Social Sustainability for the Factory of the Future

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Overview
Despite delocalization of manufacturing activities from Europe to developing and growth economies, the manufacturing sector employs over 30 million people, is the second largest sector within the European Union’s non-financial business economy in terms of its contribution to employment (22.8 percent) and the largest contributor to non-financial business economy value added, accounting for one quarter (25.0 percent) of the total.

Global megatrends drive manufacturers’ responses by continued adaptation to the location and changing needs of the population, plus economic, environmental, and social sustainability.

Since manufacturing is considered a key enabler for the European economy, the EU has decided to start funding a research topic on social sustainability in manufacturing.

The EU’s Strategy Until 2020
Economic growth depends on innovation. To support continued innovation, as part of its strategy for 2020 the EU has set the goal to spend 3 percent of GDP on research & development, similar to the spending levels in Japan or the US. Other targets are to have an employment rate of 75 percent of the 20 to 64 year-olds and have 20 million less people in or at risk of poverty and social exclusion. In short, the EU is targeting “Growth, jobs, and better lives,” with a focus on manufacturing, which offers greater po-
potential to employ people and add value than services, which are limited in these respects.

Global megatrends drive manufacturers’ responses by continued adaptation to the location and changing needs of the population, plus the need for economic, social and environmental sustainability. Together with Advanced Manufacturing Systems, the EU has defined the following key enabling technologies: nanotechnology, advanced materials, micro/nano electronics, and biotechnology.

The EU’s Framework Programs for Research

In an earlier ARC Advisory Group Insight we introduced the EU’s 7th Framework Program for Research (FP7). The last work program of FP7 2013 has just started.

Many in industry consider the effort required to apply for funding too high compared to the chances of being elected and the levels of funding offered. However, ARC believes that the principle of competing on proposal quality is sound. Furthermore, the budgets for funding R&D projects will increase considerably in the near future. The EU also plans to make the application procedures simpler in the next framework for research, called Horizon 2020. The program will run from 2014 to 2020 with an 80 billion euro budget. It will combine all research and innovation funding provided through FP7 and other programs. Horizon 2020 aims at “excellent science,” “industrial leadership,” and “societal changes.”

The program will address industrial leadership by financing research on the key enabling technologies, facilitating access to risk financing, and providing specific support for the small- and medium-size enterprises in the EU, identified as a key component of industrial innovative manufacturing.

Societal changes will be stimulated through research addressing climate change, sustainable transport and mobility, making renewable energy more affordable; ensuring food safety and security; and health, particular as related to the aging population.
Factory of the Future, F3 Factory, and SPIRE

In addition to the programs financed in majority by the EU, there are so-called private-public partnerships (PPPs), financed 50 percent by industry. The goal of the PPPs was to include more industrial partners in research projects, thereby accelerating the transformation of research results into tangible business results.

One of the PPPs is the “Factory of the Future” program. Its goal is to help EU discrete manufacturing enterprises, and in particular small-to-medium enterprises, adapt to global competitive pressures by developing new and sustainable technologies. The commission contributes 1.2 billion euro as part of the European Economic Recovery plan to the Factory of the Future within the current FP7 program. Because of its success in creating momentum with the industry, it will be continued within Horizon 2020.

Readers should not confuse the Factory of the Future program with the F3Factory project (www.f3factory.com), aimed at developing a new paradigm in sustainable production technology for the chemical industry. ARC will report separately about the SPIRE program that aims to help the EU process industry become more competitive (www.spire2030.eu)

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The goal of sustainable social development is to expand people’s freedoms and capabilities to lead lives that they can have reason to value, without compromising the ability of future generations to meet their own human development needs. Social sustainability is inseparable from environmental sustainability because man needs the environment as resource for his own development. Social sustainable development has recently emerged as a combination of human development and sustainable development. Income was considered an indicator for human development. Indicators for social sustainability are more about wellbeing: access to resources, education, social stability, and the quality of the natural environment. Since people’s chances at better lives should not be constrained by factors out of their control, equity is also an integral part of social sustainable development.

The UN report on human development from 2011 mentions that human development progressed enormously over the past decades. However, ac-
According to the report, income growth was associated with deterioration in key environmental indicators and the distribution of income has worsened in most countries.

**Attractiveness of Work to Enable the Factory of the Future**

In recent years, the community of automation professionals in Europe has become increasingly concerned about the attractiveness of the profession for young engineers relative to other professions. Not only automation is impacted; there is a more general concern regarding the attractiveness of working in manufacturing.

Since the EU considers manufacturing a key enabler for the European economy, it has decided to start funding a research topic on social sustainability in manufacturing. Recognizing the need to help ensure social wellbeing in the factories of the future, the Commission’s recent call for research proposals includes wording to encourage submissions that redefine the human role in manufacturing. Specifically, research is needed on new types of interaction between process, machinery, and people, and as a result, the industry needs to define new jobs and introduce new roles for people in factories.

The Commission aims at research to make work in factories stimulating, and creating conditions in which people can make most of their skills and knowledge and have opportunities for lifelong learning. As economic targets are very important as well, cross-disciplinary work is needed to ensure profitable operation together with social sustainable conditions in future factories.

The goals for project proposals are to assess current activities in achieving social sustainability in manufacturing, defining favorable conditions to enhance social sustainability and to propose a future research roadmap. Recently, the proposals were evaluated and ranked, based on three criteria: scientific and technical quality, impact, and management and organization.
Large-Scale Dissemination Plan Needed
While the call text appears to be relevant and well formulated, the subject is very broad and can be interpreted in many ways. For example, focusing on human-machine interfaces or interactions of humans with information or communication technologies in manufacturing is very relevant, but so are noise reduction and gender inequalities, which are not necessarily considered.

The opportunity to use strengths and skills to obtain good results or to reach objectives is well-identified as a potential source of well-being is well identified. However, creating conditions for social sustainability and defining new roles for people depends to a large extent on management leadership. This was not explicitly mentioned in the call text and is at risk of being overlooked. ARC also missed a mention of manufacturing methodologies that could improve or replace current approaches.

ARC agrees with the call text that social sustainability must go hand in hand with economic profitability. Future research should establish business cases demonstrating which social sustainable practices are most compatible with profitable operation.

ARC believes that much progress can be made through new R&D and that existing knowledge in ergonomics, management and organization should be applied today.

For example, Lean methods are criticized because they often involve the workers as a formality, but do not include them in genuine “participatory work design,” where they come up with issues as well as potential solutions to improve the performance of their work cells. With existing knowledge on work organization and leadership these workshops could be made socially much more satisfying.
**Recommendations**

ARC believes that current knowledge and the results of future research in this domain should be disseminated on a large scale to create a substantial macro-economic and social impact. Policy makers at national and European levels should be influenced, supervisors, middle managers must be trained, top managers must be made aware and understand the business benefits, and the public should be informed continuously over many years about the change that manufacturing will undergo, to transform the general perception of manufacturing and creating a common vision for social sustainability in manufacturing.

The topic is relevant not only for Europe, but for manufacturing worldwide.

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