



The Smart Factory – Implications on workforce in production and management

Industry 4.0 will heavily affect employment, especially in the industrial sector. Physically demanding and repetitive employment profiles are most probable to disappear as the degree of robot assistance increases. There is however evidence that the overall effect of Industry on the global employment may be positive. Demand for highly skilled labor will rise with the extent of Smart Factories. Now business models may evolve creating additional jobs and demand.

Ever since the first definition of Industry 4.0 as a strategic term in a strategy paper of the German government global economies have identified the rise of smart manufacturing as crucial to their position in international competition. Smart manufacturing may become a game changer for the current status quo and heavily affect the competitiveness of entire economies worldwide.

However, among effected stakeholders the convergence of the global industry to smart manufacturing is considered with a high level of ambivalence. On the capital side producers and even entire national economies see the huge up-side potential in economic growth and a rise in efficiency of employed capital. As outlined in the articles before, the benefits of the Smart Factory will disrupt the way of production known today and will lead to efficiency gains never seen before. On the labor side opinions differ whether or not benefits of smart manufacturing will outweigh the negative impacts on the labor force in terms of overall employment. It is though expected that human labor perfectly collaborating with robots and artificial intelligence in the Smart Factory will experience an increase in quality of work life. Exhausting and recurring work processes can then be performed by robots allowing the human factor to dedicate itself on surveilling and improving work processes and overarching activities.

This article identifies 3 trends that a connected economy, as basis for smart manufacturing, may have on global employment:

Change in the perception of value added in production:

Ever since the beginning of industrialisation prices of produced units were in the center of attention. Unit prices were driven down by mass production based on scale effects and delocalisation of employment to more competitive locations offering lower labor costs. In Industry 4.0 however, the customers/consumers are far more involved in the production process, leading from push production of standardised goods to a pull production of individualised goods and services. This changes the focus of producers from standardised mass production to customisation of high quality products and services. At the same time and due to heavy investments in latest Industry 4.0 technology, production becomes more capital intensive shifting the balance of production costs from labor to capital. This process partially takes differences in local labor costs out of the equation, allowing producers to relocate jobs closer to the consumer. This could allow employment in the US and developed economies in Europe to benefit from relocation. The Speed Factory of the sportswear company Adidas perfectly illustrates this process.



In light of the possibilities offered by Industry 4.0 production of merchandise in Asia has become less appealing for Adidas due to the decreased advantage in labor costs, the time lag from production to sales and the carbon footprint of shipping. The new production site allows local production of sport shoes with maximum flexibility for the German market.

Change in focus of consumers from possession to use:

Another effect of the digital transformation of today's societies makes consumers change their behavior regarding possession and usage of whatever device imaginable. As societies across the globe have become extremely connected, resources are more and more shared and efficiently available where needed at any given time. Consumers no longer consider the sole possession of things as adding value but its short term usage and application when required. This trend ranges from sharing vehicles for long distance journeys to urban car sharing taking pressure off the cities' traffic infrastructure. At the far end of privacy even accommodation as a limited resource in many major cities across the globe is being shared among consumers. This trend in consumption may also serve as a role model for production in Industry 4.0. As a matter of fact, the start-up scene is already known for its custom of cooperation in sharing infrastructure and knowledge. This may be one characteristic of tomorrow's economy.

The question remains though how this trend may affect the level of employment in the years ahead. Will the gains in efficiency only serve the capital side, leading to a reduction of the labor cost or will the benefits of Industry 4.0 overcompensate potential losses in some sectors of employment by creating new business models in other sectors? The sharing economy does hold huge potential for both, producers and consumers. In a shared economy goods become more efficiently used. This increases the volume of use per unit but decreases the cost per use. Given

that prices of goods remain constant this will lead to an increase in real purchasing power for consumers. As consumers overall budget is less charged by crucial expenses, additional spending power will automatically increase demand and add to creation of new jobs.

Industrial revolutions of the past provide evidence that there is a good chance for productivity and efficiency gains provide opportunities for job creation. New business models will evolve based on the changed environment. Uber is just one of the many examples for this argument in a shared economy. As the world's largest taxi company Uber does not operate any own vehicles. However, ever since its foundation in 2009 Uber has created over 12.000 jobs providing its platform for about 800.000 commercial drivers worldwide.

Increase in quality of life at workplace

Industry 4.0 will heavily affect employment especially in the industrial sector in the mid- to long-term. Physically demanding and routine employment will decrease as the degree of robot assistance and picks up over time. Higher qualification job profiles requiring flexibility and customization will increase over time. This division of physical and intellectual work may add to a higher degree of quality of life at the workplace. Providing the employees with the opportunity to control and shape the processes of production may further add to employees employing their full potential to the workplace.

Overall Industry 4.0 will impact global employment, especially in the industrial sector. However, experiences from the past show that the overall effect of industrial revolutions to global employment was positive in the mid to long-run. The few examples explained in this article support this expectation.