

Fairtronics

A Tool for Analyzing the Fairness of Electronic Devices

36C3, 30.12.2019

Andreas Fritsch, Sebastian Beschke, Tamara Drucks



Easy

uses only data you already have

Supply-Chain

electronics production is global

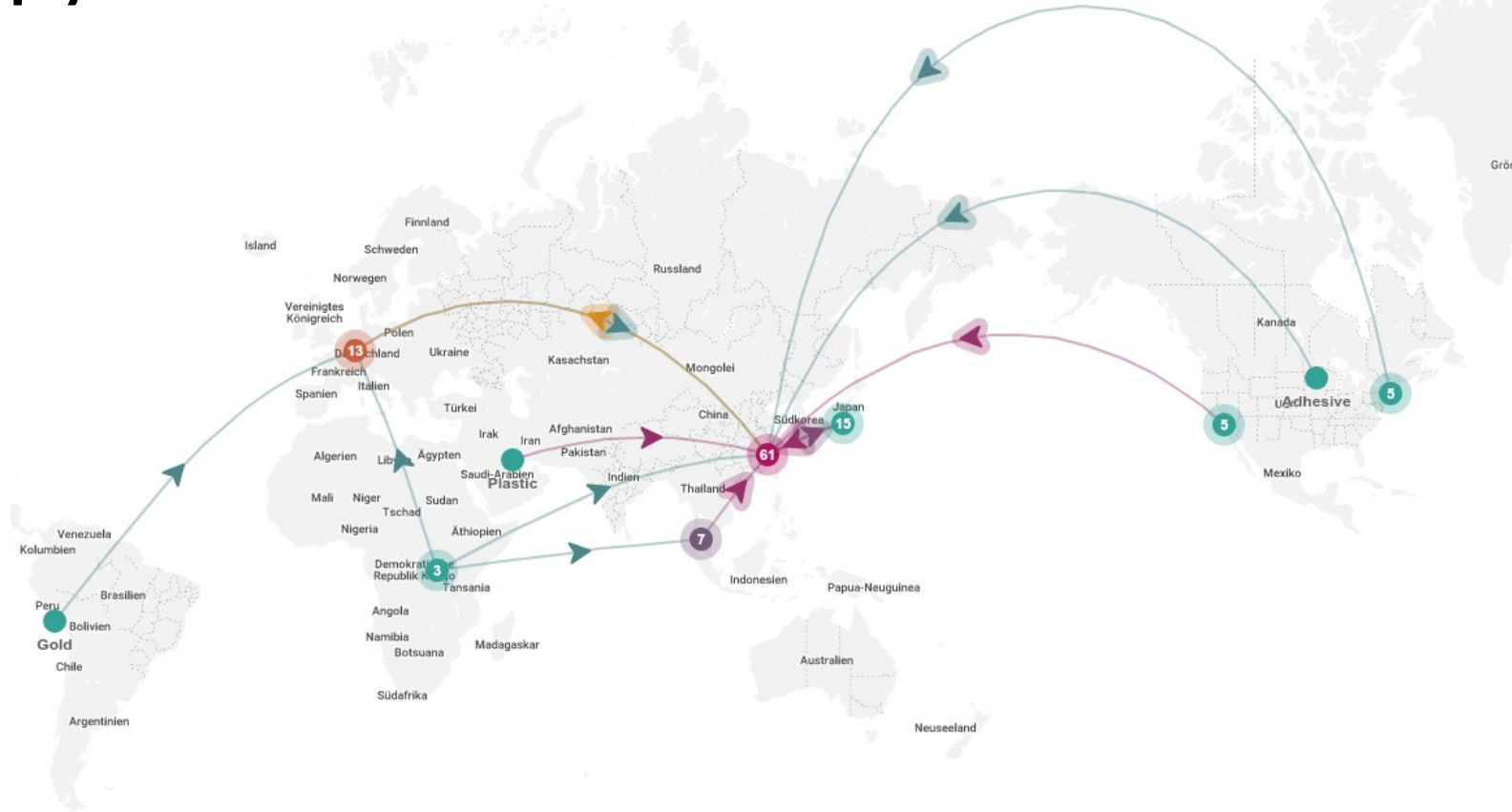
Risk

minimize harm to workers

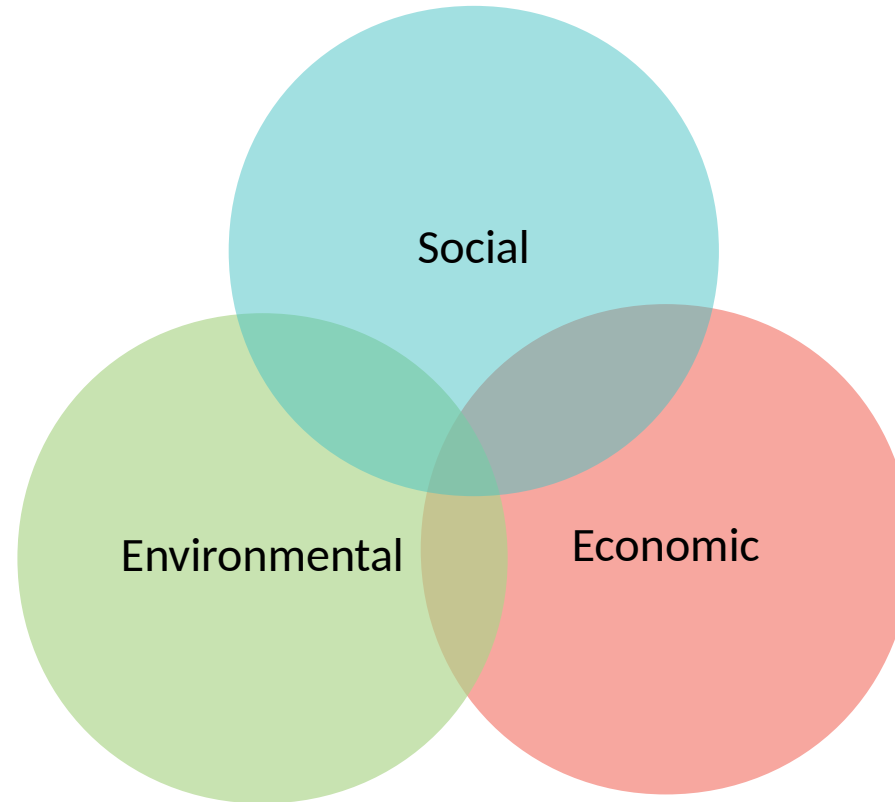
Analysis

computational model calculates hotspots

Electronics Supply Chains are Global



Pillars of Sustainability



dangerous
working condition



excessive
working hours

forced labour

Digitalization Happens on the Backs of Workers!

child labour

no freedom of
association



no social security

Use Certified Minerals If Available



<https://www.fairtrade.net/product/gold>



<https://www.fairmined.org/>

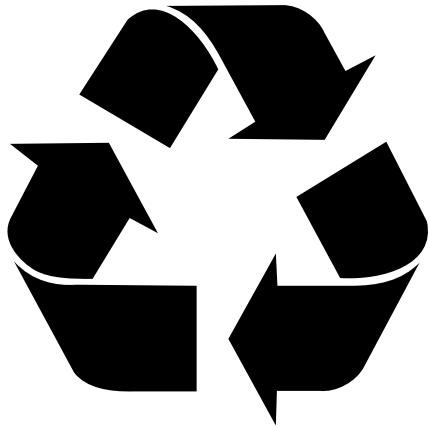


<https://responsiblemining.net/>

Make Design Decisions to Shape Resource Use

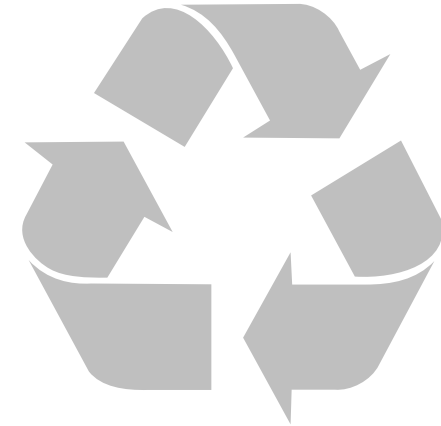
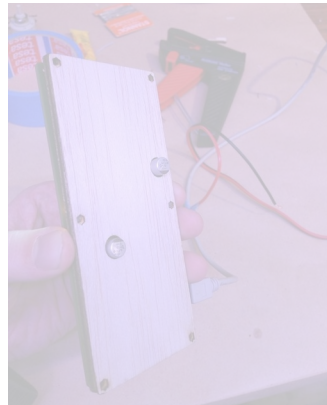


Recycling Can Minimize Resource Extraction





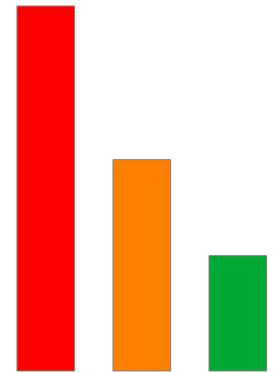
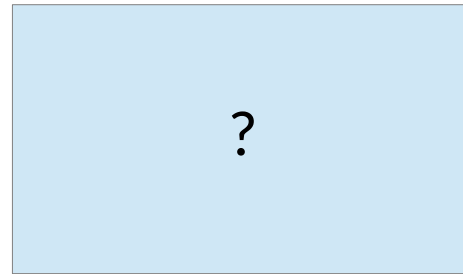
Alternatives Exist



Hotspot Analysis – but how?

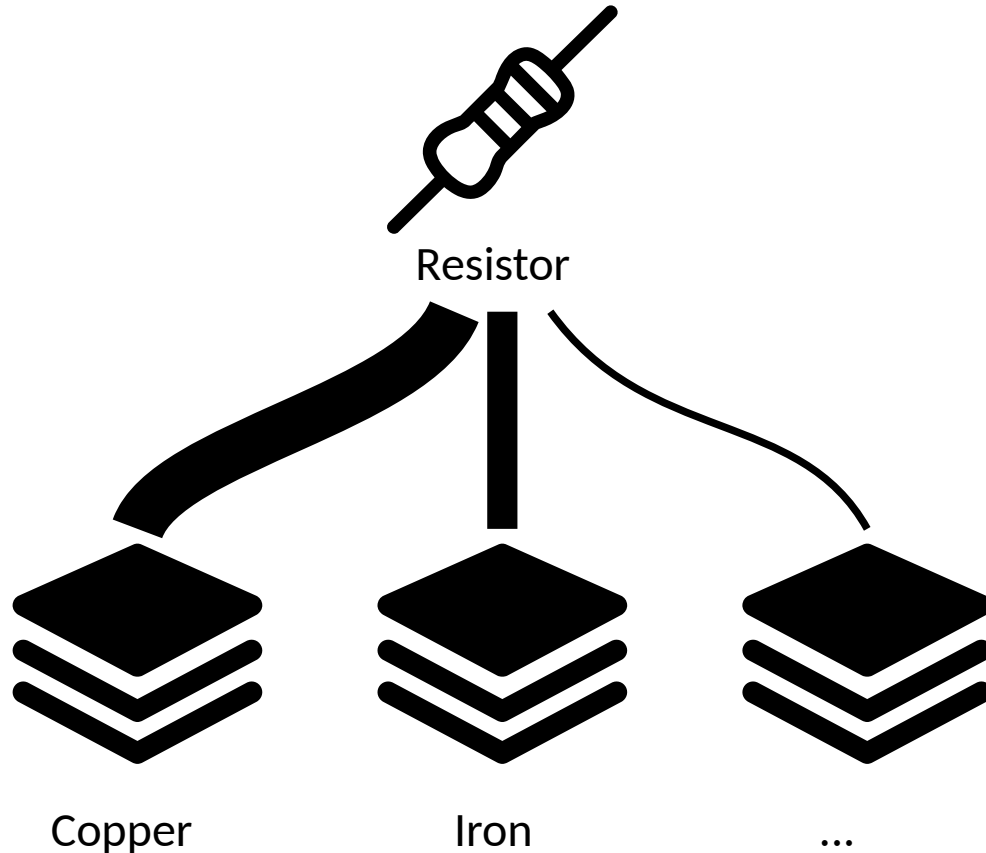


Components



Hotspot Analysis

Hotspot Analysis using Generic Data



Bedrahteter Widerstand

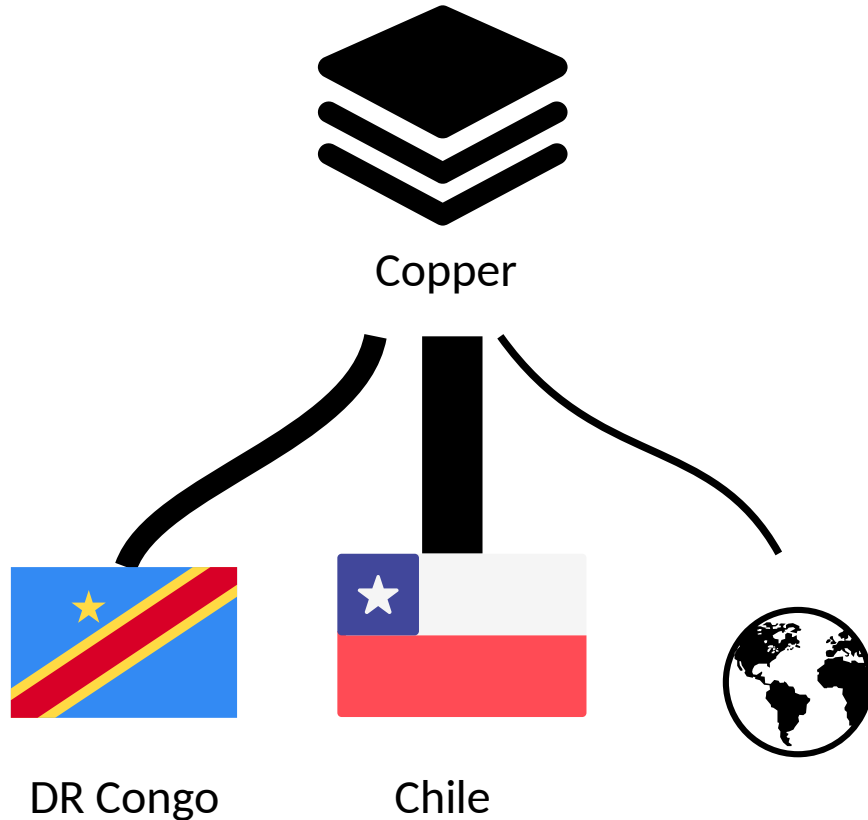
Sachbilanz

Tab. 11 Sachbilanz Bedrahteter Widerstand (0204)

	Bedrahteter Widerstand (0204)	
Komponenten-Bestandteil:	Komponenten-Material:	Gewicht (%):
Substrat	Aluminiumoxid	16.06
	Siliziumdioxid	1.89
Metallfilm	Chrom	0.02
	Nickel	0.01
Anschlussdraht	Kupfer	61.71
	Eisen	12.49
	Nickel	0.23
	Zinn	3.41
Überzug	Epoxydharz	0.19
	Polyurethan	1.65
	Pigmente	0.98
Total:	Gewicht: ca. 0.98 g	100 %

Hans-Lukas Kramer, Ökologische Bewertung von Elektronik-Komponenten und bestückten Leiterplatten, 2006

Hotspot Analysis using Generic Data



	Mine production	
	<u>2017</u>	<u>2018^e</u>
United States	1,260	1,200
Australia	860	950
Chile	5,500	5,800
China	1,710	1,600
Congo (Kinshasa)	1,090	1,200
Indonesia	622	780
Mexico	742	760
Peru	2,450	2,400
Russia	705	710
Zambia	794	870
Other countries	<u>4,250</u>	<u>4,400</u>
World total (rounded)	20,000	21,000

USGS Mineral Commodity Summaries 2019

Hotspot Analysis using Generic Data



DR Congo



Fair Salary?



Working Hours?



Child Labor?

...

Which country has the highest working poverty rate?

Share of employment by economic class (in percent), ILO modelled estimates for 2018, with lowest economic class based on the World Bank's international poverty line of \$1.90 a day (using 2011 PPPs)

■ Extremely poor
 ■ Moderately poor
 ■ Near poor
 ■ Developing middle class and above

Low income countries



<https://ilostat.ilo.org/topics/working-poor/>

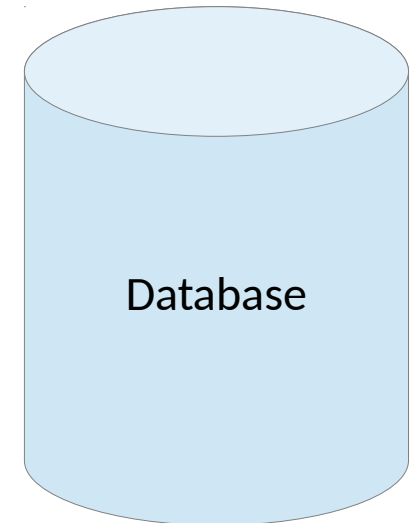
Fairtronics Database

Which country has the highest working poverty rate?

Share of employment by economic class (in percent), ILO modelled estimates for 2018, with lowest economic class based on the World Bank's international poverty line of \$1.90 a day (using 2011 PPPs)

■ Extremely poor
 ■ Moderately poor
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Low income countries



Example for one Component (Resistor)

Computation

Significance for copper produced in Congo:

Share of copper in resistor weight

$$5.81\% * 61.71\% = 3.58\%$$

Congo's share in world copper production

Impact Level for Fair Salary in Congo:

Working Poverty Rate of 70%

Interpretation

Significance between 1 and 10%

→ **Medium Activity**

→ **High Impact**

Rate for Congo among top 25%

Example for Computer Mouse

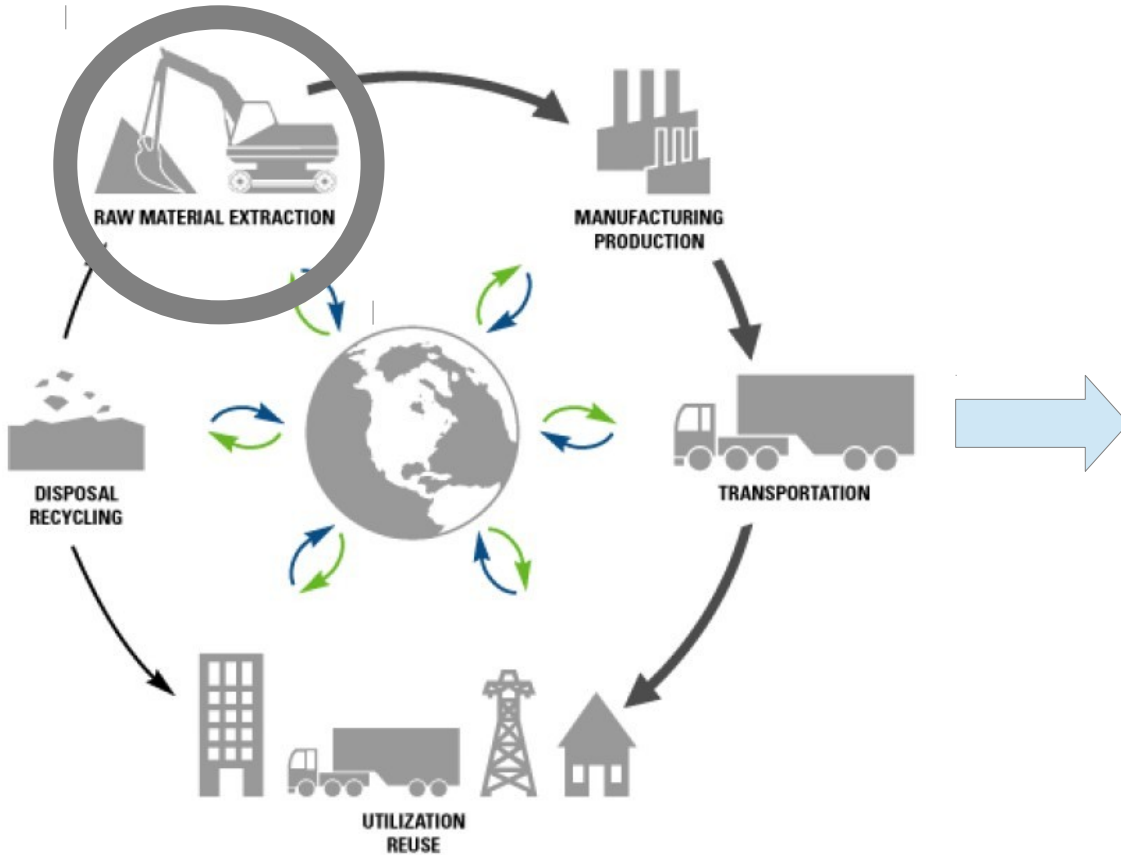
Copper is most prevalent metal in computer mouse (mainly due to the **cable**).

We identified a social hotspot for copper extraction in **DR Congo** (Impact Category: Fair Salary)

→ Finding a **source of Fair Copper** for the **cable** would be a big step forward for the fairness of the computer mouse.



Social Life Cycle Assessment



-  Freedom of Association
-  Working Hours
-  Forced Labor
-  Health and Safety
-  Social Security
-  Equal Opportunities
-  Child Labor
-  Fair Salary

A Web Based Analysis Tool

The screenshot shows a web browser window with the URL `localhost:8080/report/50`. The page title is "[Fairtronics]" and there is an "Admin" link in the top right corner. The main heading is "Report for Computer Mouse".

Components

A treemap chart displays the following components:

- Data cable (Red)
- Resistor (Teal)
- Logical IC (Orange)
- Switch (Light Green)
- Capacitator (Dark Blue)
- Condensator (Green)
- Single-layer PCB (Yellow)
- Connector (Brown)

Risks per Component

Component Cable

Congo, the Democratic Republic of the:
HIGH risk for impact category Fair Salary (3 red dots)

Peru:
LOW risk for impact category Fair Salary (3 green dots)

Zambia:
MEDIUM risk for impact category Fair Salary (3 yellow dots)

Chile:

Country	Risk Level	Impact Category	Visual Indicator
Congo, the Democratic Republic of the	HIGH	Fair Salary	3 red dots
Peru	LOW	Fair Salary	3 green dots
Zambia	MEDIUM	Fair Salary	3 yellow dots
Chile			

How can I contribute?

- Send us your BOM/PCB layout
- Use our tool (End of February 2020!)
- Program with us
 - (<https://gitlab.com/fairloetet/pse>)
- Help build/maintain DB
- Spread the word! :)

Call for Action

We want your support!

info@fairtronics.org

<https://fairtronics.org>

Come and talk with us!



Backup Slides

Further Reading

- Andrews, E. S. et al. (2009). Guidelines for social life cycle assessment of products. (C. Benoît & B. Mazijn, Eds.). UNEP/SETAC Life Cycle Initiative.
- Norris, C. B., et al. (2013). The Methodological Sheets for Subcategories in Social Life Cycle assessment (S-LCA). UNEP/SETAC Life Cycle Initiative.
- Ekener-Petersen, E., & Finnveden, G. (2013). Potential hotspots identified by social LCA - Part 1: a case study of a laptop computer. *International Journal of Life Cycle Assessment*, 18, 127–143.
- Ekener-Petersen, E., & Moberg, Å. (2013). Potential hotspots identified by social LCA–Part 2: Reflections on a study of a complex product. *International Journal of Life Cycle Assessment*, 18, 144–154.
- Kramer, H.-L. (2006). *Ökologische Bewertung von Elektronik-Komponenten und bestückten Leiterplatten*

Freedom of Association and Collective Bargaining

„All workers and employers have the right to establish and to join organizations of their choice, without prior authorization, to promote and defend their respective interests, and to negotiate collectively with other parties. They should be able to do this freely, without interference by other parties or the state, and should not be discriminated as a result of union membership.

The right to organize includes: the right of workers to strike, the rights of organizations to draw up their constitutions and rules, to elect their representatives in full freedom, to organize their activity freely and to formulate their programmes.“

Child Labor

„The term ‚child labour‘ is often defined as work that deprives children of their childhood, their potential and their dignity, and that is harmful to physical and mental development. It refers to work that is:

Mentally, physically, socially or morally dangerous and harmful to children;
Depriving them of the opportunity to attend school;
Obliging them to leave school prematurely; or
Requiring them to attempt to combine school attendance with excessively long and heavy work.

[...]

Child working constitutes child labour if the child is below:
the age of 15 years; or
the national set minimum age for employment if it is higher; or
the age of completion of compulsory education if it is higher.“

Fair Salary

„Fair wage means a wage fairly and reasonably commensurate with the value of a particular service or class of service rendered, and, in establishing a minimum fair wage for such service or class of service.

Codes of conduct which deal with wages and benefits have focused on three standards when assessing level of wages:
the minimum wage required by law;
the local ‚prevailing industry wage‘;
the ‚living wage‘ (also sometimes designated as a ‚floor wage‘ or ‚non-poverty wage‘).“

Hours of Work

„The hours of work comply with applicable laws and industry standards. Workers are not on a regular basis required to work in excess of 48 hours per week and have at least one day off for every 7-day period. Overtime is voluntary, does not exceed 12 hours per week, is not demanded on a regular basis and is compensated at a premium rate. The needs and expectations of the workers are taken into account in the organisation of working hours. There are also higher restrictions if the hours of work are made during the night.“

Forced Labor

„Forced or compulsory labour is any work or service that is exacted from any person under the menace of any penalty, and for which that person has not offered himself or herself voluntarily. Providing wages or other compensation to a worker does not necessarily indicate that the labour is not forced or compulsory. By right, labour should be offered voluntary and workers should be free to leave the employment at any time in accordance with established rules.“

Equal Opportunities/Discrimination

„Everybody deserves a "fair chance". It doesn't matter what sex, race or age you are, if you have a disability, your marital status, whether you are pregnant, your family status or your family responsibilities, the religious or political beliefs you might hold and your sexual orientation. Everybody has the right to be treated fairly and access to equal opportunities.

Equal opportunity or the principle of non-discrimination emphasizes that opportunities in education, employment, advancement, benefits and resource distribution, and other areas should be freely available to all citizens irrespective of their age, race, sex, religion, political association, ethnic origin, or any other individual or group characteristic unrelated to ability, performance, and qualification.“

Health and Safety

Since 1950, the International Labour Organization (ILO) and the World Health Organization (WHO) have shared a common definition of occupational health. The definition reads:

"Occupational health should aim at: the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention amongst workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, to summarize, the adaptation of work to man and of each man to his job."

Social Benefit/Social Security

Social benefits refer to non-monetary employment compensation. Four basic categories of Social Security benefits are often included and are paid based upon the record of worker's earnings: Retirement, disability, dependents, and survivors benefits.