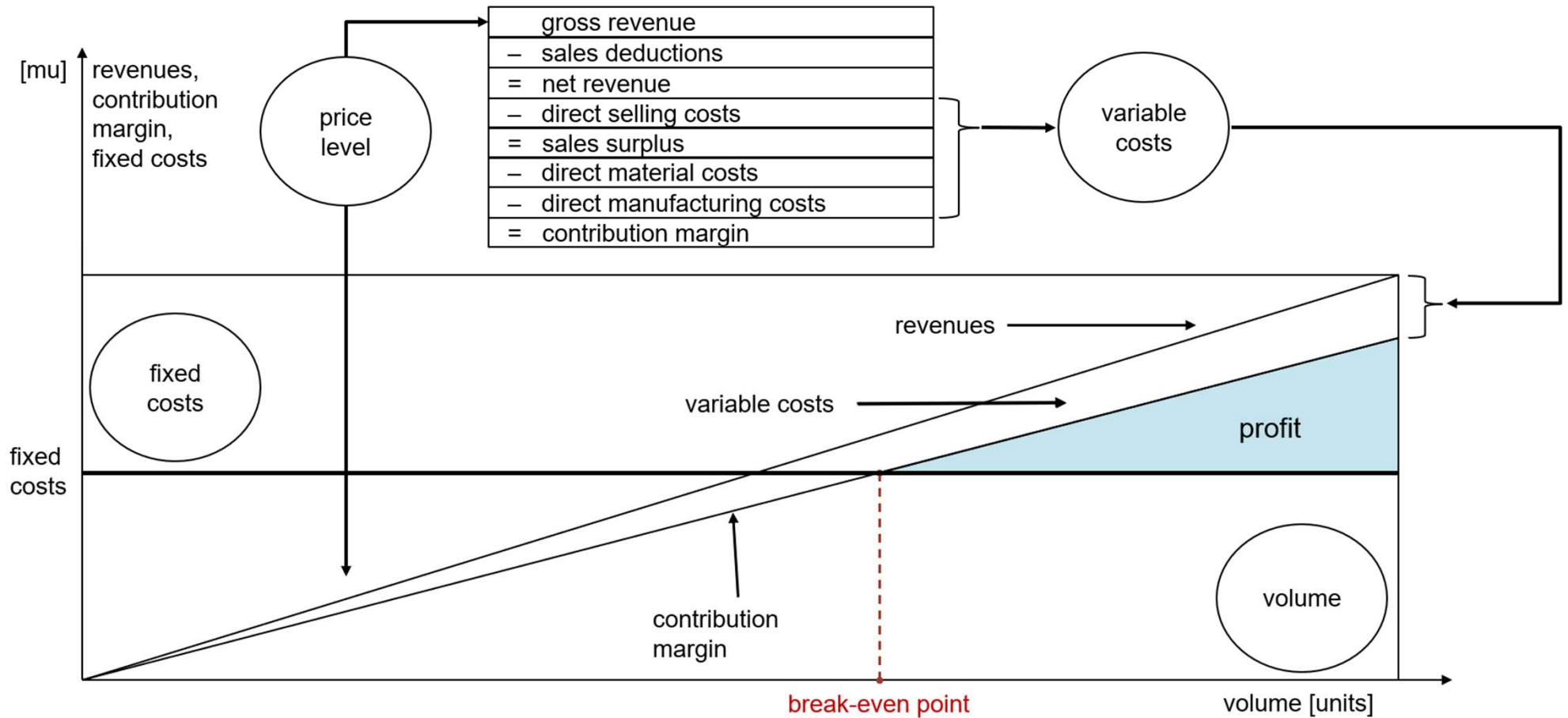
Generation of Profit

$$\begin{aligned}
 \text{profit} &= \text{revenues} - \text{costs} \\
 &= \text{price} \times \text{volume} - \text{proportional costs per unit} \times \text{volume} - \text{capacity costs} \\
 &= (\text{price} - \text{sales deductions} - \text{proportional costs per unit}) \times \text{volume} - \text{capacity costs}
 \end{aligned}$$

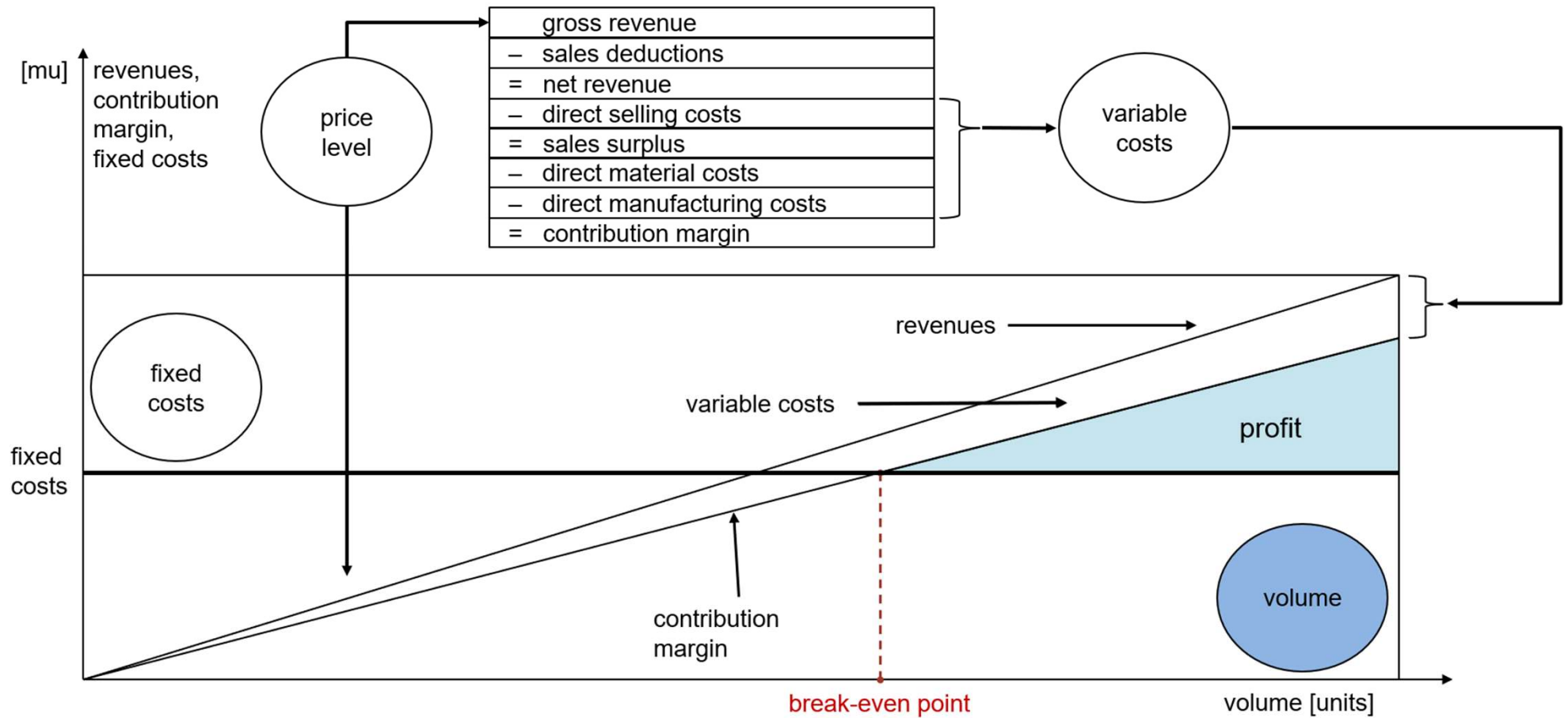
income determinants of a single-product company

$$\begin{aligned}
 \text{profit} &= (\text{price} - \text{sales deductions} - \text{proportional costs per unit}) \times \text{volume} - \text{capacity costs} \\
 &= \text{contribution margin per unit} \times \text{volume} - \text{capacity costs} \\
 &= \text{cumulated contribution margin} - \text{capacity costs}
 \end{aligned}$$

Important determinants for single-product companies



Important determinants for single-product companies

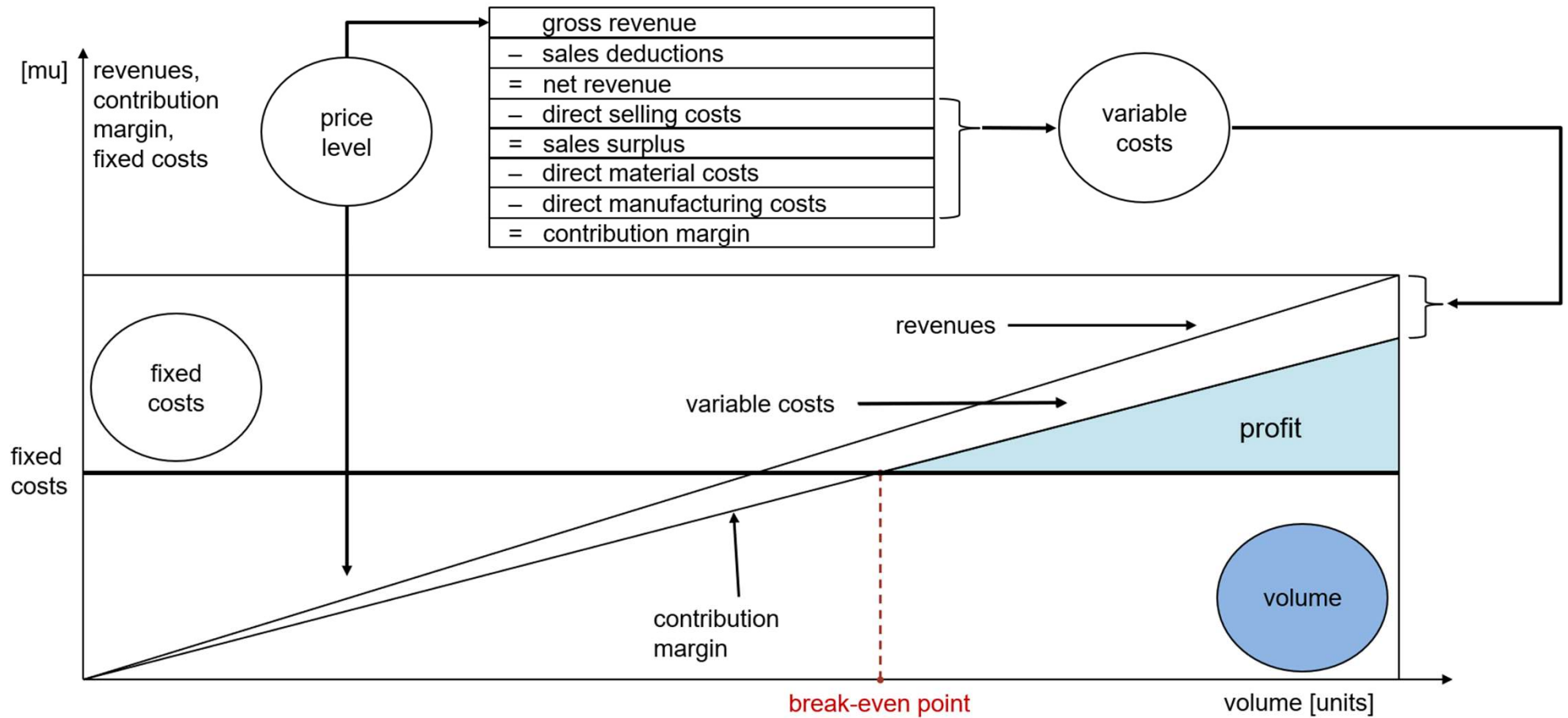


Maximal capacity consumption by resource coordination (volume)

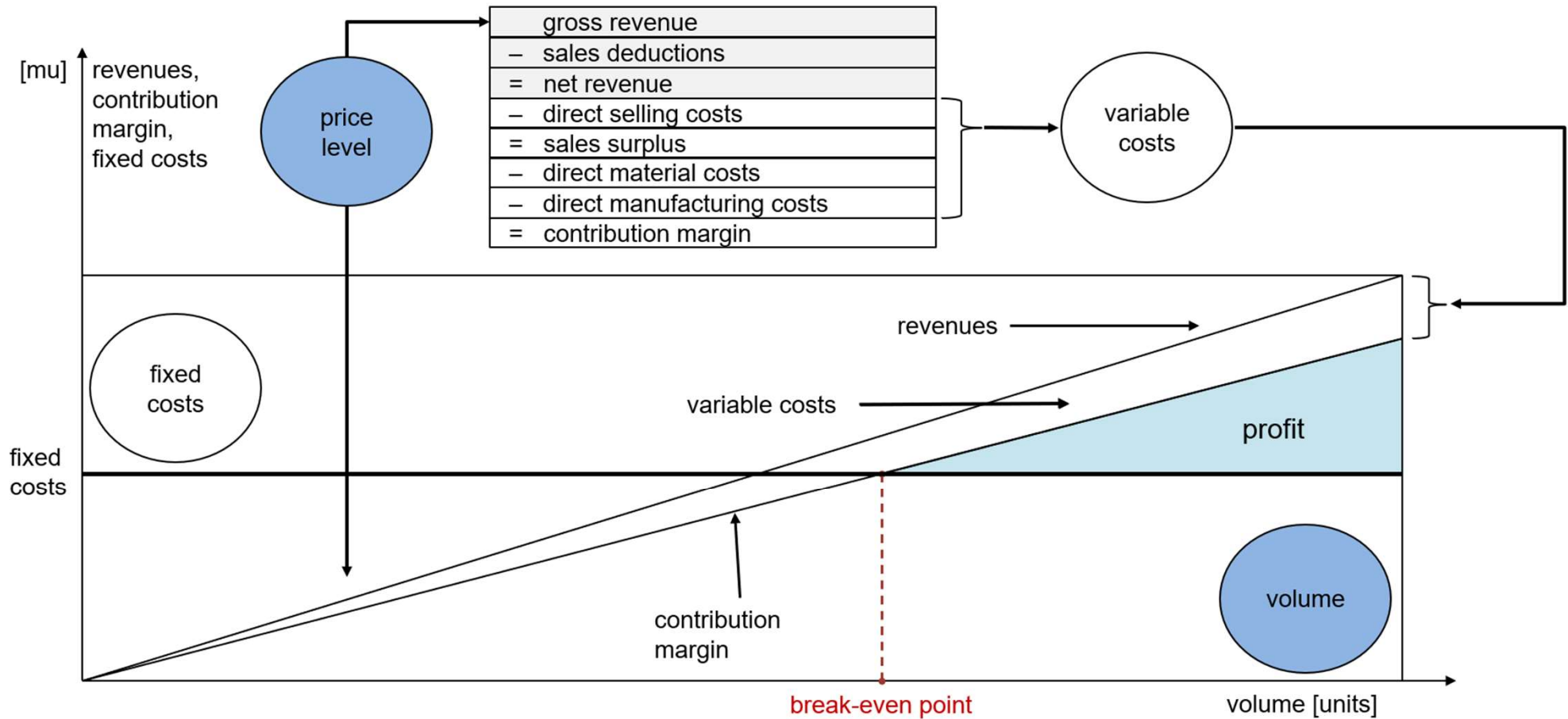


Source: <https://www.produktion.de/wirtschaft/wie-vw-tausende-kuka-roboter-fuer-die-id-4-fertigung-nutzt-119.html>

Important determinants for single-product companies



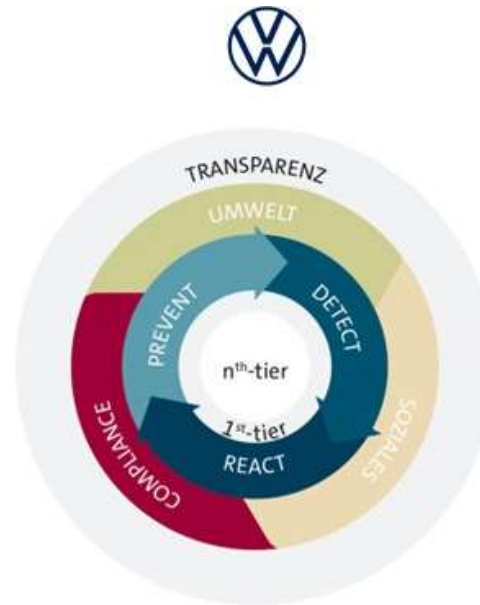
Important determinants for single-product companies



Raising the price level by increasing quality and using sustainable materials (price level)



Quelle: <https://www.wirtschaftswissen.de/einkauf-produktion-und-logistik/produktionsplanung/qualitaetsmanagement-produktion/7-strategien-zur-qualitaetssteigernden-mitarbeitermotivation/>.



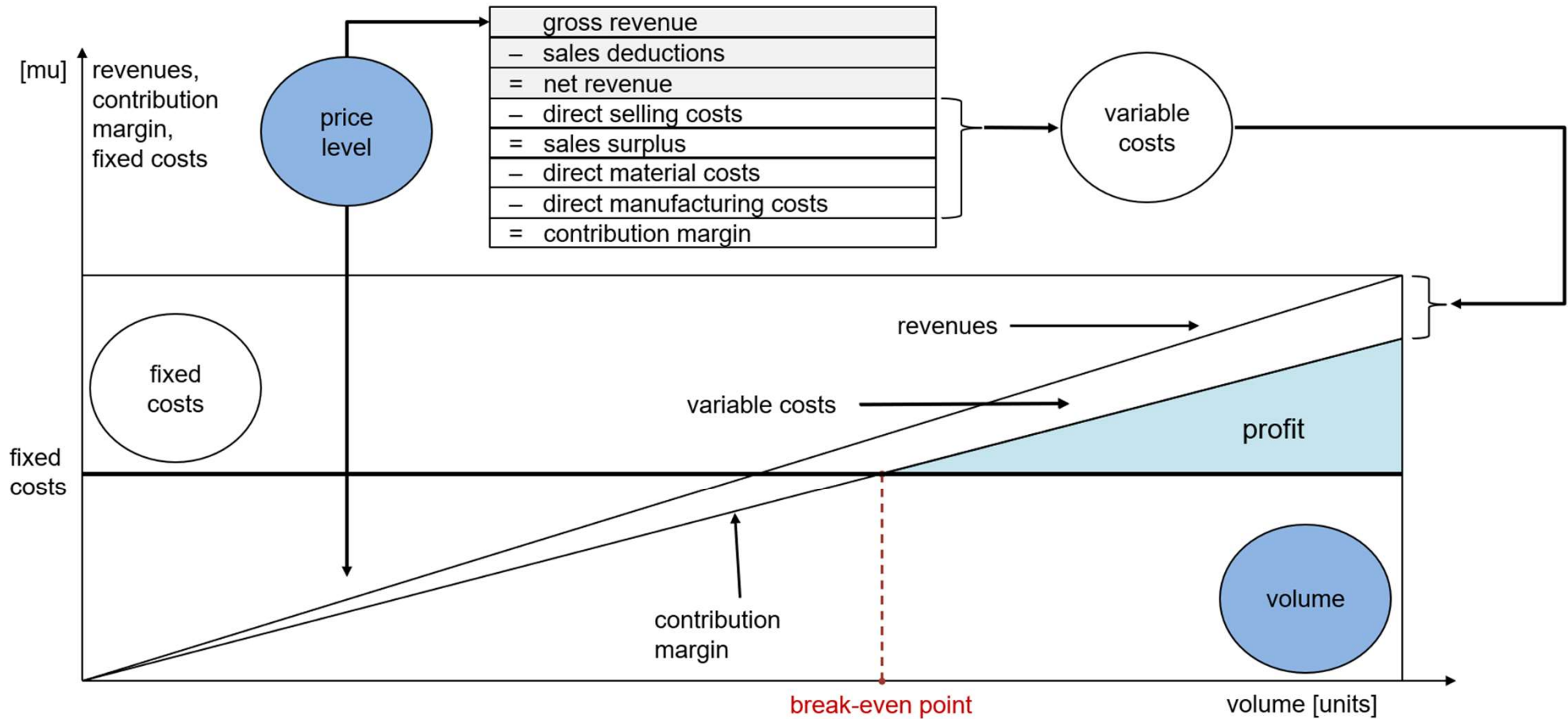
Quelle: <https://www.volkswagenag.com/de/sustainability/supply-chain/sustainability-in-the-supply-chain.html>.



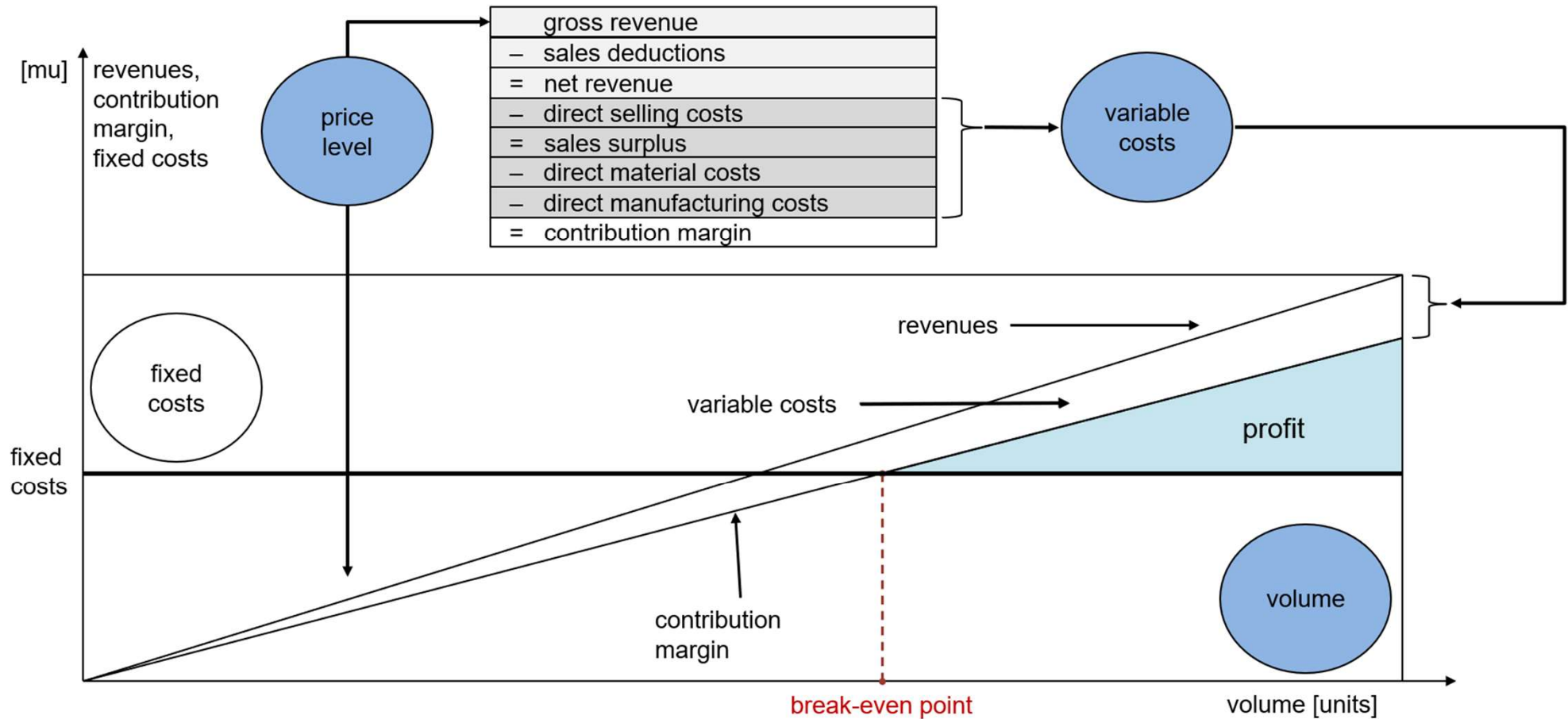
Quelle: <https://www.press.bmwgroup.com/austria/article/detail/T0365376DE/fuer-verantwortungsvolle-und-nachhaltige-lederbeschaffung:-bmw-group-wird-mitglied-der-leather-working-group?language=de>.

Quelle: <https://www.volkswagenag.com/de/sustainability/supply-chain/sustainability-in-the-supply-chain.html>.

Important determinants for single-product companies



Important determinants for single-product companies



Cost cutting through material savings: recycling (variable costs)



Quelle: <https://www.volkswagen-newsroom.com/de/publikationen/weitere/batterie-recycling-alles-zur-pilotanlage-in-salzgitter-605>.

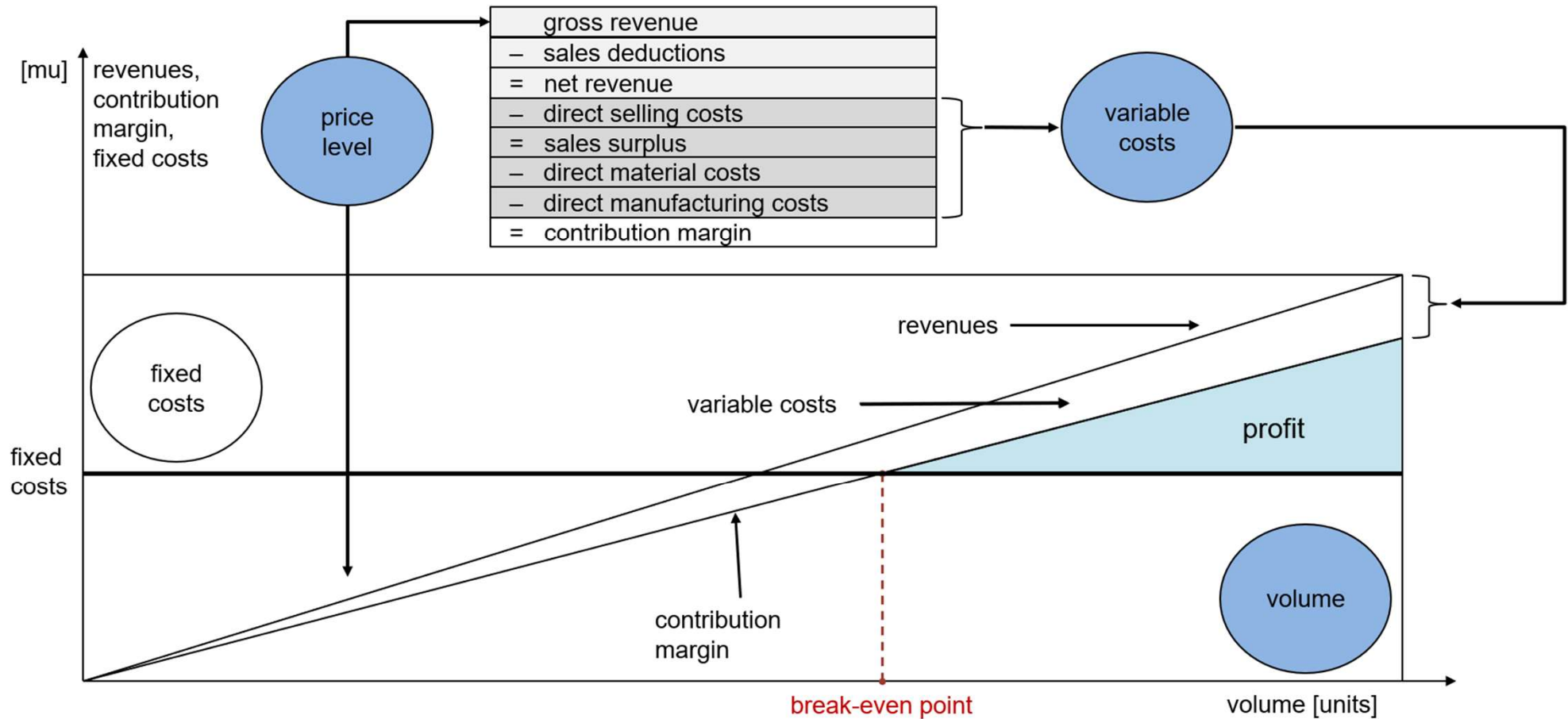


Quelle: <https://www.volkswagen-newsroom.com/de/pressemitteilungen/aus-alt-mach-neu-volkswagen-group-components-startet-batterie-recycling-6789>.

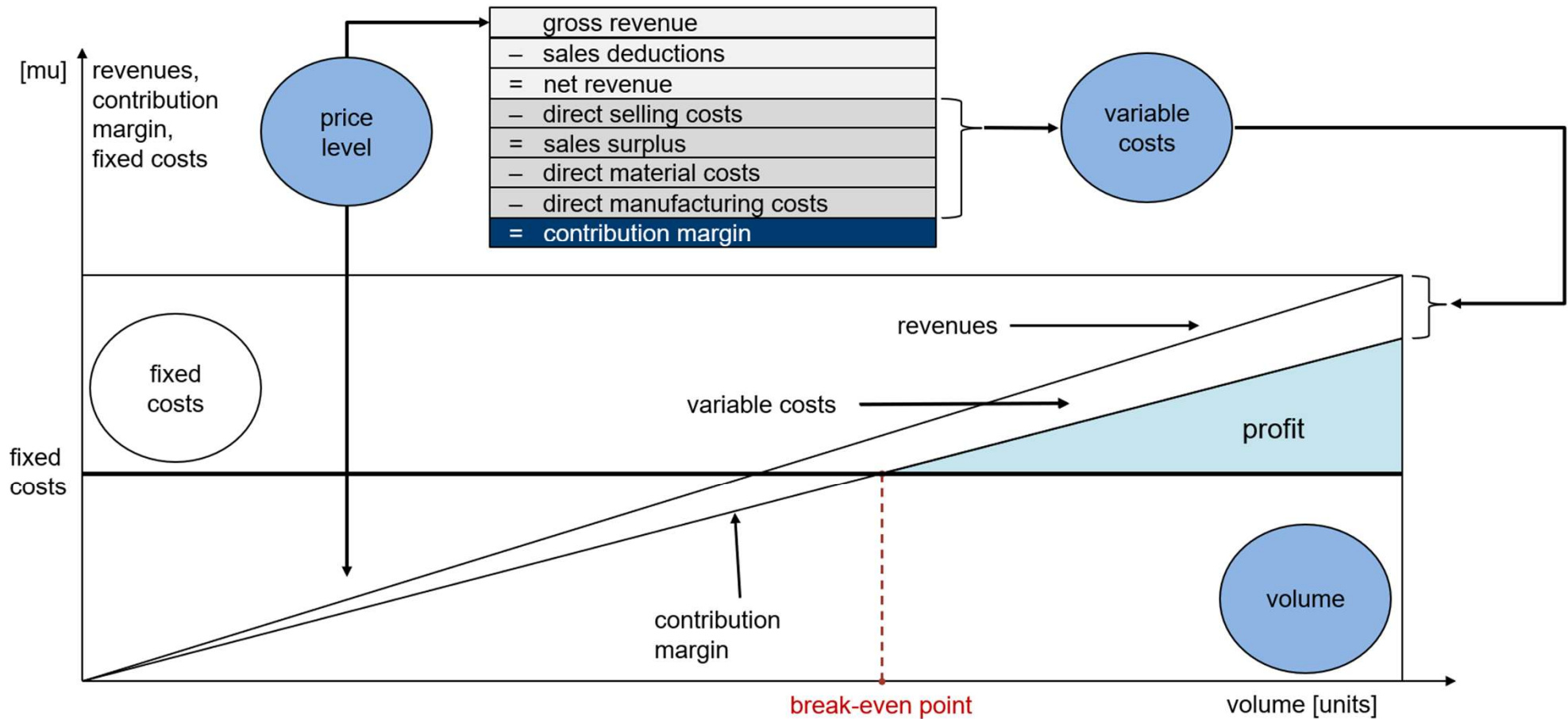
„Langfristig wirkt sich die fachgerechte Entsorgung der Batterie und die Wiederaufbereitung ihrer wertvollen Bestandteile ökologisch und wirtschaftlich nachhaltig aus. Sinken die Kosten, profitiert der Kunde.“

(Volkswagen Group (2021): Aus alt mach neu – Batterierecycling in Salzgitter, 29.01.2021, Wolfsburg/Salzgitter, online: <https://www.volkswagen-newsroom.com/de/stories/aus-alt-mach-neu-batterierecycling-in-salzgitter-6782>.)

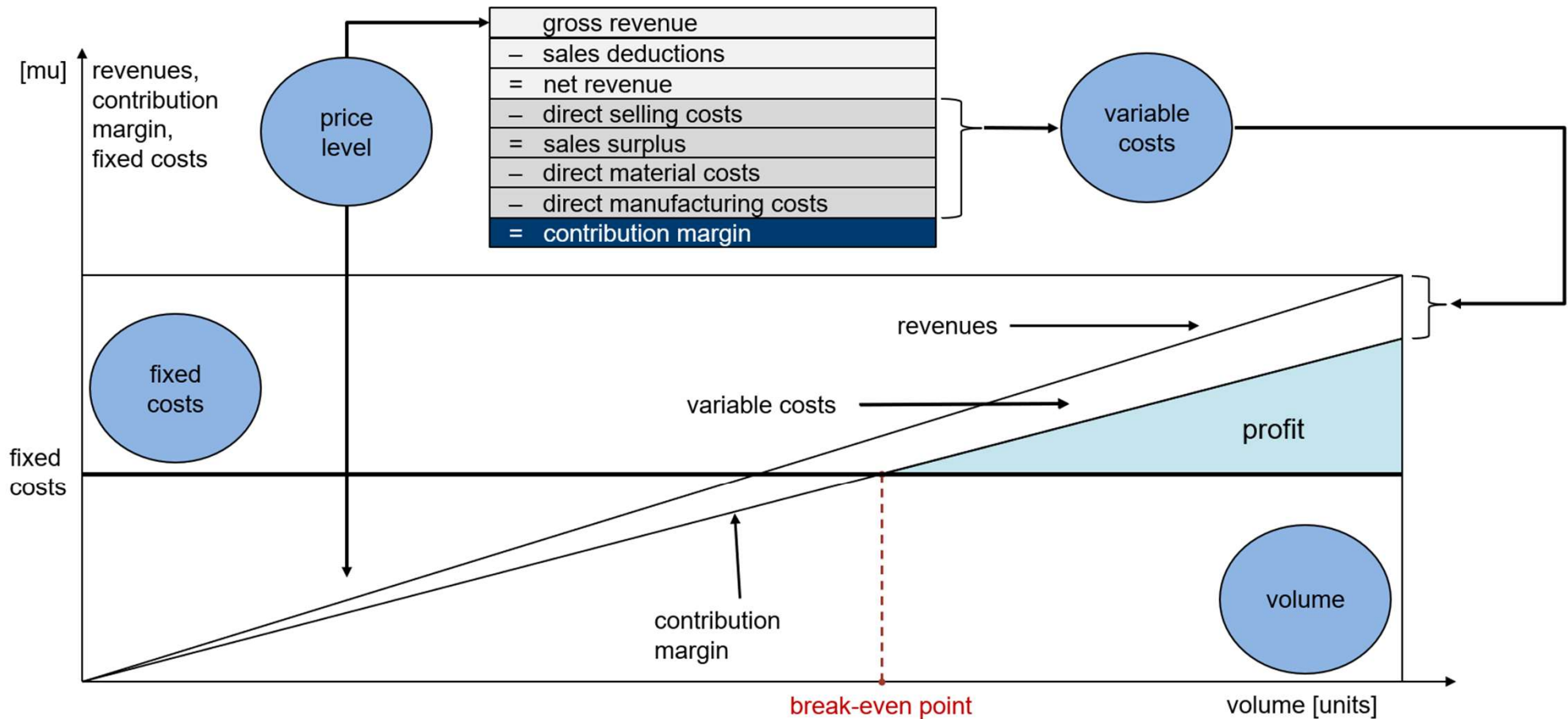
Important determinants for single-product companies



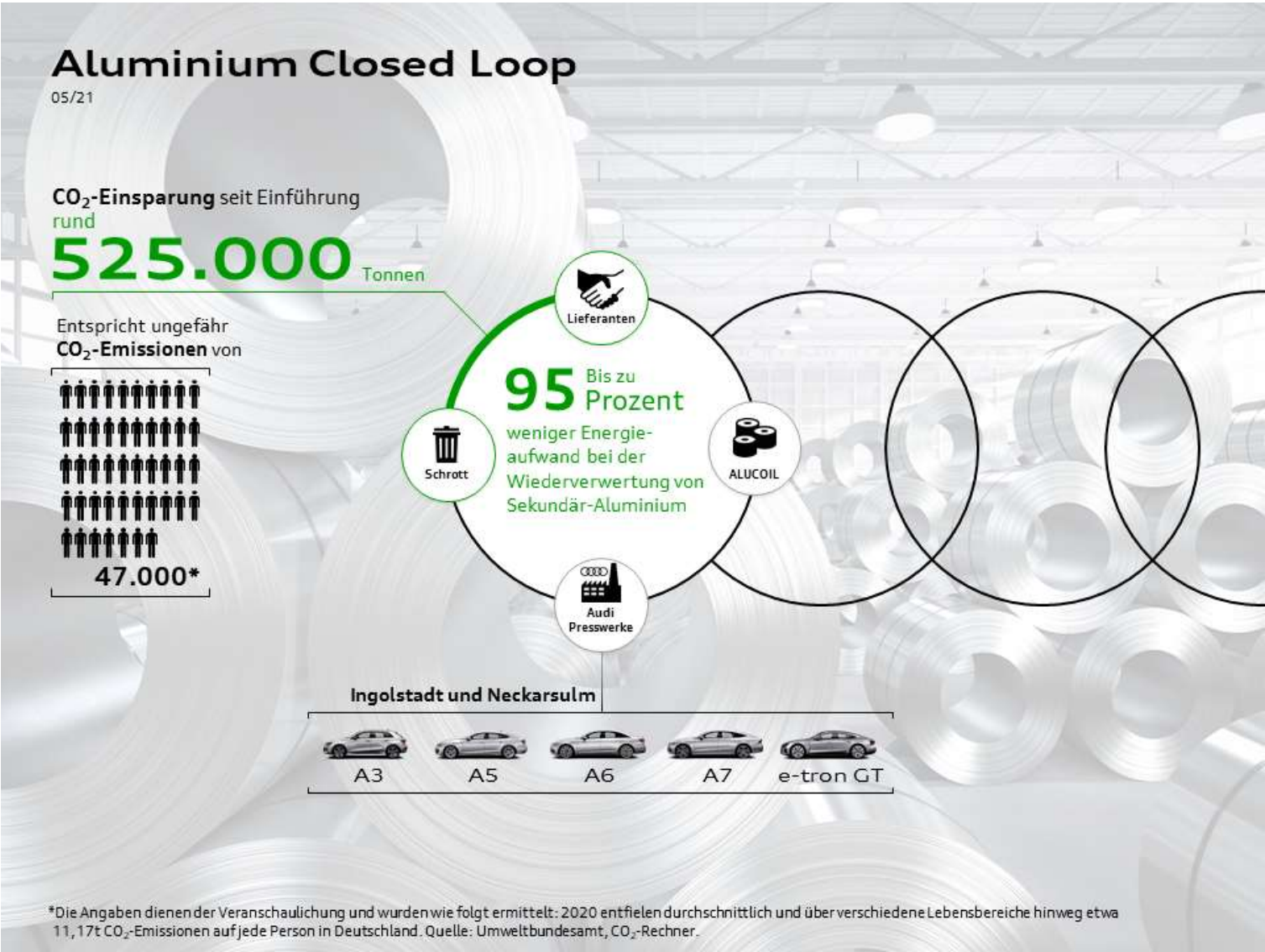
Important determinants for single-product companies



Important determinants for single-product companies

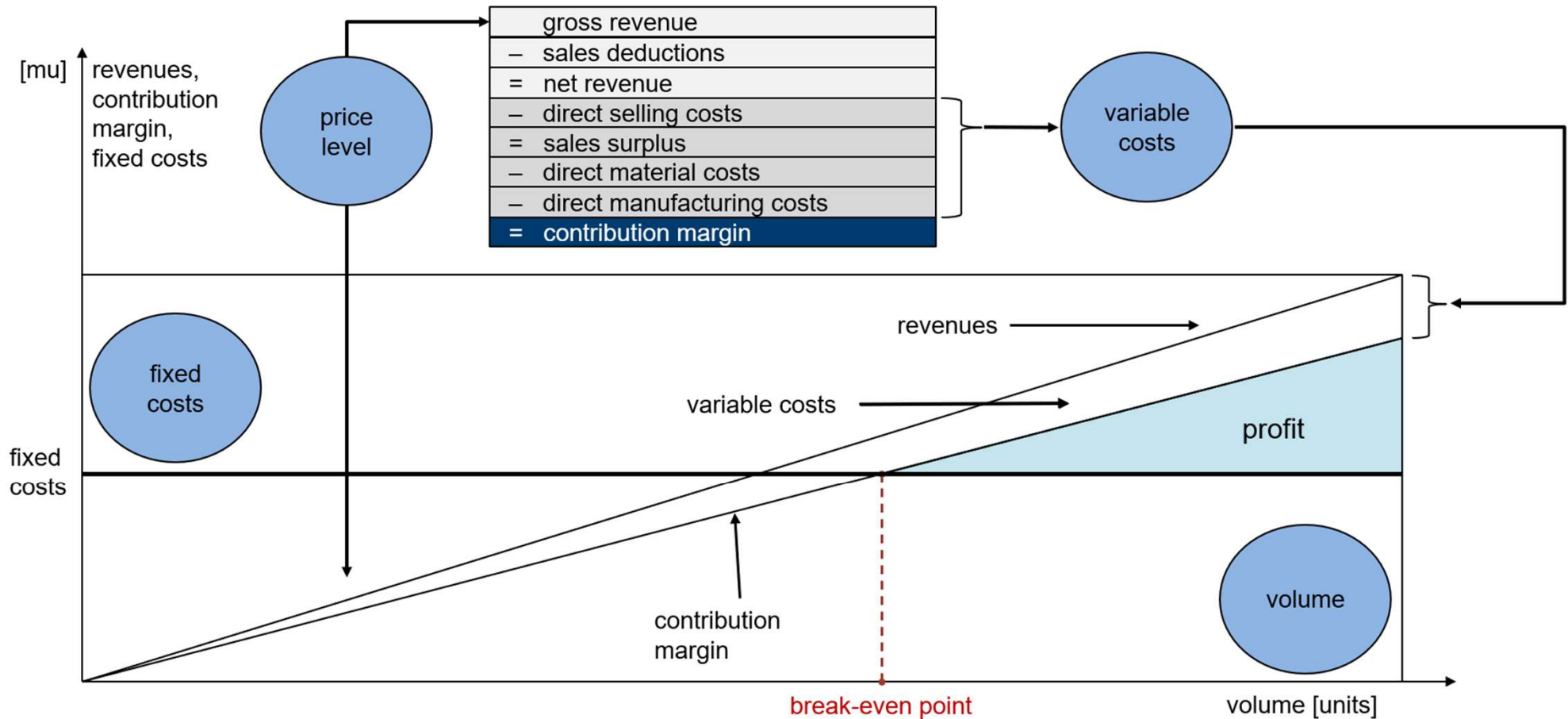


Costs cutting through energy savings (fixed costs)



Source: <https://www.audi-mediacenter.com/de/fotos/detail/aluminium-closed-loop-91506>

Important determinants for single-product companies



Optimal programme by concentration on sustainable market segments (sales mix)

| Total company | | | Total programme | | | | | | Σ | |
|-------------------|---|---------------------------------------|-----------------|----------------|----------------|------------|----------------|----------------|--------|---------|
| Product divisions | | | Division A | | | Division B | | | | |
| Product types | | | A ₁ | A ₂ | A ₃ | Σ | B ₁ | B ₂ | | Σ |
| 1 | | basic turnover | 53.460 | 42.075 | 36.790 | 132.325 | 21.500 | 11.024 | 32.524 | 164.849 |
| 2 | + | surcharges | 0 | 1.815 | 2.054 | 3.869 | 0 | 666 | 666 | 4.535 |
| 3 | = | gross turnover | 53.460 | 43.890 | 38.844 | 136.194 | 21.500 | 11.690 | 33.190 | 169.384 |
| 4 | - | sales deductions | 5.500 | 5.225 | 5.850 | 16.575 | 1.700 | 966 | 2.666 | 19.241 |
| 5 | = | net turnover | 47.960 | 38.665 | 32.994 | 119.619 | 19.800 | 10.724 | 30.524 | 150.143 |
| 6 | | direct selling costs | 5.195 | 3.700 | 2.097 | 10.992 | 1.221 | 355 | 1.576 | 12.568 |
| 7 | | variable sales overheads | 4.425 | 2.873 | 2.505 | 9.803 | 1.046 | 908 | 1.954 | 11.757 |
| 8 | - | variable Distribution costs | 9.620 | 6.573 | 4.602 | 20.795 | 2.267 | 1.263 | 3.530 | 24.325 |
| 9 | = | sales surplus | 38.340 | 32.092 | 28.392 | 98.824 | 17.533 | 9.461 | 26.994 | 125.818 |
| 10 | | direct material costs | 6.240 | 5.835 | 3.585 | 15.660 | 3.115 | 1.680 | 4.795 | 20.455 |
| 11 | | variable manufacturing costs | 8.360 | 5.440 | 4.875 | 18.675 | 3.945 | 2.420 | 6.365 | 25.040 |
| 12 | - | variable production costs | 14.600 | 11.275 | 8.460 | 34.335 | 7.060 | 4.100 | 11.160 | 45.495 |
| 13 | = | contribution margin I product types | 23.740 | 20.817 | 19.932 | 64.489 | 10.473 | 5.361 | 15.834 | 80.323 |
| 14 | - | fixed costs product types | 3.100 | 530 | 2.800 | 6.430 | 2.000 | 1.550 | 3.550 | 9.980 |
| 15 | = | contribution margin II product types | 20.640 | 20.287 | 17.132 | 58.059 | 8.473 | 3.811 | 12.284 | 70.343 |
| 16 | - | fixed costs product divisions | | | | 10.900 | | | 2.000 | 12.900 |
| 17 | = | contribution margin product divisions | | | | 47.159 | | | 10.284 | 57.443 |
| 18 | - | total company fixed costs | | | | | | | | 13.250 |
| 19 | = | net profit total company | | | | | | | | 44.193 |

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 controlling and management system | |
| Stronger perception by the management | |

Source: Sailer, U. (2017): *Nachhaltigkeitscontrolling, 2nd edition, Konstanz and München, Germany, 2017, p. 164.*

Structure

1. Approaches to Sustainability Management

2. Integration of social and environmental aspects into economic value driver systems

3. Insight into applied research projects

Presentation of the research projects FÖCO and FungiMat

FÖCO – Integrative research in the fields of Green Finance, Life Cycle Assessment and Sustainability Controlling

– ESF-Young Research Group

Duration: 01/2022 – 12/2022

Funding Amount: 400.000 EUR

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

– ESF-Young Research Group

Duration: 01/2024 – 12/2026

Funding Amount: 1.400.000 EUR

Sustainability Controlling

Implications of ecological and social aspects on value-driver systems

Prof. Bernd Zirkler

Sustainable/
Green Finance

Analysing the connection between ESG-Ratings and capital costs

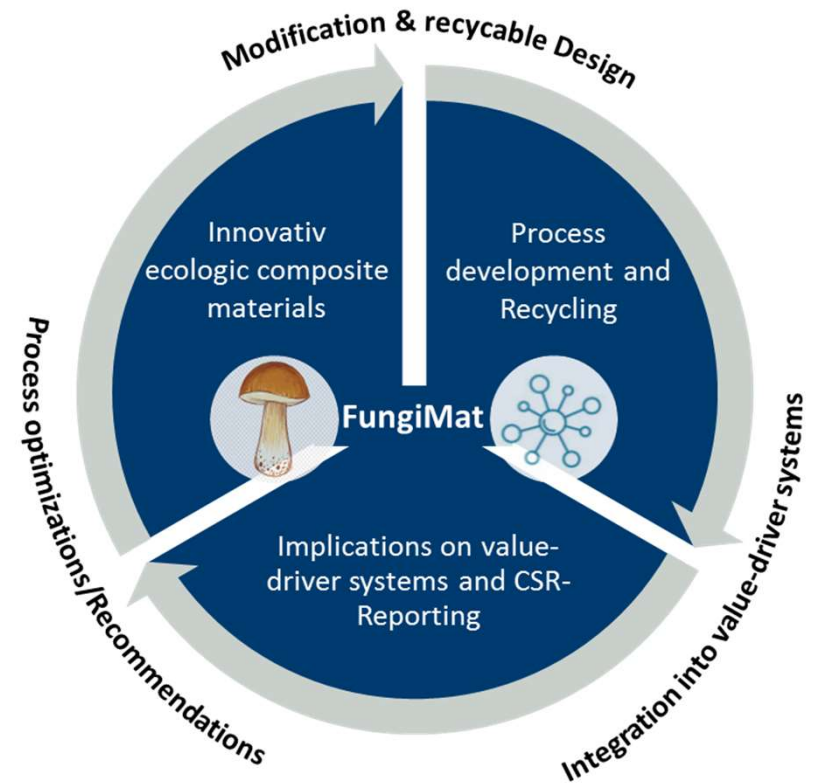
Prof. Ronny Kunz

Sustainability

Development of an Environmental Assessment Statement for composite materials

Prof. Thomas Horst

Life Cycle Assessment



Thank you for your attention! Any questions?

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

**Chair of Business Administration, esp.
Financial and Management Accounting**

Contact:



Website



+49 (0) 375 536 3298 [Direct]
+49 (0) 375 536 3337 [Assistant Melanie
Weber]



Bernd.Zirkler@fh-zwickau.de



Campus Scheffelberg, Office: Building 5, 5214
Scheffelstraße 39, 08066 Zwickau



University of Applied Sciences Zwickau |
Kornmarkt 1 | 08056 Zwickau |
Telephone: +49 (0) 375 536 0 |
Fax: +49 (0) 375 536 1127 |
Website: www.fh-zwickau.de