European Economic and Social Committee

CCMI/139
The role of engineers in reindustrialisation

Brussels, 9 December 2015

OPINION

of the
European Economic and Social Committee
on
The role of engineers in the reindustrialisation of Europe

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On 19 February 2015, the European Economic and Social Committee, acting under Rule 29(2) of its Rules of Procedure, decided to draw up an own-initiative opinion on

The role of engineers in the reindustrialisation of Europe.

The Consultative Commission on Industrial Change (CCMI), which was responsible for preparing the Committee's work on the subject, adopted its opinion on 5 November 2015 (rapporteur: Mr Pezzini, co-rapporteur: Mr Kotowski).

At its 512th plenary session, held on 9 and 10 December 2015 (meeting of 9 December), the European Economic and Social Committee adopted the following opinion by 206 votes to 1, with 6 abstentions.

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1. Conclusions and recommendations

1.1 The European Economic and Social Committee (EESC) believes that both individual European engineers and technicians and their national and European organisations are a key resource in the European reindustrialisation process as they help speed up the conversion of research into innovative market applications.

1.2 The European Union (EU)'s economic development is increasingly linked to a process of reindustrialisation, seen as a strategy for shifting to new sustainable models for design, production and marketing of high value-added, innovative products incorporating new, high-quality technologies, materials and services in an increasingly digitalised world.

1.3 The EESC believes that the key role played by engineers and technical professions in this process of attempting to resolve the difficulties facing European society as a result of the challenges posed by reindustrialisation should be more strongly emphasised and highlighted, and calls for the launch of a participatory foresight exercise on the future of the profession.

1.4 The EESC recommends promoting a **European culture of entrepreneurship** and innovation and launching tangible initiatives to revive the professions of engineer and technician, which drive civilisation and prosperity.

1.5 The EESC supports the need for a **harmonious European framework** driving the profession forward, covering areas such as:

- mutual recognition of professional qualifications;
- mobility within the EU and entrepreneurship;
- European systems of formal and informal continuing training and lifelong learning with support programmes;

- better access to public procurement, especially for businesses working in cooperation, start-ups, networks of businesses (particularly SMEs) and professional associations of engineers;
- better access to finance and capital markets;
- campaigns to increase the appeal of courses and careers and of professional qualifications;
- support for cross-disciplinary approaches and digital networking;
- flexibility and promotion of gender equality;
- mutual regulation of professional liability across the single market;
- active policies encouraging SMEs to recruit engineers;
- promotion of the intellectual property culture.

1.6 The EESC believes that high levels of training and qualifications are a prerequisite in engineering for an effective mutual recognition system. High levels of education and training need to be maintained, with the introduction of an optional EU "29th regime" based on voluntary European Professional Card pilots[1] and with active support from national and European professional associations if we want to ensure that each country has confidence in mutual, knowledge-based professional mobility.

1.6.1 The way society is currently developing is creating a multitude of new jobs outside the technical area, which, thanks to the influence of the media and the desire for social popularity, are attractive to young people looking for a rapid and prestigious career. From this point of view the engineering profession is perceived as traditional, providing no possibilities for an easy and fast career. This means that engineering disciplines will not be attractive to future generations, which presents a serious threat to the success of European reindustrialisation and the competitiveness of European industry. It is a serious challenge to existing educational systems and suggests that primary education needs to be steered firmly towards mathematics, physics and engineering, presenting them as attractive so as to arouse the curiosity of younger generations. Likewise, the principle and best practices of dual education (Germany, Switzerland and Austria) deserve special attention from all the Member States which lack such a system.

1.7 The EESC believes that it is necessary to create a European single market for engineering and develop a common, multidimensional approach for increased mobility throughout the European Union, given the importance of mutual recognition, in particular for independent self-employed engineers.

1.8 The EESC recommends that the engineering sector be given a substantial role in European standardisation policy to speed up, simplify and modernise procedures and ensure the interoperability of systems and networks.

1 See the FEANI European Engineering Card.

1.9 The EESC recommends that organisations in which engineers work develop, on the basis of the European Qualifications Framework, electronic training models geared to the younger generations and governance and evaluation arrangements geared to new engineers and their characteristics, with appealing working environments and career paths.

1.10 According to the EESC, representative organisations and professional bodies need to find more common ground in order to act as a united driving force, both within and outside the EU, and provide their members with lifelong learning in accordance with common European parameters.

1.11 The EESC recommends that the Commission take practical steps towards the establishment of a European liberal profession forum[2], in which engineering associations and professional bodies should be widely represented, and calls for the creation of a European engineering portal where issues such as liability, intellectual property, taxation, pensions, ongoing training and codes of good practice can be addressed.

1.12 The EESC recommends that the Commission draw up a European code of good engineering practice on the basis of the experience of national organisations of engineers and technicians, providing these professionals with the legal and financial prerequisites for innovative projects, particularly SMEs and R&D operators.

1.13 The EESC believes that the profession needs to be increasingly focused on the management of complex issues relating to economic, social and environmental sustainability, making increasing use of advanced multidisciplinary approaches and proper interoperability between manufacturing systems and the new Industry 4.0 systems.

1.14 The EESC calls on the Commission and Member States to take due account of the European Council conclusions of 20-21 March 2014 urging them to address shortages in the area of science, technology, engineering and mathematics — the so-called STEM skills — as a matter of priority, with increased involvement of industry.

2. Introduction

2.1 European engineering is rooted in the pursuit of innovation, as epitomised in the genius of Leonardo da Vinci, a fact that reflects European society's openness to new ideas and a culture of valuing of civic engagement, good governance and hard work.

2.2 As underlined by the European Parliament (EP), "The crisis has hit European economies hard. (...) The EU needs a comprehensive growth strategy to overcome these challenges"[3].

2 OJ C 226, 16.7.2014, p. 10.

3 See EP Resolution of 15 January 2014.

2.3 The EU's reindustrialisation strategy focuses especially on investment in innovation, where engineers play a key role, particularly in fast growing sectors.

2.4 The convergence of digital technologies, communication systems and smart grids, nanobiotechnology, sustainable industrial technologies, 3D printers and cross-sectoral enabling clean technologies is radically changing how economies and societies operate, with speed that has become exponential as a result of globalisation.

2.5 The EU's future is linked to a process of reindustrialisation, which means, first and foremost, a strategy for shifting to new sustainable models of design, production and marketing for high value-added products incorporating new technologies, materials and services in an increasingly digitalised world.

2.6 The EESC firmly believes that without scientific and technical human resources, with the requisite assets in terms of experience and know-how, it will be difficult to achieve the objectives outlined in the Europe 2020 strategy. Here, too, the role of professional organisations and associations of engineers and technicians needs to be highlighted, at national and European level.

2.7 In Europe, the highest concentration of technical skills is in the engineering sector, which boasts some 130 000 companies employing more than 10 million highly qualified and skilled people, with an annual output worth approximately EUR 1 840 billion, equivalent to around one third of all EU exports. Engineers and technicians also play an important role in all other sectors of the economy[4].

2.8 Europe needs to develop a new, "smart" approach to its policies, ensuring a new role for professionals with a technical background. There is an increasing need to manage smart transformation processes in the regions, something that is explicitly required by the new European agenda.

2.9 If it is to achieve these objectives, the EU must improve the skills levels of its workforce. There will be an increase in demand in the public and private sectors for engineering expertise in particular. The public sector will require increased technical skills to meet challenges in a range of sectors (energy, transport, health, waste management, education, the carbon footprint, the internet of things and the circular economy) applying the new public procurement directives with forms of cooperation involving business networks, work in clusters and new software.

4 Source: Eurostat.

2.10 The private sector will also have to upgrade engineering skills if it wants to reap the benefits of more advanced skills in the workplace. Analysis of consumer behaviour reveals a constantly increasing demand for intelligent products and services.

2.11 Technical know-how and experience must be constantly updated to respond to the challenges posed by new industrial processes. New forms and methods of learning and training are needed to allow for optimal, flexible use of human and social capital in the sector. It will be necessary to organise new forms of work for professionals operating in the area of vocational, technical and scientific services in Europe.

2.12 Greater mobility in national, European and global labour markets will lead to better use of the workforce available within an attractive European engineering pool. With the possibility of opting for a voluntary EU "29th regime", the dissemination of an EU professional card could be encouraged, to make it easier for specialised engineers to build up professional experience in the different European countries.

2.13 To make potential engineering students more aware of the profession, greater cooperation is needed between industry and academia and between employers and state and private schools, at both primary, secondary and R&D levels. This would encourage companies to put corporate social responsibility into practice and promote appropriate training.

2.14 Involving entrepreneurs and taking on new and more complex issues will make it clear to young people that maths, information technology, physics and chemistry are necessary to solve the problems that society has to address and are the keys to new innovative solutions in medicine and healthcare, transport, pollution and energy savings.

2.15 Cooperation of this kind must be forged at local level, but experience and best practice should be shared at European level. This would make for new jobs and career opportunities for engineers, and could help to make these subjects more alive and relevant for future generations.

2.16 At the same time, taking into account parallel progress in all the various disciplines and the multi-disciplinary nature of practical applications, quality and effectiveness need to be guaranteed, introducing educational pathways that incorporate other subjects into secondary and university education, such as social psychology and human resources team management, stimulation of creative processes, nanotechnologies, biomedical engineering, technical history, economic geography, etc.

2.17 A process of accrediting educational curricula is one way in which these professions can guarantee compliance with standards. Quality assurance involves the establishment of reference and evaluation standards in line with the European and national qualifications frameworks.

2.18 External accreditation and internal quality assurance are two very important factors in maintaining high quality engineering training.

3. General comments

3.1 The driving role of engineers in EU reindustrialisation

The EESC considers the driving role of engineers and technicians in the practical implementation of the European reindustrialisation strategy to be essential, providing viable solutions for lean, clean and green processes, products and services in response to the challenges of sustainable, competitive development.

3.1.1 At the same time, the EESC points to the need for a European framework driving the profession covering the following areas:

- mutual recognition of qualifications and professions;
- mobility within and outside the single market and development of entrepreneurship;
- increasingly aligned European systems of formal and informal continuing training and lifelong learning with support programmes;
- uniform liability guarantees and accountability in the single market;
- campaigns to increase the appeal of courses and careers and professional qualifications, promoting a gender balance;
- support for cross-disciplinary approaches and network management of complex issues;
- flexibility and harnessing of the specific attributes of the new generations;
- "Gen C" (the connected generation);
- policies to increase the flexibility of management and communication, including across sectors and disciplines, ensuring interoperability between science, manufacturing and Industry 4.0;
- support for the role of engineers and technicians and their socio-occupational organisations in the use of R&I programmes and Structural Funds;
- measures promoting accountability and implementation of codes of ethics, particularly in public procurement with the system introduced by the new directives[5], with networks of businesses and cooperation in clusters, and specifications in the area of green procurement and for civil defence;
- an international cooperation framework, facilitating access to third-country markets;
- legislative changes to guarantee protection of intellectual property rights geared to the development of the information society.

5 OJ L 94, 28.3.2014, p. 65, p. 243, p. 1.

3.2 Mutual recognition of qualifications and professions, mobility and entrepreneurship

3.2.1 The EESC believes that high levels of engineering training and qualifications are a prerequisite for an effective mutual recognition system: lowering educational standards in order to preserve mobility might be likely to reduce mutual confidence in a knowledge-based EU that can address new engineering challenges.

3.2.2 In the EESC's view, there is a need to develop a common, multidimensional approach (with the European Professional Card)[6], subject to greater alignment of training paths, the adoption of a parallel optional regulatory framework for a voluntary EU professional card, and a common training framework and systems for the validation of formal and/or informal qualifications obtained.

3.2.3 The EESC recommends launching specific measures to revive the professions of engineer and technician, as they are the main drivers speeding up the conversion of research into market applications and solutions to society's problems. In particular, the EESC calls for specific reinforcement for engineers of the Erasmus for Young Entrepreneurs (EYE) initiative and micro-credit facilities, along with the introduction of an EU creative engineering prize, to give the profession a higher profile and to encourage the formulation of engineering concepts and projects of excellence.

3.3 Formal and informal continuing training and lifelong learning

3.3.1 Given the pace of technological progress, the EESC considers it important for Europe to support the development of training modules in partnership with industry, to impart high levels of specific skills and develop collaborative learning and learning by doing projects for better interpersonal communication and on-line digital technology modules, and communication networks for gathering and evaluating information.

3.3.2 With regulatory support from the EU, global standards need to be developed for validation of leadership and risk-taking abilities acquired through non-formal learning[7].

3.3.3 Harnessing the skills of the new generations: Gen C requires a new configuration of production, organisational, communication and leadership structures.

3.4 The image and future of engineers in EU reindustrialisation

3.4.1 The EESC believes that the key role played by engineers and the technical professions in addressing the difficulties facing European society as a result of the challenges of reindustrialisation should be more strongly emphasised and highlighted, and calls for a

6 OJ L 354, 28.12.2013, p. 132.

7 *European Institute for Industrial Leadership* (Position Paper P 20-2015).

participatory foresight exercise to be launched, involving development players, administrations, policymakers and stakeholders, to identify and highlight the profiles that will be required by the profession in future in terms of problem-solving ability and the speed with which new technologies are acquired and applied.

3.4.2 In this respect, engineers should be given a specific role in giving this reindustrialisation process economic, social and environmental sustainability, to bring about a gradual transition to a circular economy "including re-manufacturing and re-use"[8].

3.5 The role of engineers and technicians in the use of R&D programmes and the Structural Funds

3.5.1 The EESC believes that European engineers and technicians are a key resource in the reindustrialisation process as they help speed up the conversion of research into innovative market applications and resolve the complex difficulties involved in shifting to a sustainable, sound, competitive social market economy: this resource must be given access to support in the form of innovative solutions that reward quality as well as economy and encouragement of all kinds of joint cooperation in networks and clusters through EU policies and programmes, starting with:

- strategic measures in the area of the digital agenda;
- H2020, especially through Key Enabling Technologies;
- COSME and the EIF;
- the Structural Funds and the Cohesion Fund.

4. Final comments

4.1 The EU is facing major challenges that present European engineers with just as many difficulties:

- the prospect of an ageing population;
- pervasive, intrusive digitalisation;
- an increasing lack of resources in an increasingly critical environmental and climate context;
- geographical, political and financial globalisation with the centre of gravity shifting away from Europe;
- the convergence between technologies, in particular ICTs, nanobiotechnology and 3D systems;
- complex issues of integrated management, particularly of megacities;

8 OJ C 230, 14.7.2015, p. 91.

– the exponential growth in the internet of products and services and smart grids, with the development of Industry 4.0;
– the mushrooming of collective intelligence connected in real time (social brain) among Gen C.

4.2 The EESC believes that the new Gen C of engineers will have to obtain higher formal and informal qualifications and levels of skill, given that simpler problem-solving will be carried out by autonomous digital systems, and develop cross-disciplinary abilities and flexibility to manage complex issues.

4.3 The organisations in which the engineers operate will have to develop digitalised training modules and systems on the basis of the European Qualifications Framework, with governance arrangements geared to the new generation of engineers and their qualities, increasing buy-in to corporate values and goals and fostering attractive working environments and career paths.

4.4 The EESC believes that engineers' representative organisations and professional bodies should find more common ground at European level in order to be able to act as a greater driving force both within and outside the EU in the creation of a **single European engineering market**.

4.5 The EESC recommends that the Commission take practical steps towards the establishment of a **European liberal profession forum**, in which engineering associations and professional bodies[9] of independent engineers and engineering SMEs should be widely represented, and calls for the creation of a **European engineering portal** where key issues such as management of responsibility, protection of intellectual property and taxation and pensions systems can be addressed interactively.

Brussels, 9 December 2015

The President
of the
European Economic and Social Committee

Georges Dassis

9 OJ C 226, 16.7.2014, p. 10.