How to Master Data with the Industry 4.0 Management Style

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Context

- The “Industrial 4.0” concept appeared first in an article published by the German government in November 2011, as a high-tech strategy for 2020. Similarly, France launched project of “usine du futur” in 2013, then renamed the project as “industrie du futur” in 2015. The United States launched the Advanced Manufacturing Partnership (AMP) in 2011. Other countries have also put forward the corresponding fourth industrial revolution plan. It will greatly enhance manufacturing productivity, promote economic transformation and industrial development, and improve the employment structure of the labor force, ultimately changing the competitive landscape between the company and the country. Industry 4.0 will bring tremendous changes to the world.

Exploring the impacts of Industry 4.0 from a macroscopic perspective

Table 1 methodology for exploring the impacts of Industry 4.0

1. Identify the scope and definition of Industry 4.0
2. Investigation for key technologies of industry 4.0
3. Investigation for new practices of industry 4.0 in various industry sectors
4. Investigate and detect new academic direction for Industry 4.0

- An information transmission and decision model in the context of Industry 4.0 was proposed;
- Status and development directions of Industry 4.0 were concluded.

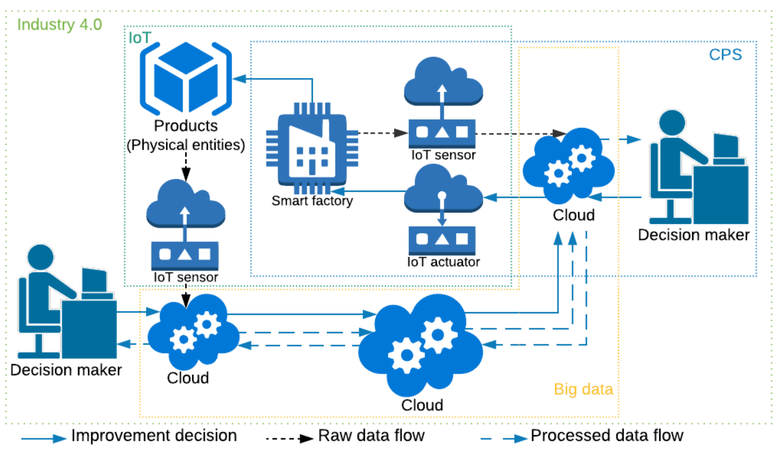

Figure 2 Proposition of information transmission and decision mode

The wide application of sensors has laid the foundation for the Internet of Everything. Physical information systems provide guarantee for smart factories and intelligent production. Cloud services enable big data to be integrated and enable big data analytics to play a bigger role in Industry 4.0 era.

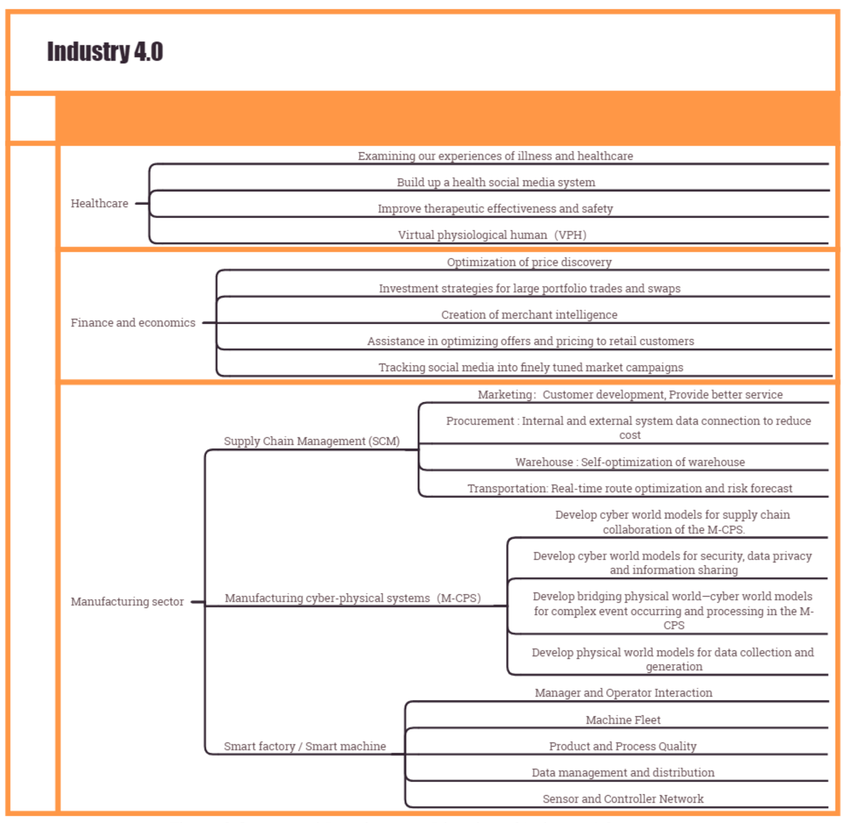

Figure 3 Status and Development Direction of Industry 4.0

This part focuses on the application of Industry 4.0 in healthcare, finance & economics and manufacturing sector, the research field is not comprehensive enough.
In future research, The following four topics will be considered: analyze / model the expected contribution of Industry 4.0 technologies for industrial performance; Smart manufacturing technology, market maturity analysis and technology roadmap; Industry 4.0 and make or buy decision (outsourcing or self-produce facing with automation / robots); New business models support Industry 4.0

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Employment Analysis Based on Panel Data in the Background of Industry 4.0

Background

A survey for 1,896 experts showed half of these experts (48%) envision a future in which robots and digital agents have displaced significant numbers of both blue- and white-collar workers, most of them concern that this will lead to vast increases in income inequality, masses of people who are effectively unemployable, and breakdowns in the social order. The other half of the experts who responded to this survey (52%) expect that technology will not displace more jobs than it creates by 2025. So, whether the new technological revolution will bring unemployment, whether the number of newly created jobs can make up for the disappearance of jobs, which were always the focus of debate.

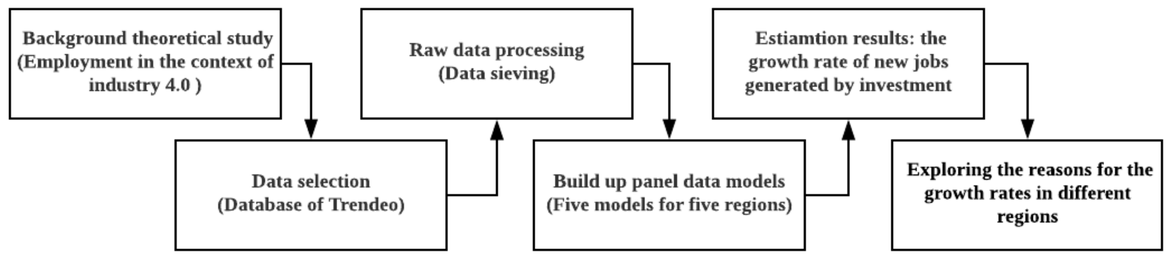


Figure 4 Methodology for employment analysis based on panel data

Table 2 Materials information

	Type	Nature	Source	Amount	Unit
Industrial Sectors	Literal Data	Classification	Trendeo	63	Sector
Period	Time Data	Classification	Common Sense	5	Semiannually
Investment	Digital Data	Statistical Data	Trendeo	2128990	Million $
Number of Jobs	Digital Data	Statistical Data	Trendeo	1728265	Job
Region	Literal Data	Classification	Official Website/ Common Sense	5	Cooperation Organization/ Region

Five regions: European Union (EU); North American Free Trade Agreement (NAFTA); South Asian Association for Regional Cooperation (SAARC); African Union (AU); East Asia (EA)

Trendeo I&S as a database that tracks industrial investment worldwide, by number of projects, by amount invested and along industry 4.0 criteria

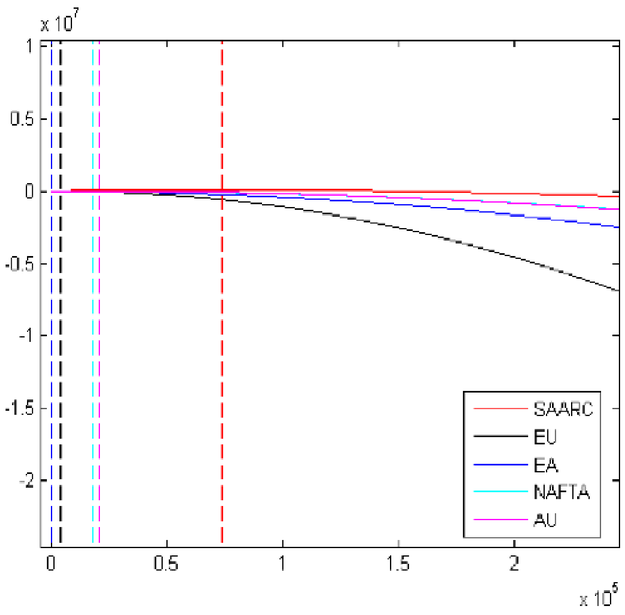
Modeling

- SAARC: $SAARCJobs_{it} = \delta_1 SAARCInvestM_{it} + \delta_2 SAARCInvestM^2{}_{it} + \alpha_{SAARC_i} + \varepsilon_{SAARC_{it}}$
- EA: $EAJobs_{it} = \vartheta_2 EAInvestM^2{}_{it} + \alpha_{EA_i} + \varepsilon_{EA_{it}}$
- AU: $AUJobs_{it} = \beta_1 AUInvestM_{it} + \beta_2 AUInvestM^2{}_{it} + \alpha_{AU_i} + \varepsilon_{AU_{it}}$
- EU: $EUJobs_{it} = \alpha_{EU} + \mu_{EU_i} + \gamma_1 EUInvestM_{it} + \gamma_2 EUInvestM^2{}_{it} + \varepsilon_{EU_{it}}$
- NAFTA: $NAFTAJobs_{it} = \alpha_{NAFTA} + \mu_{NAFTA_i} + \tau_1 NAFTAInvestM_{it} + \tau_2 NAFTAInvestM^2{}_{it} + \varepsilon_{NAFTA_{it}}$
- α_{SAARC}, α_{EA}, α_{AU}, α_{EU}, α_{NAFTA}: Intercept in corresponding equation ;
- ε_{SAARC}, ε_{EA}, ε_{AU}: Error terms in corresponding equation;
- δ_1, δ_2, ϑ_2, β_1, β_2: Coefficients to be estimated;
- μ_{EU}, μ_{NAFTA}: Error terms of cross section in corresponding equation;
- ε_{EU}, ε_{NAFTA}: Mixed random error terms in corresponding equation;
- γ_1, γ_2, τ_1, τ_2: Coefficients to be estimated;
- i : Industry sectors; t : Time interval.

Results

	Coef. of linear term	P>|t| for linear term	Coef. of quadratic term	P>|t| for quadratic term	Constant term
SAARC	2.057522	0.000	-.0000139	0.000	-275.4755
EU	1.09156	0.000	-.0001192	0.005	546.2181
EA			-5.38e-06	0.003	4123.543
NAFTA	0.903856	0.012	-.0000248	0.032	914.9933
AU	1.095524	0.151	-.0000262	0.180	124.8732

Table 3 Results



EU is facing the greatest technical unemployment pressure comes from industry 4.0 among the five regions, followed by East Asia, then NAFTA and the African Union, and the most optimistic is SAARC.
We speculate that this is due to Europe had a relatively complete industrial system and a high level of automation, infrastructure investment has already been taken a large part, the demand for labor will continually decrease. The industrial foundation in South Asia is very poor. There are still many pre-steps to be completed in the process of moving to Industry 4.0. These steps also require a large amount of labor. Labor-intensive industries are gradually shifting from East Asia to other regions, which has lost a lot of jobs in this process, and Industry 4.0 will bring new challenges, consequently, East Asia does not reflect the jobs increase by investment.