The replacement of human labor through robots

Oral Presentation
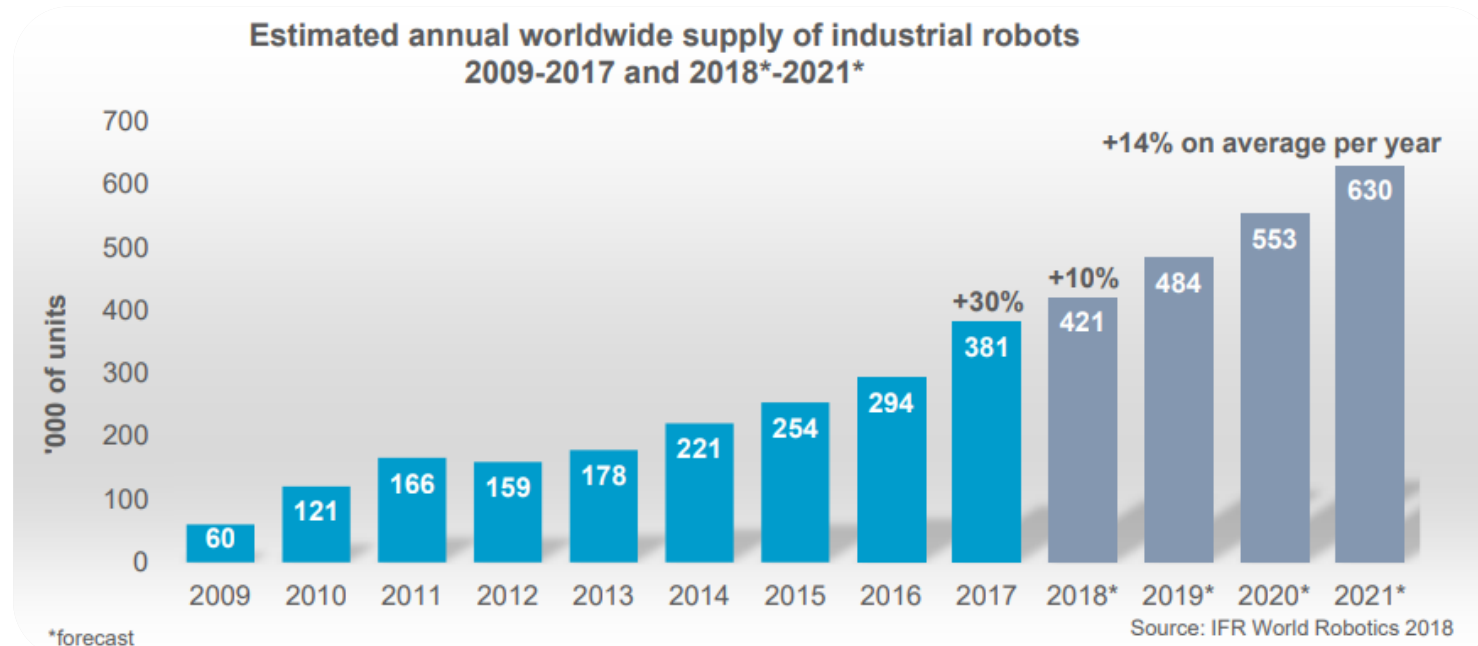
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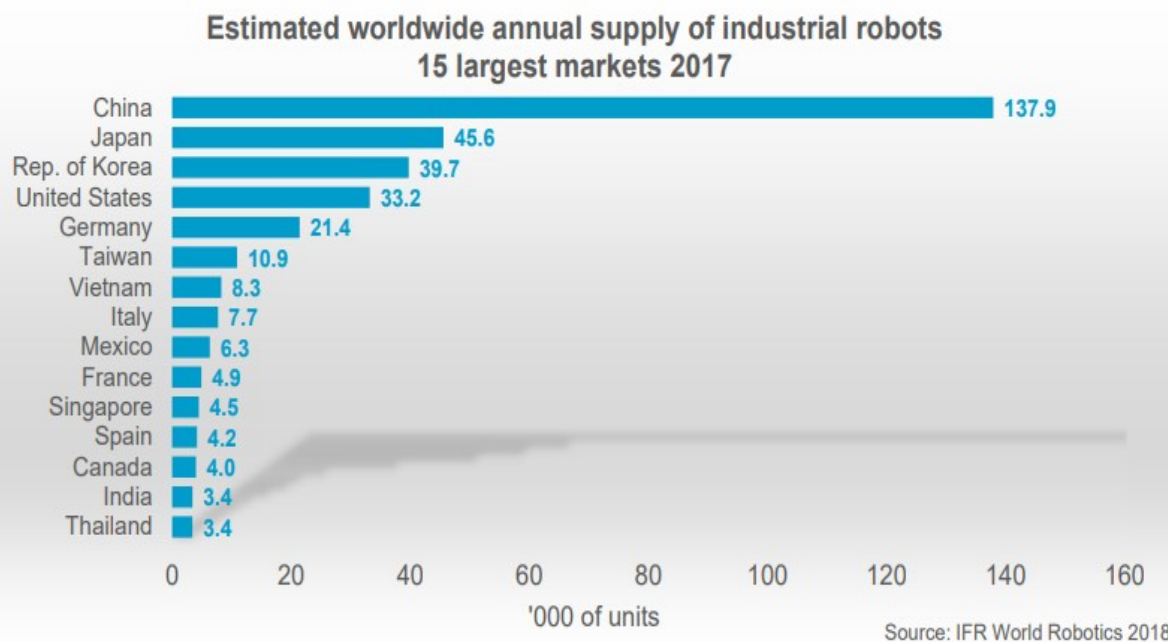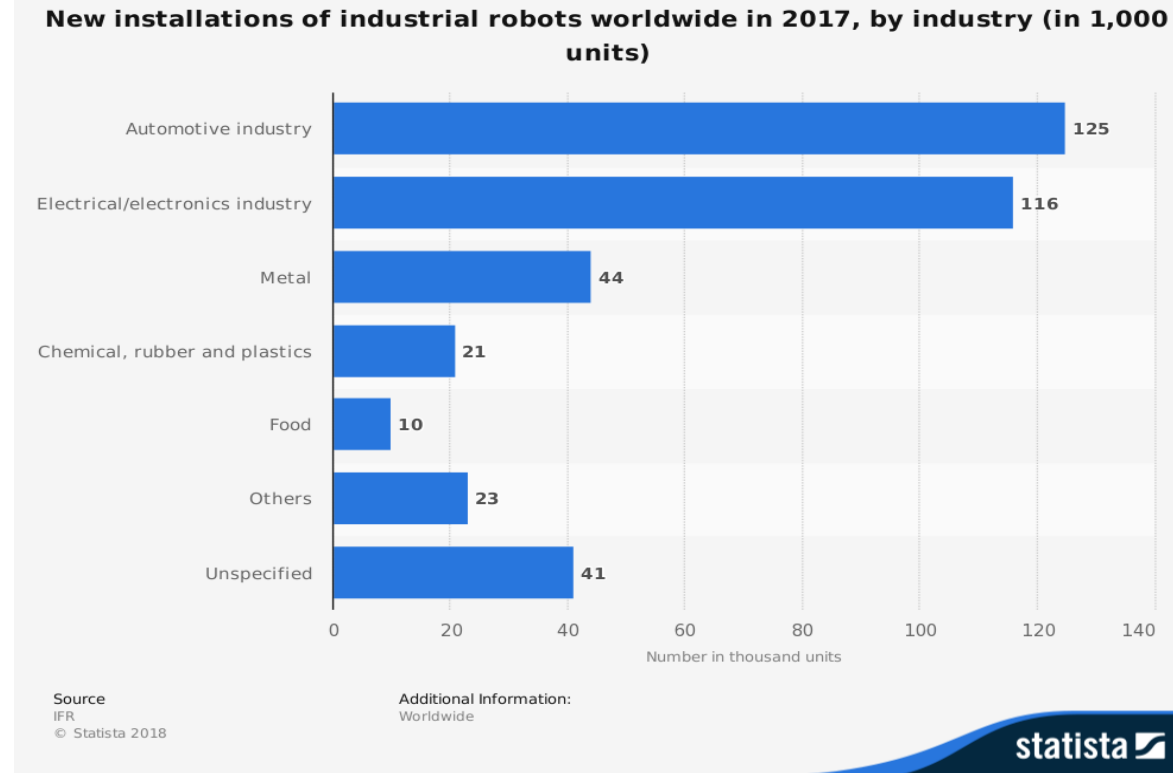
Human Resources Management

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Overview about robot industry

▶ In 2017, the value of global market was around US$16.2 billion

▶ Since 2010, the demand for industrial robots has accelerated considerably due to the ongoing trend toward automation and continued innovative technical improvements in industrial robots

▶ Robot sales increased by 30% to 381,335 units, in 2017; it's a new peak for the fifth year in a row.

▶ New estimation by IFR World Robotics confirm that this growth is not going to slow down for several years yet, in fact, in 2018 is expected a growth by 10% to 421,000 units and in 2021 the units will be 630,000 with on average per year by +14%

Estimated annual worldwide supply of industrial robots 2009-2017 and 2018*-2021*

+14% on average per year

'000 of units

| 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018* | 2019* | 2020* | 2021* |
| 60 | 121 | 166 | 159 | 178 | 221 | 254 | 294 | 381 | 421 | 484 | 553 | 630 |

+30% +10%

*forecast

Source: IFR World Robotics 2018

- The main drivers of this exceptional growth in 2017 were the metal industry (+55%) and electrical/electronics industry (+33%). Robot sales in the automotive industry increased by 22% and remained still the major customer of industrial robots with a share of 33% of the total supply in 2017.

New installations of industrial robots worldwide in 2017, by industry (in 1,000 units)

Industry	Number in thousand units
Automotive industry	125
Electrical/electronics industry	116
Metal	44
Chemical, rubber and plastics	21
Food	10
Others	23
Unspecified	41

Number in thousand units

statista

Estimated worldwide annual supply of industrial robots 15 largest markets 2017

Market	'000 of units
China	137.9
Japan	45.6
Rep. of Korea	39.7
United States	33.2
Germany	21.4
Taiwan	10.9
Vietnam	8.3
Italy	7.7
Mexico	6.3
France	4.9
Singapore	4.5
Spain	4.2
Canada	4.0
India	3.4
Thailand	3.4

'000 of units

Source: IFR World Robotics 2018

- There are five major markets representing 73% of the total global sales volume in 2017: China, Japan, the Republic of Korea, the United States and Germany. Since 2013 China has been the biggest robot market in the world with a continued dynamic growth.

Job sections affected/not affected

- Robots may replace 800 million workers by 2030

- Automation will more or less affect by type of activity parts of almost all workstations

- For some industries, an increase in automation won't mean a decline in employment, but rather a shift in the tasks needed to be done

- Factors:

  - Technical feasibility
  - Costs for the development and use of both hardware and software
  - Labour costs and the associated supply and demand dynamics
  - Advantages over labour substitution including higher production volumes of better quality and fewer errors

Not affected:

- Recreational Therapists
- First-Line Supervisors of Mechanics, Installers, and Repairers
- Emergency Management Directors
- Mental Health and Substance Abuse Social Workers
- Audiologists
- Occupational Therapists

Technical feasibility of automation, %[1]

Predictable physical work   78%

Unpredictable physical work   25%

Affected:

▶ Physical activities play a prominent role in sectors such as manufacturing, gastronomy and housing, and retail trade, they are most vulnerable to automation for technical reasons alone

▶ All these occupations share a predictable pattern of repetitive activities, the likes of which are possible to replicate through Machine Learning algorithms

Occupation sector	percent
Professions in agriculture/forestry and horticulture	44
Social and cultural service professions	13
Construction and extension occupations	37
Medical and non-medical health professions	21
IT and scientific service occupations	39
Professions in business management and organisation	57

Occupation sector	percent
Transport and logistics professions	56
Enterprise-related service occupations	60
Cleaning jobs	39
Commercial professions	50
Manufacturing occupations	83
Security professions	20
Food and hospitality professions	40

Countries which are most affected by robot replacement

► "(...) the share of occupations that could experience significant automation is actually higher in developing countries than in more advanced ones, where many of these jobs have already disappeared" (Muoio D.)

The Countries Where the Potential for Automation Is Highest

Percentage of work activities that could be automated by adapting current technology.

AFRICA		ASIA/AUSTRALIA		EUROPE		NORTH AMERICA		SOUTH AMERICA	
Kenya	51.9%	Japan	55.7	Czech Rep.	52.2	Mexico	51.8	Peru	53.2
Morocco	50.5	Thailand	54.6	Turkey	50.4	Costa Rica	51.7	Colombia	53.0
Egypt	48.7	Qatar	52.0	Italy	50.3	Barbados	48.7	Brazil	50.1
Nigeria	45.7	South Korea	51.9	Poland	49.5	Canada	47.0	Chile	48.9
South Africa	41.0	Indonesia	51.8	Spain	48.5	U.S.	45.8	Argentina	48.2
		India	51.8	Germany	47.9				
		Malaysia	51.4	Greece	47.8				
		China	51.2	Austria	47.4				
		Russia	50.3	Switzerland	46.7				
		Philippines	47.9	Sweden	46.0				
		U.A.E.	47.3	Netherlands	45.4				
		Oman	46.8	France	43.1				
		Bahrain	46.1	U.K.	42.8				
		Saudi Arabia	46.0	Norway	42.4				
		Australia	44.9						
		Singapore	44.2						
		Kuwait	41.1						

Decisive factors:

- ► Level of manufacturing processes
- ► Labor costs
- ► Skill shortage
- ► Age of population/ Birth rate
- ► Labor regulations/ bureaucratic obstacles

Positive aspects:

- Better decision making
- Objective feedback
- Avoiding conflict
- Decreased Production Costs
- Shorter Cycle Times
- Improved Quality and Reliability
- Better Floor Space Utilization
- Increased Safety
- Improved efficienty and outcome
- Looking forward: Utopia

Negative aspects:

- Humans need human contact

- Lack of creativity

- Higher Maintenance and Installation Costs

- Enhanced Risk of Data Breach and Other Cybersecurity Issues

- Reduced Flexibility

- Anxiety and Insecurity Regarding the Future

- Looking forward: Dystopia

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Thank you!